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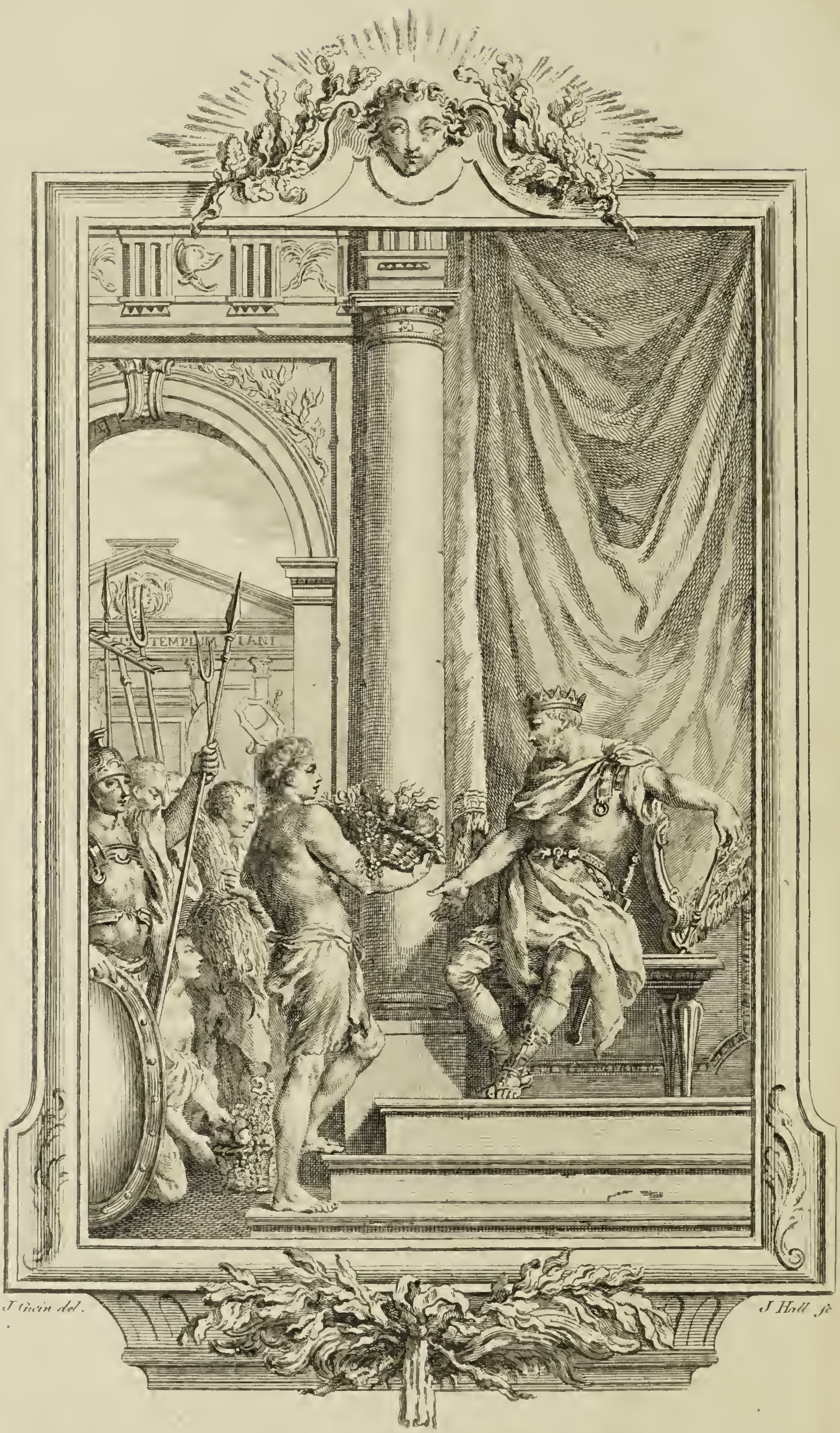

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Numa Pompilius calling the Roman Husbandmen before him, to encourage those whose Lands were well cultivated, & reproach others with the want of Industry.

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THE
COMPLETE FARMER:
OR, A
GENERAL DICTIONARY
OF
HUSBANDRY,
IN ALL ITS BRANCHES;

Containing the Various

Methods of Cultivating and Improving every Species of Land,

According to the PRECEPTS of both the

OLD AND NEW HUSBANDRY.

In which every Thing valuable from the beſt Writers on this Subject will be extracted, viz. LINNÆUS, CHATEAUVIEUX, the Marquis of TURBILLY, PLATT, EVELYN, WORLIDGE, MORTIMER, TULL, ELLIS, MILLER, HALE, LISLE, ROQUE, MILLS, &c.

TOGETHER WITH

A Great VARIETY of NEW DISCOVERIES and IMPROVEMENTS.

ALSO

The Whole Buſineſs of Breeding, Managing, and Fattening CATTLE of all Kinds; and the moſt approved Methods of curing the various Diſeaſes to which they are ſubject. Together with the Method of raiſing BEES, and of acquiring large Quantities of WAX and HONEY, without deſtroying thoſe laborious Inſects. Likewiſe the uſeful Parts of GARDENING; or thoſe neceſſary for the FARMER, and COUNTRY GENTLEMAN.

Illuſtrated with a great VARIETY of Folio COPPER-PLATES, finely engraved; exhibiting all the Inſtruments uſed in this neceſſary ART; particularly thoſe lately invented, and preſented to the SOCIETY for the Encouragement of ARTS, &c. in LONDON; many of which have never yet appeared in any Work of this NATURE.

By A SOCIETY of GENTLEMEN,

Members of the SOCIETY for the Encouragement of ARTS, MANUFACTURES, and COMMERCE.

LONDON: Printed for the AUTHORS;
And ſold by S. CROWDER, at the Looking-Glaſs; J. COOTE, at the King's Arms, in Paternoſter-Row; and F. BLYTHE, near the Royal Exchange.
MDCCLXVI.

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HUSBANDRY is, with great juſtice, placed at the head of human arts, as having a very great advantage over all others, both with regard to antiquity and uſefulneſs. It had its birth with the world, and has always been the genuine ſource of ſolid wealth, and real treaſures; for it will furniſh a people with every thing neceſſary to render life happy and deſirable, form the principal revenues of the ſtate, and even ſupply the defect of all others, when they happen to fail.

It is therefore no wonder that the wiſeſt princes, and the moſt able miniſters, among the ancients, made it their principal ſtudy to encourage and improve the Art of Huſbandry: they well knew that the ſtrength of a ſtate ſhould not be eſtimated by the extent of its territories, but by the number of its inhabitants, and the utility of their labours. And it ſhould be remembered, that ſome of the moſt noble conſuls and dictators among the ancient Romans were taken from the Plow, and that the ſenators of that flouriſhing people ſpent the greater part of their time in the country, where they tilled their fields with their own hands. "In thoſe happy times, ſays Pliny, the earth, pleaſed at ſeeing herſelf cultivated by the hands of triumphant victors, ſeemed to make ſtronger efforts, and to produce her fruits in greater abundance." Doubtleſs becauſe they applied themſelves to the taſk with greater attention, and took the wiſeſt precautions to render their labours ſucceſsful: for when men of genius and abilities apply themſelves to any art, they ſoon make very great improvements, and advance it to a much higher degree of perfection: while the common people, by ſervilely confining themſelves to the common mode of practice, never make any farther progreſs in their profeſſion.

But when deſtructive luxury was introduced among the old Romans, Huſbandry declined, and has never ſince reached the honourable ſtation it before poſſeſſed: owing, in a great meaſure, to an opinion founded on falſehood, namely, that the Practice of Huſbandry requires neither ſtudy, reflection, nor precepts; and is therefore beneath the notice of men of fortune and genius. The ancients, however, thought very differently: they were perſuaded, that, in order to cultivate Lands to advantage, it was neceſſary to ſtudy the works of thoſe who had written on this ſubject, and to add the experience of others to their own. This opinion is now once more happily eſtabliſhed; and the Study of Huſbandry purſued with ſuch aſſiduity in different of Europe, that an amazing number of the moſt important diſcoveries have been lately made in that uſeful and neceſſary branch of knowledge.

But theſe uſeful Diſcoveries and Improvements are ſcattered through a multitude of volumes, written in different languages, and publiſhed in different countries; ſo that they can only be known to thoſe who have abilities to purchaſe, and leiſure ſufficient to peruſe ſo great a variety of books.

The Authors of this Undertaking were therefore perſuaded, that the Public would very willingly encourage a work in which the Theory and Practice of every branch of Huſbandry were delivered in the plaineſt and moſt intelligent manner, and enriched with all the Diſcoveries hitherto made in any part of Europe. This laborious taſk they have accordingly undertaken, and will venture to promiſe the Reader, that he will find in this Dictionary all the valuable Precepts, Obſervations, Diſcoveries, and Improvements, contained in the writings of *Linnæus*, *Barck*, *Tarello*, *Duhamel*, *Chateauvieux*, *De Lille*, the Marquis of *Turbilly*, *Platt*, *Sharrack*, *Evelyn*, *Houghton*, *Worlidge*, *Stillingfleet*, *Mortimer*, *Tull*, *Ellis*, *Miller*, *Hale*, *Liſle*, *Mills*, and ſeveral other Authors; together with thoſe publiſhed by the Societies of *Berne*, *Lions*, *Tours*, *Paris*, *Rouen*, *Edinburgh*, *Dublin*, and *London*.

And they hope it will be remembered, that this is the Firſt Attempt to give a COMPLETE SYSTEM of every branch of Huſbandry, and to blend in One Work the various Diſcoveries made in different nations. They alſo hope that the pains they have taken to inſert every thing belonging to the ſame ſubject in one article, and to range the whole in alphabetical order, will be approved of by their Subſcribers, as it evidently tends to facilitate the Study of Huſbandry, by enabling the Reader to find, with the greateſt eaſe and expedition, whatever ſubject he may be deſirous of conſidering; which cannot fail of being very ſerviceable to the public, it being the general complaint, that in all the books of Huſbandry, though they contain very valuable materials ſcattered throughout, it requires much time and trouble to diſcover them.

The great number of large COPPER-PLATES, with which this Dictionary will be illuſtrated, muſt prove a very valuable addition, and render it far ſuperior to any treatiſe of this kind ever yet offered to the world; as it is impoſſible to convey an adequate idea of the various inſtruments, lately invented or improved for facilitating the practice of Huſbandry, without the aſſiſtance of large and accurate drawings. This has, however, rendered the work far more expenſive to the Proprietors; but being determined to make it as complete as poſſible, they have ſpared nothing in their power to ſucceed; and flatter themſelves with receiving proportionable encouragement from the Public.

THE

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ABELE-TREE, a ſpecies of poplar, growing naturally in all the temperate parts of Europe, and called by botaniſts *populus foliis lobatis dentatis ſubus tomentoſis.*

The leaves of the abele-tree are large, and divided into three, four, or five lobes, which are indented on their edges, of a very dark colour on their upper ſide, but very white and downy on their under, ſtanding upon foot-ſtalks about an inch long. The young branches have a purple bark, and are covered with a white down; but the bark of the ſtem and older branch is grey. In the beginning of April, the male flowers or catkins appear, which are cylindrical, ſcaly, and about three inches long: about a week after come out the female flowers, or catkins, which have no ſtamina like thoſe of the male. Soon after theſe come out, the male-catkins fall off, and in five or ſix weeks after, the female flowers will have ripe ſeeds incloſed in a hairy covering; then the catkins will drop, and the ſeeds will be wafted by the winds a great diſtance. This tree is often confounded with the white poplar; but they are in reality diſtinct ſpecies.

The abele-tree may be propagated either by layers or cuttings, which will readily take root, or by ſuckers, which they ſend up from their roots in great plenty. The beſt time for tranſplanting theſe ſuckers is in October, when their leaves begin to decay. Theſe may be placed in a nurſery for two or three years to get ſtrength, before they are planted out where they are deſigned to remain; but if they are propagated from cuttings, it is better to defer the work till February, at which time truncheons of two or three feet long ſhould be thruſt about a foot and a half into the ground. Theſe will readily take root, and if the ſoil, in which they are planted, be moiſt, will arrive to a conſiderable bulk in a few years.

A conſiderable advantage may be made by planting theſe trees upon boggy ſoils, where few other trees will thrive. Many ſuch places there are in England, which do not at preſent bring in much money to their owners; whereas, if they were planted with theſe trees, they would, in a very few years, be of more value than the ground, clear of all expences; but there are many perſons, who think nothing, except corn, worth cultivating in England; or, if they plant timber, it muſt be oak, aſh, or elm; and if their land be not proper for either of theſe, it is conſidered as of little value: whereas, if the nature of the ſoil was examined, and proper ſorts of plants adapted to it, there might be very great advantages made of ſeveral large tracts of land, which at this time lie neglected.

The wood of the abele-tree is very good for floors, where it will laſt many years, and for its exceeding whiteneſs is, by many perſons, preferred to oak; but, being of a ſoft nature, is very ſubject to take the impreſſions of nails, &c. which renders it leſs proper for this purpoſe. It is alſo very good for wainſcoting rooms, being leſs ſubject to ſwell or ſhrink than moſt other woods; but for turnery-ware there is no wood equal to this for its exceeding whiteneſs, ſo that trays, bowls, and many other utenſils are made of it; the bellows-makers alſo prefer it for their uſe, as do alſo the ſhoemakers for heels of ſhoes; it is likewiſe very good to make light carts, and the poles are very proper to ſupport hops, vines, &c. and the lopping will afford good fuel, which in many countries is much wanted. *Miller's Dict.*

The abele-tree is very proper for planting where you deſire a ſpeedy ſhelter and walks, it often making ſhoots of eighteen or twenty feet long in a year. *Mortimer's Huſbandry.*

ABLACTATION, a term formerly uſed for a particular method of grafting, called by modern gardeners, inarching, or grafting by approach. *See* GRAFTING *by approach.*

ABLAQUEATION, the removing the earth, and laying bare the roots of fruit trees in winter, that they may be the more readily expoſed to the influence of rains, ſnow, air, &c. an operation formerly thought neceſſary for their future welfare; but experience has ſhewn it to be a dangerous practice, eſpecially where the trees are much expoſed to the winds, particularly the ſouth-weſt, which are generally the moſt violent. The practice of ablaqueation is therefore with very good reaſon laid aſide in the preſent practice.

ABORTIVE CORN, a diſtemper of corn mentioned by Mr. Tillet, in a diſſertation which gained the prize at the academy of Bourdeaux.

This diſtemper, ſays that ingenious naturaliſt, ſhews itſelf long before harveſt, when the ſtalk is not above eighteen inches high; and may be known by a deformity of the ſtalk, the leaves, the ear, and even the grain.

The ſtem of abortive corn is generally ſhorter than that of other plants of the ſame age; it is crooked, knotted, and rickety; the leaves are commonly of a bluiſh green colour, curled up in various forms; ſometimes turned like wafer cakes, and often rolled in a ſpiral form. The ears have very little of their natural form; they are lean, withered, and ſhew very imperfect rudiments, either of the chaff or grain.

All theſe ſymptoms are however only to be found in plants that are in the height of the diſtemper. The ſtalks are often pretty ſtrait, the leaves but little curled, and the chaff tolerably well formed; but inſtead of encloſing a ſmall embryo, white and ſoft at the ſummit, it contains only a green kernel, terminating in a point, not unlike a young pea when forming in its pod.

Theſe abortive kernels have two or three points very viſible; they are then faſhioned as if two or three kernels were joined together at the baſe. When theſe kernels are ripe, or rather when they are dried up, they grow black, and ſo greatly reſemble the ſeeds of cockle, that huſbandmen, who are not acquainted with this diſtemper, often confound abortive wheat with the ſeeds of that weed.

This diſtemper M. Tillet ſuſpects to be occaſioned by inſects; for he perceived on the ſickly plants ſmall drops of a very limpid liquor, which he judged to be extravaſated ſap.

ACORNS, the fruit of the oak, and too well known to need any deſcription. *See* Oak.

Acorns are ſaid to have been the primitive food of mankind; but at preſent they are principally uſed in fattening hogs, for which they are very proper.

Some care is, however, neceſſary to be taken when hogs feed upon acorns, for otherwiſe they will be ſubject to a diſtemper, called the garget. To prevent which, the beſt way is to moiſten ſome peaſe or beans with water, and ſprinkle over it ſome antimony pounded and ſifted; if this be repeated every other day for a fortnight or three weeks, it will effectually preſerve them from the diſorder. Or if the acorns be collected and prepared in the following manner, they may be given to hogs without any danger.

Dig a hole in the ground in a warm place, large enough to contain ſeveral buſhels of acorns; in this let the acorns be put, and well moiſtened with water, in which a handful or two of common ſalt has been diſſolved: in a few days they will begin to heat and ſpire; obſerve them therefore attentively, and when they have made a ſhoot about three inches long, take them out of the hole, and ſpread them to dry on a barn floor, and in a day or two they will be fit to be given to the hogs. This matter muſt, however, be managed with care and caution; they muſt not have too many given at a time; at firſt twice a day is often enough to feed them for a day or two; afterwards three times a day. Nor ſhould they, while they eat this food, be confined to a ſtye, but ſuffered to run at large; for if their liberty be too much abridged, they will never thrive well, or grow fat on acorns.

It is no uncommon thing in Hertfordſhire, with the management above directed, and the aſſiſtance of a little waſh, and a few grains now and then, for a farmer to kill ſeveral hogs in a ſeaſon, which ſhall weigh from eight to ten ſcore, and ſometimes even more.

Theſe hogs make very good meat, but it is not ſo fine as when the hogs are taken up, and four or five buſhels of peaſe or barley meal given to each, to complete their fattening before they are killed. *Muſeum Ruſticum, vol.* I. *p.* 475.

ACRE, a ſuperficial meaſure of land, containing, according to the ſtatute, one hundred and ſixty ſquare poles or perches, of ſixteen feet and a half each.

But this meaſure does not prevail in all parts of England; for though one hundred and ſixty ſquare poles or perches are allowed to be an acre, yet the length of the pole varies in different counties, and is generally called cuſtomary meaſure.

Thus the cuſtomary perch in Staffordſhire is twenty-four feet. In the foreſt of Sherwood twenty-one. In Herefordſhire the perch of walling is ſixteen feet and a half; but a perch for digging twenty-one feet.

Old farmers alſo eſtimate the acre of land by the proportion of ſeed uſed in ſowing it; by which means it muſt vary in proportion to the fertility or barrenneſs of the ſoil; and hence in many counties of England they have two ſorts of acres, diſtinguiſhed by ſeed-acres and ſtatute-acres.

The French acre, or arpent, according to Mr. Greaves's calculation, conſiſts of 100 perches of twenty-two feet each, amounting to 48,400 ſquare French feet, which are equal to 51,691 ſquare Engliſh feet, or very near one acre, and three quarters of a rood, Engliſh meaſure.

The Iriſh acre is to the Engliſh, as 196 to 121. For the number of poles in each are the ſame; but the Iriſh pole is twenty-one feet, whereas the Engliſh contains only ſixteen feet and a half; and the Welch acre is equal to two Engliſh ſtatute acres.

ACREME, a quantity of land, conſiſting of ten acres.

ADDERS-TONGUE, a weed growing in low moiſt meadows, where it is commonly hid among the graſs.

From a very low ſtalk ariſes a ſingle, thick, ſmooth, oblong leaf, from the bottom of which iſſues a kind of tongue, ending in a point, and indented on each ſide like a file.

ADZE, a kind of crooked axe uſed by carpenters, ſhipwrights, coopers, &c.

AFTERMATH, the ſecond crop, or graſs which ſprings up after mowing, or the graſs cut after the corn.

In the neighbourhood of London, the aftermath when made into hay, is of conſiderable value: but in haying this crop, ſo as to make it ſell well, great nicety is requiſite; the nature of the aftermath-graſs being more ſoft, ſpongy, and porous, than the firſt growth, and therefore more liable to be hurt by rains. *See* Hay.

AGE *of a horſe.* This is eaſily known by his mouth till he comes eight, after which the uſual marks wear out. A horſe, like many other brute animals, has his teeth divided into three ranks, viz. his fore-teeth, which are flat and ſmooth, his tuſhes, and his back-teeth. His back teeth, or jaw-teeth, are called his grinders, being thoſe by which a horſe chews and grinds his provender, and are twenty-four in number, twelve above, and twelve below: they are ſtrong double teeth with ſharp edges; but when a horſe grows old, they wear much ſmoother.

The firſt that grows are his foal teeth, which begin to appear a few months after he is foaled: they are twelve in number, ſix above, and ſix below; and are eaſily diſtinguiſhed from the teeth that come afterwards, by their ſmallneſs and whiteneſs, not unlike the fore-teeth of a man.

When the colt is about two years and a half old, he caſts the four middlemoſt of his foal teeth, viz. two above, and two below; but ſome do not caſt any of their foal teeth till they are near three years old. The new teeth are eaſily diſtinguiſhed from the foal teeth, being much ſtronger, and always twice their ſize, and are called the nippers or gatherers, being thoſe by which a horſe nips off the graſs, when he is feeding abroad in the fields, or, in the houſe, gathers his hay from the rack. When a horſe has got theſe four teeth complete, he is reckoned three years old.

When he is about three and a half, or in the ſpring before he is four years old, he caſts out four more of his foal teeth, viz. two above, and two below, one on each ſide the nippers, or middle teeth: ſo that when you look into a horſe's mouth, and ſee the two middle teeth full grown, and none of the foal teeth, except the common teeth remaining, you may conclude he is four that year, about April or May. Some indeed are later colts, but that makes little alteration in the mouth.

The tuſhes appear near the ſame time with the four laſt mentioned teeth, ſometimes ſooner than theſe, and ſometimes not till after a horſe is full four years old: they are curved like the tuſhes of other beaſts, only in a young horſe they have a ſharp edge all round the top, and on both ſides, the inſide being ſomewhat grooved and flattiſh, inclined to a hollowneſs.

When a horſe's tuſhes do not appear for ſome time after the foal teeth are caſt out, and the new ones come in their room, it is generally owing to their foal teeth having been pulled out before their time, by the breeders or other dealers in horſes, to make a colt of three years old appear like one of four, that he may be the more ſaleable; for when any of the foal teeth have been pulled out, the others ſoon come in their place; but the tuſhes having none that go before them, can never make their appearance till their proper time, viz. when a horſe is about four, or coming four; and therefore one of the ſureſt marks to know a four year old horſe, is by his tuſhes, which are then very ſmall, and ſharp on the top and edges.

When a horſe comes five, or rather in the ſpring before he is five, the corner teeth begin to appear, and at firſt but juſt equal with the gums, being filled with fleſh in the middle. The tuſhes are alſo by this time grown to a more diſtinct ſize, though not very large: they likewiſe continue rough and ſharp on the top and edges. But the corner teeth are now moſt to be remarked; they differ from the middle teeth in being more fleſhy on the inſide, and the gums generally look rawiſh upon their firſt ſhooting out, whereas the others do not appear diſcoloured. The middle teeth arrive at their full growth in leſs than three weeks, but the corner teeth grow leiſurely, and are ſeldom much above the gums till a horſe is full five: they differ alſo from the other fore-teeth in this, that they ſomewhat reſemble a ſhell; and thence are called the ſhell teeth, becauſe they environ the fleſh in the middle half way round; and as they grow, the fleſh within diſappears, leaving a diſtinct hollowneſs and openneſs on the inſide. When a horſe is full five, theſe teeth are generally about the thickneſs of a crown piece above the gums. From five to five and a half they will grow about a quarter of an inch high, or more; and when a horſe is full ſix, they will be near half an inch, and in ſome large horſes a full half inch above the gums.

The corner teeth in the upper jaw fall out before thoſe in the under, ſo that the upper corner teeth are ſeen before thoſe below; on the contrary, the tuſhes in the under gums come out before thoſe in the upper.

When a horſe is full ſix years old, the hollowneſs on the inſide begins viſibly to fill up, and that which was at firſt fleſhy grows into a browniſh ſpot, not unlike the eye of a dried garden bean, and continues ſo till he is ſeven; with this difference only, that the tooth is more filled up, and the mark, or ſpot, becomes faint, and of a lighter colour. At eight the mark in moſt horſes is quite worn out, though ſome retain the veſtiges of it a long time; and thoſe who have not had a good deal of experience, may ſometimes be deceived by taking a horſe of nine or ten years old for one of eight. It is at this time only, when a horſe is paſt mark, that one can eaſily err in knowing the age of a horſe; for what practices are uſed to make a very young horſe or colt appear older than he is, by pulling out the foal teeth before their time, may be diſcovered by feeling along the edges where the tuſhes grow, for they may be felt in the gums before the corner teeth are put forth; whereas, if the corner teeth come in ſome months before the tuſhes riſe in the gums, we may reaſonably ſuſpect that the foal teeth have been pulled out at three years old.

It will, perhaps, be needleſs to mention the tricks that are uſed to make a falſe mark in a horſe's mouth, by hollowing the tooth with a graver, and burning a mark with a ſmall hot iron; becauſe thoſe who are acquainted with the true marks, will eaſily diſcover the cheat by the ſize and colour of the teeth, by the roundneſs and bluntneſs of the tuſhes, by the colour of the falſe mark, which is generally blacker, and more impreſſed than the true mark, and by many other viſible tokens, which denote the advanced age of a horſe.

After the horſe has paſſed his eighth year, and ſometimes at ſeven, nothing certain can be known by the mouth. It muſt, however, be remembered, that ſome horſes have but indifferent mouths when they are young, and ſoon loſe their mark; others have their mouths good for a long time, their teeth being white, even, and regular, till they are ſixteen years old and upwards, together with many other marks of freſhneſs and vigour; but when a horſe comes to be very old, it may be diſcovered by ſeveral indications, the conſtant attendants of age, viz. his gums wear away inſenſibly, leaving his teeth long and naked at their roots: the teeth alſo grow yellow, and ſometimes browniſh. The bars of the mouth, which in a young horſe are always fleſhy, and form ſo many diſtinct ridges, are, in an old horſe, lean, dry, and ſmooth, with little or no riſing. The eye-pits in a young horſe (except thoſe come of old ſtallions) are generally filled up with fleſh, look plump and ſmooth; whereas, in an old horſe, they are ſunk and hollow, and make him look ghaſtly, and with a melancholy aſpect. There are alſo other marks which diſcover a horſe to be very old, viz. grey horſes turn white, and many of them all over flea-bitten, except about their joints. This, however, happens ſometimes later, and ſometimes ſooner, according to the variety of colour and conſtitution. Black horſes are apt to grow grey over their eye-brows, and very often over a good part of their face, eſpecially thoſe who have a ſtar or blaze fringed round with grey when they are young. All horſes, when very old, ſink more or leſs in their backs, and ſome horſes, that are naturally long backed, grow ſo hollow with age, that it is ſcarce poſſible to fit them with a ſaddle. Of this kind are ſeveral Spaniſh and Barbary horſes, and many of the Daniſh and Flanders breed. Their joints alſo grow ſo ſtiff with old age, and their knees and hocks bend ſo, that they are apt to trip and ſtumble upon the leaſt deſcent, though the way be ſmooth, and no ways rugged. After which they can be of little uſe to the owner. *Gibſon on Horſes.*

AGE *of neat cattle*, viz. *the ox, cow, and bull.* The age of theſe animals is known by the teeth and horns. At the end of ten months they ſhed their firſt fore-teeth, which are replaced by others, larger, but not ſo white; and in three years all the inciſive teeth are renewed. Theſe teeth are at firſt equal, long, and pretty white; but as the creatures advance in years, they wear, become unequal, and black. They alſo ſhed their horns at the end of three years; and theſe alſo are replaced by other horns, which like the ſecond teeth continue. The manner of the growth of theſe horns is not uniform, nor the ſhooting of them equal. The firſt year, that is the fourth year of the creatures age, two ſmall pointed horns make their appearance, neatly formed, ſmooth, and towards the head terminated by a kind of button. The following year this button moves from the head, being impelled by a horny cylinder, which lengthening in the ſame manner, is alſo terminated by another button, and ſo on; for the horns continue growing as long as the creature lives. Theſe buttons become annular joints, which are eaſily diſtinguiſhed in the horn, and by which the age of the creature may be eaſily known; counting three years for the point of the horn, and one for each of the joints. *Buffon's Hiſtoire Naturelle, tom.* IV.

AGE *of ſheep.* Theſe animals in their ſecond year have two broad teeth; in their third year they have four broad teeth before; in their fourth year ſix broad teeth, and in their fifth year eight broad teeth. After which none can tell how old a ſheep is while their teeth remain, except by being worn down. *Ellis on Sheep.*

At the end of one year, rams, ſheep, and weathers, loſe the two fore-teeth of the lower jaw; and they are known to want the inciſive teeth in the upper jaw. At eighteen months the two teeth joining to the former, alſo fall out; and at three years, being all replaced, they are even and pretty white. But as the creature advances in age, they become looſe, blunt, and afterwards black. The age of the ram, and all horned ſheep, may alſo be known by their horns, which ſhew themſelves in their very firſt year, and often at the birth, and continue to grow a ring annually to the laſt period of the creature's life. *Buffon's Hiſtoire Naturelle, tom.* V.

AGE *of goats*. The age of goats is known by the ſame tokens as thoſe of the ſheep, viz. by their teeth, and the annular rings on their horns.

AGRICULTURE, the art of tilling, manuring, and cultivating the earth, in order to render it fertile.

This art claims the precedency of all others in point of antiquity, it having been the ſole employment of our firſt parents in the delightful garden of Eden.

Adam inſtructed his children in this neceſſary art, both by precepts and example; and we are told by the ſacred hiſtorian, that Cain applied himſelf to huſbandry, while Abel led the life of a ſhepherd, and contented himſelf with feeding his flocks.

After the deluge the deſcendants of Noah carried with them the art of huſbandry, and eſtabliſhed it in the various countries where they ſettled. It was, however, very ſimple in theſe early ages, and its advances towards perfection ſlow and almoſt imperceptible.

Abraham, and the reſt of the patriarchs, who had no fixed reſidence, applied themſelves to a paſtoral life, ennobling, by their example, a profeſſion, which has now for many ages loſt its original dignity, from its being practiſed only by the meaner ſort of people. But as ſoon as their deſcendants were fixed in Paleſtine, they all became huſbandmen, from the chief of the tribe of Judah, to the loweſt branch of the family of Benjamin: birth at that time made no diſtinction, and agriculture was conſidered as a very honourable employment.

The Chaldeans, who inhabited the countries where agriculture had its birth, carried that valuable art to a conſiderable degree of perfection: they cultivated their lands with great aſſiduity, and enjoyed the pleaſing ſatisfaction of receiving from their fields a very plentiful harveſt. The Egyptians, who from the fertility of their country, cauſed by the annual overflowings of the Nile, raiſed prodigious quantities of corn, were ſo ſenſible of the bleſſings reſulting from agriculture, that they aſcribed the invention of it to Oſiris; and even carried their ſuperſtitious gratitude ſo far, as to worſhip thoſe animals that laboured in tilling the ground.

The Phœnicians, ſo well known in the ſacred writings by the name of Philiſtines, were alſo famous for their ſkill in agriculture; but finding themſelves too much confined in their native country by the conqueſts of the Iſraelites, they ſpread themſelves through the greater part of the iſlands of the Mediterranean, and carried with them their knowledge in huſbandry.

The Carthaginians followed the taſte of their anceſtors, and applied themſelves aſſiduouſly to the ſtudy of agriculture. Mago, their famous general, wrote no leſs than twenty-eight books on that ſubject, and which Columella tells us, were tranſlated into Latin by an expreſs decree of the Roman ſenate. Servius adds, that Virgil uſed theſe books as a model when he wrote his Georgics.

The ancients tell us, that the goddeſs Ceres was born in Sicily, where ſhe invented the art of ſowing corn, and the tillage of land. The meaning of this fable is very evident; that iſland was very fruitful in corn, and agriculture was there eſteemed ſo honourable an employment, that even their kings did not diſdain to practiſe it with their own hands.

But time, which at firſt gave birth to arts, often cauſed them alſo to be forgotten, when they were removed from the place of their origin. The children of Noah, who ſettled in Europe, doubtleſs carried with them the knowledge of agriculture; but their deſcendants, who took poſſeſſion of Greece, were ſuch a ſavage race, that they fed on herbs, after the manner of beaſts. Pelaſgus taught them the culture of the oak, and the uſe of acorns as food, for which divine honours were paid him.

The Athenians, who were the firſt that received any tincture of politeneſs, taught the uſe of corn to the reſt of the Greeks; they alſo taught them the manner of cultivating the ground, and preparing it for the ſeed. The Greeks ſoon perceived that bread was more wholeſome, and its taſte more delicate than acorns; and accordingly thanked the gods for ſuch an unexpected and beneficial preſent. After this the Athenian kings thinking it more glorious to govern a ſmall ſtate wiſely, than to aggrandize themſelves by foreign conqueſts, withdrew their ſubjects from war, and employed them ſolely in cultivating the earth. This conſtant application carried agriculture to a conſiderable degree of perfection, and ſoon reduced it into an art.

Heſiod, who is generally thought to have been cotemporary with Homer, was the firſt among the Greeks who wrote on this ſubject. He calls his poem, "Works and Days;" becauſe agriculture requires exact obſervations of times and ſeaſons.

The other eminent Greek writers upon agriculture, are Democritus of Abdera, Socraticus, Xenophon, Tarentinus, Architas, Ariſtotle, and Theophraſtus, from whom the art received conſiderable improvements; as alſo from Hieron, Epicharmus, Philometor, and Attalus.

The old Romans eſteemed agriculture ſo honourable an employment, that in the earlieſt times of the republic, the higheſt praiſe that could be given a man, was to ſay of him, that he cultivated well his own ſpot of ground. The moſt illuſtrious ſenators applied themſelves to this profeſſion; nor had they either ſplendor or majeſty, but when they appeared in public. And their greateſt generals at their return from the toils of war, from taking of cities, and ſubduing of nations, were impatient till they were again employed in cultivating their lands, and thought it no diſgrace to follow the plough, though they were at the ſame time prepared to ſerve the wants of the republic, attend her councils, or put themſelves at the head of her armies.

It muſt indeed be allowed, that when the Romans became tainted with the luxury of Aſia, they gradually loſt the noble ſimplicity of their anceſtors, and employed their ſlaves in the ſeverer labours of a country life. But though they did not themſelves hold the plough, yet even men of conſular dignity looked upon it as a reward for their public ſervices, when they obtained leave to retire into the country, and were equally reſpected when overlooking their farms, as when ſeated in the chair of magiſtracy. M. Cato, the cenſor, that illuſtrious Roman general, orator, politician, and lawyer, after having governed provinces, and ſubdued nations, did not think it below his ſtation to write a large treatiſe on agriculture.

This work, according to Servius, was dedicated to his own ſon, and was the firſt Latin treatiſe on that ſubject. This work has been handed down to us in all its purity, in the ſame manner as Cato wrote it. Varro compoſed a treatiſe on the ſame ſubject, and on a more regular plan. This work is embelliſhed with all the Greek and Latin erudition of that learned author. Agriculture alſo received great improvements from the two Saſernaes, and likewiſe from Scorfa, Tremellius, and M. Terentius. Virgil has adorned it with the language of the muſes, and given it majeſty by his verſe. He has finely embelliſhed the precepts of huſbandry left by Heſiod and Mago.

Columella, who flouriſhed in the reign of the emperor Claudius, wrote twelve books on huſbandry. He was a native of Bœtica in Spain, and had devoted his time to the ſtudy of huſbandry.

From this time till the reign of Conſtantine IV. huſbandry continued in a declining ſtate, when that wiſe emperor cauſed a large collection of the moſt uſeful precepts relating to agriculture to be extracted from the beſt writers, and publiſhed under the title of Geoponics. Some ſay he made this collection with his own hand. Nor is this at all improbable, as it is well known, that after he had conquered the Saracens and Arabians, he not only practiſed, but ſtudied the arts of peace, fixing his chief attention on the advancement of huſbandry.

But from the time of Conſtantine IV. till about the year 1478, agriculture lay in a kind of dormant ſtate, when Creſcenzio publiſhed an excellent performance on agriculture at Florence. He was ſoon followed by ſeveral of his countrymen, among whom Tatti, Stefano, Aguſtino Gallo, Sanſovino, Lauro, and Tarello, deſerve particular honour.

In the mean time Fitz-Herbert, judge of the Common Pleas, ſhone with unrivalled luſtre in the practical parts of huſbandry. He publiſhed two treatiſes on this ſubject; the firſt, which was entitled, The Book of Huſbandry, appeared 1534, and the ſecond, called, The Book of Surveying and Improvements, in 1539.

Fitz-Herbert's books of agriculture ſoon raiſed a ſpirit of emulation in his countrymen, and many treatiſes of the ſame kind ſucceſſively appeared; but time has deprived us of many of thoſe writings, or at leaſt they are become ſo very ſcarce, as only to be found in the libraries of the curious.

About the year 1600, France made ſome conſiderable efforts to revive huſbandry, as appears from ſeveral large works, particularly *Les Moyens de devenir Riche*, and the *Coſmopolite*, by Barnard de Paliſſy, a poor potter; *Le Theatre d'Agriculture*, by de Serres; *L'Agriculture, & Maiſon Ruſtique*, by Meſſrs. Etienne and Liebault, &c.

The Flemings, about the ſame period, dealt more in the practice of huſbandry, than in publiſhing books on the ſubject; ſo that their intention doubtleſs was to carry on a private lucrative trade, without inſtructing their neighbours: and hence it happened, that whoever was deſirous of copying their method of agriculture, was obliged to travel into their country, and make his own remarks. Their principal, and indeed juſt, idea of huſbandry conſiſted in this, namely, to make a farm reſemble a garden as near as poſſible. Such an excellent principle at firſt ſetting out led them of courſe to undertake the culture of ſmall eſtates only, which they kept free from weeds, continually turning the ground, and manuring it plentifully and judiciouſly.

When they had by this method brought the ſoil to a proper degree of cleanlineſs, health, and ſweetneſs, they ventured chiefly upon the culture of the more delicate graſſes, as the ſureſt means of acquiring wealth in huſbandry upon a ſmall eſtate, without the expence of keeping many draught horſes or ſervants.

A few years experience was abundantly ſufficient to convince them, that ten acres of the beſt vegetables for feeding cattle, properly cultivated, would maintain a larger ſtock of grazing animals, than forty acres of common farm graſs. They alſo found that the beſt vegetables for this purpoſe, were lucerne, ſaintfoin, trefoil of moſt denominations, ſweet fenugreek, buck and cow-wheat, field turnips, and ſpurrey.

The political ſecret of their huſbandry therefore conſiſted in letting farms on improvement. They alſo diſcovered eight or ten new ſorts of manure. They were the firſt among the moderns who ploughed in living crops for the ſake of fertiliſing the earth, and confined their ſheep, at night, in large ſheds built on purpoſe, whoſe floors were covered with ſand or virgin earth, &c. which the ſhepherd carted away every morning to the compoſt dunghill.

Our fatal domeſtic wars, during the reign of Charles I. changed the inſtruments of huſbandry into martial weapons; but after the death of that unfortunate monarch, artful and avaricious men crept into the confiſcated eſtates of the nobility, gentry, and clergy; and as many of theſe new encroachers had riſen from the plough, ſo they returned with pleaſure to their old profeſſion, being chiefly animated by the love of gain. Plattes, Hartlib, Blythe, and others, ſeized this favourable diſpoſition of the common people, and encouraged it by writings which have ſince had few equals; nor was Cromwell wanting to lend his aſſiſtance.

Sir Hugh Platt was one of the moſt ingenious huſbandmen of the age in which he lived; yet ſo great was his modeſty, that all his works, except his Paradiſe of Flora, ſeem to be poſthumous. He held a correſpondence with all the lovers of agriculture and gardening in England; and ſuch was the juſtice and modeſty of his temper, that he always named the author of every diſcovery communicated to him. Perhaps no man, in any age, diſcovered, or, at leaſt, brought into uſe ſo many new ſorts of manure. Witneſs his account of the compoſt and covered dunghill, and his obſervations on the fertiliſing qualities lodged in ſalt, ſtreet-dirt, and the ſullage of ſtreets in great cities, clay, fuller's earth, mooriſh earth, dunghills made in layers, fern, hair, calcination of all vegetables, malt-duſt, willow-tree earth, ſoap-boilers aſhes, marle, and broken pilchards.

Gabriel Plattes may be eſteemed an original genius in huſbandry. He began his obſervations in the time of queen Elizabeth, and continued them through the reigns of James I. Charles I. and during the firſt three or four years of the common-wealth. But notwithſtanding the great merit of this writer, the public ſuffered him to ſtarve and periſh in the ſtreets of London; nor had he a ſhirt upon his back when he died.

Samuel Hartlib, a celebrated writer on huſbandry in the laſt century, was highly beloved and eſteemed by Milton and other great men of that time. In his preface to a work commonly called his Legacy, he laments that no public director of huſbandry was eſtabliſhed in England by authority; and that we had not adopted the Flemiſh method of letting farms upon improvement. This remark of Hartlib procured him a penſion of one hundred pounds a year from Cromwell; and the writer afterwards, the better to fulfil the intention of his benefactor, procured Dr. Beati's excellent annotations on the Legacy, with other valuable pieces from his numerous correſpondents.

About the time when this author flouriſhed ſeems to have been an æra when the Engliſh huſbandry roſe to great perfection; for the preceding wars had made the country gentry poor, and, in conſequence thereof, induſtrious. They found the cultivation of their own lands to be the moſt profitable poſt they could occupy. But a few years after, when the reſtoration took place, all this induſtry and knowledge were exchanged for diſſipation and heedleſſneſs; and then huſbandry paſſed almoſt entirely into the hands of farmers.

The famous work attributed to Hartlib, and called the Legacy, was only drawn up at Hartlib's requeſt; and, after paſſing through his correction and reviſal, was publiſhed by him. The real author of this treatiſe was R. Child. It conſiſts of one general anſwer to the following queſtion, namely, "What are the actual defects and omiſſions, as alſo the poſſible improvements in Engliſh huſbandry?"

Several other pieces on huſbandry followed the publication of the Legacy, and greatly improved that neceſſary and uſeful art.

The firſt writer that inſpired his countrymen with a deſire of reviving the ſtudy of agriculture after the reſtoration was Evelyn; who, being followed by the famous Tull, opened a new ſphere for the minds of mankind to range in; and ſince this period ſeveral valuable improvements have been made in the Engliſh huſbandry, by a great variety of authors.

Ireland, about the middle of the laſt century, began to make no inconſiderable figure in the art of huſbandry. It muſt, indeed, be confeſſed that Ireland had very ſtrong prejudices in behalf of a very wretched method of agriculture, till about the middle of the laſt century, when Blythe opened the eyes of that people by his incomparable writings. Since which a certain ſpirit of improvement has, more or leſs, been promoted and carried on with great zeal and conſtancy by the nobility, clergy, and gentry of that kingdom. In proof of which it will be ſufficient to obſerve, that the tranſactions of the Dublin ſociety for encouraging huſbandry, are now cited by all foreigners in their memoirs relating to that ſubject.

After the peace of Aix-la-Chapelle, almoſt all the nations of Europe, by a ſort of tacit conſent, applied themſelves to the ſtudy of agriculture; and continued to do ſo, more or leſs, amidſt the univerſal confuſion that ſoon ſucceeded. The French found by repeated experience, that they could never maintain a long war, or procure a tolerable peace, without they raiſed corn enough to ſupport themſelves in ſuch a manner as they ſhould not be obliged to ſubmit to harſh terms on the one hand, or periſh by famine on the other. Their king therefore thought proper to give public encouragement to agriculture, and has ever been preſent at the making of ſeveral experiments. The great and rich of various ranks and ſtations followed this example, and the very ladies put in for their ſhare of fame in this commendable undertaking. Even during the hurry and diſtreſſes of the laſt war, ſome attention was paid to agriculture. Prize queſtions were then propoſed annually in rural academies; particularly at the two academies of Lyons and Bourdeaux. And many alterations were made by the ſociety for improving agriculture in Britany.

Since the concluſion of the peace matters have been carried on with great vigour. The univerſity of Amiens has made various propoſals to the public for the advancement of huſbandry; while the marquis de Tourbilly, a writer who proceeds chiefly on experience, has the principal direction of a georgical ſociety lately eſtabliſhed at Tours.

The ſociety of Rouen alſo deſerves our notice: nor have the king and his miniſters thought it unworthy their notice. The archbiſhop of the dioceſe is one of the members.

We ſhall only add on this ſubject, that there are at preſent thirteen ſocieties exiſting in France, eſtabliſhed by royal approbation, for the promoting of agriculture; and theſe thirteen ſocieties have nineteen co-operating ſocieties belonging to them, whenever it happened that a diſtrict was too large to be effectually taken care of by one ſociety.

The art of agriculture is, at preſent, publickly taught both in the Swediſh, Daniſh, and German univerſities, where the profeſſors may render effectual ſervice to their reſpective countries, if they underſtand the practical as well as the ſpeculative parts, and can converſe to as much advantage with the farmer and peaſant, as with Virgil and Columella.

Nor has Italy been inactive. The Neapolitans of the preſent age have condeſcended to return back to the firſt rudiments of revived huſbandry, and begun to ſtudy afreſh the agriculture of Creſcenzio, firſt publiſhed in the year 1478. The people of Bergamo have purſued the ſame track, and given the world a new edition of the *Ricordo d'Agricultura di Tarello*, which was originally publiſhed at Mantua in 1577.

The duchy of Tuſcany has embibed the ſame ſpirit. A private gentlemen has lately left his whole fortune to endow an academy of agriculture. The firſt eccleſiaſtic in that duchy is preſident of the ſociety, and many of the chief noblity are members. Even Ferrara, a ſmall territory in the papal dominions, has contributed its juſt contingent, and made ſome laudable attempts in huſbandry.

Animated with a deſire that the people under his government ſhould excel in huſbandry, his Sardinian majeſty has ſent ſubjects to learn the practice of foreign countries, and made ſeveral attempts to eſtabliſh a better method of agriculture among his ſubjects.

In Poland, where a natural fertility of ſoil ſeems to diſpenſe with the neceſſity of calling in improvements, Mr de Bieleuſki, grand-marſhal of the crown, has made abundance of ſucceſsful attempts to introduce the new huſbandry among his countrymen, and procured the beſt inſtruments for that purpoſe from France and other parts of Europe.

The Hollanders give little attention to agriculture, if we except one ſingle collateral inſtance, namely, the draining of fens and moraſſes; and even that has proceeded more from the motive of ſelf-preſervation, than any particular turn towards huſbandry.

In the year 1759, a ſociety eſtabliſhed itſelf at Berne in Switzerland, for the advancement of agriculture, and rural œconomics. That ſociety conſiſts of many ingenious private perſons, and alſo of ſome of great weight and influence in the republic; moſt of them men of a true caſt for the improvement of huſbandry, being enabled to join the practice with the theory. They have already publiſhed ſeveral uſeful pieces, which we ſhall be careful to inſert under their proper heads.

We muſt not omit to mention here, that Linnæus and his diſciples have performed great things in the north of Europe, particularly in diſcovering new, profitable, and well taſted food for cattle. At the ſame time Sweden has augmented a commerce that had been long cramped within narrow bounds, and beſtowed ſucceſsful labours on a ſoil, which was before looked upon as cold, barren, and incapable of melioration; of this the late memoirs publiſhed at Stockholm will be a laſting monument.

Denmark, as well as many courts in Germany, follow the like example. His Daniſh majeſty encourages, in particular, the woollen manufacture; and the late king ſent three perſons into Arabia Felix, to make remarks, and bring over ſuch plants and trees as may be uſeful in huſbandry, building, &c.

At the ſame time the duchy of Wirtemberg, a country no ways unfavourable to corn and paſturage, has not failed to contribute its aſſiſtances towards the improvement of agriculture, having ſome time ago communicated to the public its œconomical relations from the preſs at Stutgard.

Nor have the learned of Leipſic and Hanover been inattentive to this great art of ſupporting human kind, and that amidſt all the rage and devaſtations of war; witneſs the *Journal d'Agriculture*, printed at Leipſic, and the *Recueils d'Hanovre*, printed at that city.

Even Spain, naturally inactive on theſe occaſions, in ſpite of all the prejudices of a bigotted religion, has invited Linnæus, with the offers of a large penſion, to ſuperintend a college founded for the ſake of making new inquiries into the hiſtory of nature, and the art of agriculture.

But England alone exceeds all modern nations in huſbandry; and there is reaſon to hope, from the ſpirit that now animates a great number of the nobility and gentry, that this uſeful art will, in a few years, be carried to a much greater degree of perfection than it ever yet reached in any age or country. The reſpectable patriots that form the ſociety eſtabliſhed at London, for the encouragement of arts, ſeem determined to contribute all that lies in their power towards the advancement of agriculture. They have already done much, and there is reaſon to hope they will do more. A vaſt variety of different machines for facilitating the practice of agriculture have been ſent them in conſequence of their large premiums and bounties. Such munificence and attention to public proſperity may be truly called royal, as it would caſt a luſtre on the greateſt monarch that ever ſwayed a ſceptre. We ſhall conclude this hiſtory, with obſerving, that the reader will find under the proper articles a more minute account of the various improvements that have been lately made in the different parts of Europe.

AGRIMONY, a troubleſome pyrennial plant in paſture grounds. It has generally a ſingle, round, rough ſtalk, with leaves placed alternately upon it, which are winged with ſmaller leaves placed between the larger pairs. The yellow flowers grow alternately along the ſtalk, in a long row, after the manner of a ſpike, and are ſucceeded by rough ſeeds.

AIR, that thin dilatable, and compreſſible body in which we breathe, and which ſurrounds the earth to a great height.

The air, beſides its various other uſes, is a principal cauſe of the vegetation of plants, an inſtance of which we have from Mr. Ray, in the Philoſophical Tranſactions, of lettuce-ſeed, that was ſown in the glaſs receiver of the air-pump, which was exhauſted and cleared from all air, which grew not at all in eight days time; whereas ſome of the ſame ſeed that was ſown at the ſame time in the open air, was riſen to the height of an inch and an half in that time; but the air being let into the exhauſted receiver, the ſeed grew up to the height of two or three inches in the ſpace of one week.

Another inſtance of the uſefulneſs of the air in vegetation, is the ſedum, which will puſh out roots without earth and water, and live for ſeveral months: and ſome ſorts of aloes, if hung up in a room entirely ſecured from froſts, will remain freſh for ſome years, though they will ſenſibly loſe in their weight. Air is capable of penetrating the porous and ſpongy parts of plants, and being there contracted, of dilating itſelf again.

The air operates alſo within the bowels of the earth, and, by its ſubtilty perſpiring through the pores, aſſiſts in the rarefaction of the crudities of the earth, and in the diſpelling all ſuperfluous moiſture, entering into the very pores and veins of the trees, plants, herbs, &c. carrying along with it thoſe ſalts contained either in itſelf, or lodged in the earth: which ſalts or juices are altered according to the ſeveral figures or dimenſions of the different ſtrainers or veſſels of thoſe ſeveral plants which grow upon the ſame ſpot of earth, which is ſo impregnated with theſe ſalts: and thence thoſe varieties in taſte and ſmell proceed, notwithſtanding they all receive their nouriſhment from the ſame ſtock that is lodged in the earth.

The air alſo affects the branches, leaves, and flowers of trees, plants, and herbs, entering and perſpiring through them, and even through the bark and body of trees: and by the ſame kind of ſubtilty it does, by its refreſhing breezes, moderate the intenſeneſs of the ſunbeams, cooling, chearing, blowing, opening, and extending all the offspring of nature. The air fixes and inſinuates its æreal ſubſtance into the liquid ſap of vegetables: and, as all the agitations in nature proceed from the contrariety of parts inhabiting together, in this æreal and liquid ſubſtances, being mixed, cauſed the agitation and motion in vegetables, or, more properly, ſet it all into a ferment, whether it be in the roots, or in the ſtem; and it riſes by co-operation of the ſun, which is the third agent in vegetation, up to the top of a tree, &c. as liquids riſe by fire to the top of the containing veſſel.

The air, we find, produces a vibratory motion in ſeveral bodies; and, particularly in plants, the air-veſſels thereof perform the office of lungs: for the air contained in them, ſometimes contracting, and ſometimes expanding, according as the heat is increaſed or diminiſhed, preſſes the veſſels, and eaſes them again by turns; and thus promotes a circulation of their juices, which could ſcarce be otherwiſe effected.

Air, ſays the learned Dr. Hales, is a fine elaſtic fluid, with particles of very different natures floating in it, whereby it is admirably fitted by the great author of nature, to be the breath or life of vegetables, as well as animals, without which they can no more live nor thrive than animals can. As a proof of the great quantities of air in vegetables, he refers to the third chapter of his excellent Treatiſe of Vegetable Statics, where, he ſays, in the experiments on vines, the great quantities of air was viſible, which was continually aſcending through the ſap in the tubes; which manifeſtly ſhews what plenty of it is taken in by vegetables, and is perſpired off with the ſap through the leaves.

He adds ſeveral experiments, as to an apple-branch, apricot-branch, birch, and other plants, to prove the ſame thing.

And Dr. Grew has obſerved, that the pores are ſo large in the trunks of ſome plants, as in the better ſort of thick walking-canes, that they are viſible to a good eye without a glaſs; but, with a glaſs, the cane ſeems as if ſtuck at top full of holes with great pins, ſo large as very well to reſemble the pores of the ſkin in the ends of the fingers, and ball of the hand.

In the leaves of pines, they likewiſe, through a glaſs, make a very elegant ſhew, ſtanding almoſt exactly in rank and file through the length of the leaves. Whence it may be thought probable, that the air freely enters plants, not only with the principal fund of nouriſhment by the roots, but alſo through the ſurface of their trunks and leaves, eſpecially at night, when they are changed from a perſpiring to a ſtrongly imbibing ſtate.

Dr. Hales likewiſe tells us, that, in all thoſe experiments that he tried to this purpoſe, he found that the air entered very ſlowly at the bark of young ſhoots and branches, but much more freely through old bark; and that in different kinds of trees it had different degrees of more or leſs free entrance.

And likewiſe, that there is ſome air both in an elaſtic and unelaſtic ſtate, mixed with the earth (which may well enter the roots with the nouriſhment) he found by ſeveral experiments, which he gives in the above-mentioned treatiſe.

The excellent Mr. Boyle, in making many experiments on the air, among other diſcoveries, found, that a good quantity of air was produceable from vegetables, by putting grapes, plums, gooſeberries, peas, and ſeveral other ſorts of fruits and grain, into exhauſted and unexhauſted receivers, where they continued for ſeveral days emitting great quantities of air.

This put the curious Dr. Hales upon further reſearches to find out what proportion of air he could obtain out of the vegetables in which it was lodged and incorporated; and, from a vaſt variety of curious and accurate experiments, concludes, that air abounds in vegetable ſubſtances, and bears a conſiderable part in them: and, that if all parts of matter were only endowed with a ſtrongly attracting power, all nature would then become one unactive cohering lump.

Wherefore it was abſolutely neceſſary, in order to the actuating this vaſt maſs of attracting matter, that there ſhould be every where mixed with it a due proportion of ſtrongly repelling elaſtic particles, which might enliven the whole maſs, by the inceſſant action between them and the attracting particles.

And ſince theſe elaſtic particles are continually in great abundance reduced by the power of the ſtrong attracters, from an elaſtic to a fixed ſtate, it was therefore neceſſary, that theſe particles ſhould be endued with a property of reſuming their elaſtic ſtate, whenever they were diſengaged from that maſs in which they were fixed, that thereby this beautiful frame of things might be maintained in a continual round of the production and diſſolution of vegetable, as well as animal bodies.

The air is very inſtrumental in the production and growth of vegetables, both by invigorating their ſeveral juices, while in an elaſtic active ſtate, and alſo by greatly contributing, in a fixed ſtate, to the union and firm connection of the ſeveral conſtituent parts of thoſe bodies, viz. their water, fire, ſalt, and earth.

To conclude, by reaſon of thoſe properties of the air before-mentioned, it is very ſerviceable to vegetables, in that it collects up and breaks open the clouds, thoſe treaſures of rain, which nouriſhes the vegetable tribe.

The air alſo helps to waft or diſperſe thoſe foggy humid vapours which ariſe from the ſoil, and would otherwiſe ſtagnate, and poiſon the whole face of the earth.

The air, by the aſſiſtance of the ſun, aſſumes and ſublimates thoſe vapours into the upper regions; and theſe foggy humid vapours are, by this ſublimation, and the coercive power of the air and ſun, rarefied, and made again uſeful in vegetation.

On the contrary, the air, which in ſo many ways is ſubſervient to vegetables, is alſo, upon ſome accounts, injurious and pernicious to them; not only to the ligneous, herbaceous, and flowery parts above, but alſo to the roots and fibres below the earth: for as the air penetrates deep into the ſoil, it is natural to conclude, that a dry, huſky, ſcorching air, may be very prejudicial to the tender fibres of new planted vegetables.

ALDER-TREE, the name of a tree very common in moſt parts of England. It hath male and female flowers, which are produced at remote diſtances on the ſame plant; the male flowers are digeſted into a long juli or catkin, which is looſe, imbricated, and cylindrical. The female flowers are collected into a conical ſcaly head, and are ſucceeded by ſcaly cones.

Theſe trees delight in a moiſt ſoil, where few other trees will thrive, and are a great improvement to ſuch lands; they are propagated either by layers, or planting of truncheons about three feet in length. The beſt time for this is in February, or the beginning of March; theſe ſhould be ſharpened at one end, and the ground looſened with an inſtrument before they are thruſt into it; leſt, by the ſtiffneſs of the ſoil, the bark ſhould be torn off, which may occaſion their miſcarriage. Theſe truncheons ſhould be thruſt into the earth two feet at leaſt, to prevent their being blown out of the ground by ſtrong winds, after they have made ſtout ſhoots. The plantations ſhould be cleared from all ſuch weeds as grow tall, otherwiſe they will overbear the young ſhoots; but when they have made good heads, they will keep down the weeds, and will require no farther care.

If you raiſe them by lying down the branches, it muſt be performed in October; and by the October following, they will have taken root ſufficient to be tranſplanted out; which muſt be done by digging a hole, and looſening the earth in the place where each plant is to ſtand, planting the young trees at leaſt a foot and a half deep, cutting off the top to about nine inches above the ſurface, which will occaſion them to ſhoot out many branches.

The diſtance theſe trees ſhould be placed, if deſigned for a coppice, is ſix feet ſquare; and if the ſmall lateral ſhoots are taken off in the ſpring, it will very much ſtrengthen your upright poles, provided you leave a few ſmall ſhoots at diſtances upon the body thereof, to detain the top for the increaſe of its bulk.

Theſe trees may be alſo planted by the ſide of brooks, as is uſual for willows, where they will thrive exceedingly, and may be cut for poles every fifth or ſixth year. This wood is in great requeſt with the turners, and will endure a long time under ground, or to be laid in water. *Miller's Gard. Dict.*

Alder makes an extraordinary fence againſt rivers and ſtreams, and preſerves the banks from being undermined by the water; becauſe it is always ſending ſuckers from the loweſt roots, which makes it very uſeful, where ſtreams wear away the banks, and are widening of their courſe. *Mortimer's Huſbandry.*

Alder has one peculiar and beneficial property, namely, that no beaſt will crop it, be it young or old, which ſaves the great charge of fencing it after planting. *Ellis's Timber Tree improved.*

ALE, a fermented liquor obtained from the infuſion of malt, and differing only from beer in having a leſs proportion of malt and hops. *See the articles* BEER *and* BREWING.

GILL-ALE, is ale in which the dried leaves of gill, or ground-ivy, have been infuſed. It is eſteemed good in diſorders of the breaſt, and obſtructions of the viſceræ.

ALLEY, in the new huſbandry, implies the vacant ſpace between the outermoſt row of corn on one bed, and the neareſt row to it on the next parallel bed. *See* BED.

The practice of the new huſbandry has already ſufficiently ſhewn, that too narrow alleys would hardly anſwer any of the ends for which they are intended; and, on the other hand, the making them too wide is a loſs of ground. About four feet, excluſive of the ſpaces or partitions between the rows of corn in the beds, is a good middling breadth.

It is not indeed neceſſary to make the alleys quite ſo wide in good ſoils; an intelligent huſbandman will eaſily judge what breadth is moſt proper. But what greatly merits the attention of every one, and ought never to be loſt ſight of, is, that wide alleys are more eaſily and much better ſtirred than thoſe which are narrower: for when an alley is wide, the large furrow in the middle of it may be cut deep, there being then ſufficient room to turn the earth over towards the rows; while, on the other hand, the earth, in too narrow alleys, cannot be ſtirred deep enough, nor can room be found for what is turned over out of the furrows, without danger of burying great part of the rows.

We will, therefore, ſuppoſe the general breadth of the alleys to be about four feet; but the whole of that breadth is not to be ploughed or ſtirred, either with the plough or cultivator, as ſoon as the field is ſown. Neither of theſe inſtruments ought to go too near the rows of corn, for fear of rooting up the plants; but a ſlip of earth, about ſix inches wide, ſhould be left untouched on the outſide of each bed; by which means the part of the alley that is to be ſtirred, will be reduced to the breadth of three feet; and even that is leſſened in the firſt ploughing before winter by a deep furrow, which is then cut cloſe to, and all along thoſe ſix inch ſlips, and the earth taken out of each furrow, is thrown into the great furrow in the middle of the alley, which it ſerves to fill and arch up. Theſe two ſide furrows make together a breadth of about eighteen inches, and, conſequently leave, in the middle of the alley, a breadth of about eighteen inches more, on which is heaped up the earth thrown out of the two furrows: and thus the al-remain all the winter.

The firſt hoeing in the ſpring ſhould turn the earth, heaped up in the middle of the alleys, back towards the rows of corn. The two furrows that were opened before winter are then filled up, and a new one is cut in the middle of the alley.

To perform the firſt hoeing with the common plough, which may be very eaſily done, two turns of that inſtrument will be requiſite, namely, one on each ſide of the alley, as near as poſſible to the beds. But as theſe two turns will not be always ſufficient to form the furrow perfectly, a great deal of earth frequently remaining between it and the bed, a third turn of the plough becomes often neceſſary; and ſometimes a fourth, to hollow the middle furrow as it ought to be.

If this work be performed with the cultivator with two mould-boards, the inſtrument muſt be placed in the middle of the alley, and the horſes in one of the two furrows. The ſhare will eaſily enter a great depth into the earth, which was laid there by the laſt hoeing before winter: and as the horſes advance, that great ridge of earth will be divided into two parts, which will be turned over into, and fill up the furrows that were made before winter, on each ſide of the alley, cloſe to the beds. *See the article* CULTIVATOR.

Thus the great furrow in the middle of the alley will be opened, and the whole operation performed by one turn of the cultivator. The earth thus turned over will be thoroughly ſtirred, and ſo much time and labour will be ſaved by this method, thar the farmer may eaſily afford one or two ſtirrings more in the ſummer, which will always be of great ſervice. *M. de Chateauvieux.*

ALLEY, in gardening, implies a ſtrait walk, bounded on both ſides with trees or ſhrubs, and commonly covered with gravel or graſs.

An alley is diſtinguiſhed from a path, by being broad enough for two perſons to walk a-breaſt, whereas a path is ſuppoſed to admit of only one at a time; but if an alley be wider than ten or twelve feet, it may, with more propriety, be called a walk.

Covered ALLEY, is that where the trees on each ſide meet at the top, ſo as to form a ſhade.

ALMOND-TREE, is generally cultivated in gardens for the beauty of its flowers. Theſe often appear in February, when the ſpring is forward; but if froſt comes on after the flowers appear, their beauty will be of ſhort duration, and in thoſe ſeaſons few almonds are produced; whereas when the trees do not flower till late in March, they ſeldom fail to bear plenty of fruit; many of which will be very ſweet, and fit for the table when green, but they will not keep long.

Almond-trees are propagated by inoculating a bud of theſe trees into a plum, almond, or peach-ſtock, in the month of July. The next ſpring, when the buds ſhoot, you may train them up, either for ſtandards, or ſuffer them to grow for half ſtandards, according to your own fancy.

The beſt ſeaſon for tranſplanting theſe trees, if for dry ground, is in October, as ſoon as the leaves begin to decay; but for a wet ſoil, February is much preferable: obſerve always to bud upon plum-ſtocks for wet grounds, and on almond or peach-ſtocks for dry. *Miller's Gard. Dict.*

ALP, a name in many counties of England for the bulfinch.

AMEL-CORN, the ſame with Spelt. *See* SPELT.

AMERANTHUS, amaranth, or flower-gentle, a genus of very beautiful plants, cultivated in gardens.

There are many ſpecies of this plant, but the three following are the principal generally cultivated, 1. Amaranthus tricolor, 2. Amaranthus bicolor, 3. Flower-gentle, with five ſtamina, and very long cylindrical ſpikes, commonly called princes feathers.

The firſt ſort has been long cultivated in gardens for the beauty of its variegated leaves, which are of three colours, viz. green, yellow, and red; theſe are very elegantly mixed, and when the plants are in full vigour, the leaves are large, and cloſely ſet from the bottom to the top of the ſtalks, and the branches form a ſort of pyramid; ſo that there is not a more beautiful plant than this, when it is in its full luſtre.

The ſecond ſort has been introduced into the Engliſh gardens much later than the firſt ſpecies. It grows to the ſame height with the former, and greatly reſembles it in the manner of its growth; but the leaves have only two colours, which are obſcure purple, and a bright crimſon; theſe are ſo blended as to ſet off each other, and, when the plants are vigorous, they make a fine appearance.

The third ſort, which is a native of America, grows with an upright ſtem above three feet high; the leaves and ſtalk are of pale green colour; the ſpikes of the flowers are produced from the wings of the ſtalks, and alſo in cluſters at the extremity of the branches: they are of a bright colour, hang downwards, and ſome of them two feet and a half long.

Theſe plants muſt be ſown on a hot bed in February, or the beginning of March at fartheſt; and in about a fortnight's time, if the beds be in good temper, the plants will riſe; when you muſt prepare another bed covered with good, rich, light earth, about four fingers thick. As ſoon as this bed is in proper temper to receive the young plants, you ſhould raiſe them up with your finger, ſo as not to break off the tender roots, and prick them into your new hot-bed, about four inches diſtant every way, giving them a gentle watering to ſettle the earth to their roots; but in doing this be very cautious not to bear your young plants down to the ground by haſty watering, for they rarely riſe again, at leaſt ſo as to recover their former ſtrength. When your plants are firmly rooted, and begin to grow, you muſt obſerve to give them air every day, more or leſs, to prevent their drawing up too faſt, which weakens their ſtems.

In about three weeks or a month's time theſe plants will have grown ſo as to ſtand in need of another hot-bed, which ſhould be of a moderate temper, and covered with the ſame rich earth about ſix inches thick, into which they ſhould be removed; obſerving to take them up with as much earth about their roots as poſſible, and plant them ſeven or eight inches diſtant every way, giving them ſome water to ſettle the earth about their roots: and keep them ſhaded in the heat of the day, until they have taken freſh root, and be ſure to refreſh them often gently with water, and give them air in proportion to the heat of the weather, covering the glaſſes every night with mats, leſt the cold chill your bed, and ſtop the growth of the plants.

In the beginning of May you muſt provide another hot-bed, which ſhould be covered with a deep frame, that your plants may have room to grow. Upon this hot-bed you muſt ſet as many three-penny pots, as can ſtand within the compaſs of the frame; theſe pots muſt be filled with good rich earth, and the cavities between each pot filled up with any common earth, to prevent the heat of the bed from evaporating, and filling the bed with noxious ſteams; then take up your plants from the former hot-bed, with as much earth as poſſible about their roots, and place each ſingle plant in the middle of one of the pots, filling the pot up with the rich earth, and ſettle it cloſe to the roots of the plant with your hands; water them gently as before, and ſhade them in the heat of the day from the violence of the ſun, by covering the glaſſes with mats: refreſh them often with water, and give them plenty of air in the day time.

In about three weeks more theſe plants will have attained a conſiderable ſize and ſtrength, ſo that you muſt now raiſe the glaſſes very much in the day time; and when the air is ſoft, and the ſun is clouded, draw off the glaſſes, and expoſe them to the open air, repeating it as often as the weather will permit; which will harden them by degrees to be removed abroad into the places where they are to remain the whole ſeaſon, which ſhould not be done till the firſt week in July, when the air is ſoft, and in a gentle ſhower of rain.

Let them be ſet firſt near the ſhelter of a hedge for two or three days, where they may be ſcreened from the violence of the ſun, and ſtrong winds, to which they muſt be enured by degrees. Theſe plants, when grown to a good ſtature, perſpire very freely, and muſt be every day refreſhed with water, if the weather proves hot and dry; otherwiſe they will ſtint, and never produce ſo large leaves, as thoſe which are ſkilfully treated. *Miller's Gard. Dict.*

AMBERVALIA, a ceremony practiſed by the ancient Romans, in order to procure from the gods a happy harveſt.

This ceremony conſiſted of a proceſſion in which the victims were conducted thrice round the corn fields before they were ſacrificed. Twelve prieſts walked at the head of the proceſſion, which conſiſted of all the neighbouring inhabitants, every one being crowned with leaves of oak, and ſinging hymns in honour of Ceres, the goddeſs of corn.

AMBLE, a peculiar kind of pace, wherein a horſe's two legs of the ſame ſide move at the ſame time.

In this pace the horſe's legs move nearer the ground than in the walk, and, at the ſame time, are more extended: but what is moſt ſingular in it is, that the two legs of the ſame ſide, for inſtance, the off hind and fore-leg, move at the ſame time; and then the two near legs, in making another ſtep, move at once; the motion being performed in this alternate manner. So that the two ſides are alternately without ſupport, or any equilibrium between the one and the other, which muſt neceſſarily prove very fatiguing to the horſe, being obliged to ſupport himſelf in a forced oſcillation, by the rapidity of a motion, in which his feet are ſcarcely off the ground. For if in the amble he lifted his feet as in the trot, or even in a walk, the oſcillation would be ſuch, that he could not avoid falling on his ſide, and it is only by keeping his feet very near the ground, and by the quick alternate motion that he ſupports himſelf in this pace, in which the hind leg is not only to move at the ſame time with the fore-leg of the ſame ſide, but alſo to gain on it, or touch the ground a foot, or a foot and a half, beyond the ſpot where the latter grounded. The further the hind-leg extends beyond the place where the fore-leg grounded, the better the horſe ambles, and the whole motion is proportionally faſter. Thus the whole difference between the amble and the trot conſiſts in this, that the two legs moving together in the latter are in a diagonal poſition, whereas, in the former, the two legs of the ſame ſide move together.

This pace, which is very fatiguing to the horſe, is very eaſy to the rider. It has not the roughneſs of the trot, which is cauſed by the reſiſtance of the fore-leg, at the lifting up of the hind; becauſe, in the amble, this fore-leg is lifted up at the ſame time with the hind-leg of the ſame ſide; whereas in the trot the fore-leg of the ſame ſide is at reſt, and reſiſts the impulſe during the whole time that the hind-leg is in motion.

They who are ſkilled in horſemanſhip tell us, that horſes which naturally amble, never trot, and that they are a great deal weaker than others. Colts, indeed, very often move in this manner, eſpecially when they exert themſelves, and are not ſtrong enough to trot or gallop. Moſt good horſes, which have been over-worked, and on the decline, are alſo obſerved voluntarily to amble, when forced to a motion ſwifter than a walk.

The amble may, therefore, be conſidered as a defective pace, not being common, and natural only to a very few horſes, which, in general, are weaker than others. Add to this, that ſuch amblers as ſeem the ſtrongeſt, are ſpoiled ſooner than thoſe which trot or gallop. *Buffon's Hiſtoire Naturel, tom.* IV.

There are various methods of diſcipline for bringing a young horſe to amble: ſome chuſe to toil him in his foot pace through new ploughed fields, which naturally inures him to the ſtroke required in the amble; but this diſorderly toil is very apt to weaken, and ſometimes to lame a young horſe. Others attempt it by ſtopping him in a gallop, or trot; ſo that by loſing both, he neceſſarily ſtumbles on an amble; but this is apt to ſpoil a good mouth and rein, and expoſes the horſe to the danger of an hoof-reach, or ſinew-ſtrain, by over-reaching, &c. Some prefer ambling by weights as the beſt way; and in order to this, either overload the horſe with exceſſive heavy ſhoes, or fold thick pieces of lead about the fetlock paſterns, without conſidering that the former are apt to make him interfere, or ſtrike ſhort with his hind-feet; and that the latter, beſides that miſchief, expoſe the horſe to incurable ſtrains, cruſhing of the coronet, breeding of ring-bones, &c. Others load the horſe with earth, lead, &c. which often occaſion a ſwaying of the back, over-ſtraining of the fillets, &c. Some endeavour to make him amble in hand, before they mount his back, by means of ſome wall, ſmooth pale, or rail, and by checking him in the mouth with the bridle-hand, and correcting him with a rod on the hinder hoofs, and under the belly, when he treads falſe; but this is very apt to ſpoil a ſpirited horſe, even before he can underſtand what you would have him do.

The beſt method ſeems to conſiſt in trying with your hands, by a gentle and deliberate racking and thruſting of the horſe forwards, by helping him in the weak part of his mouth with your ſnaffle, which muſt be ſmooth, big, and full; and correcting him firſt on one ſide, then on the other, with the calves of your legs, and ſometimes with a ſpur. If you can by this means make him fall readily into an amble, though in a ſhuffling and diſorderly manner, much labour will be ſaved; for that aptneſs to amble will render the tramel more eaſy to him, and he will find the motion without ſtumbling, or being frighted. *See the article* TRAMEL. *Bradley's Dict. Ruſt.*

AMPHITHEATRE, in gardening, implies a temple of view, erected on a riſing ground, of a ſemicircular figure.

Theſe amphitheatres are formed of ſeveral ſorts of ever-greens, obſerving to plant thoſe of the ſhorteſt growth in front, and the talleſt trees, ſuch as pines, firs, cedars, &c. behind. But as the modern taſte in gardening excludes regularity and ſtiffneſs, amphitheatres are at preſent but little eſteemed.

AMBRY, ACEMBRY, or AUMERY, a pantry, or cupboard to ſet victuals in.

ANBURY, a kind of wen, or ſpongy wart growing on any part of a horſe's body. *See the article* WEN.

ANANAS, the pine-apple. *See* PINE-APPLE.

ANEMONE, or the wind-flower, a genus of fine flowers very common in the Engliſh gardens.

There are various ſpecies of the anemone, but the beſt ſorts are natives of the eaſt, from whence the roots were brought originally; but have been ſo greatly improved by culture, as to render them ſome of the chief ornaments of our gardens in the ſpring. The principal colours of theſe flowers are red, white, purple, and blue, and ſome are finely variegated with red, white, and purple. There are many intermediate ſhades of theſe colours; the flowers are large, and very double, and, when properly managed, are extremely beautiful.

The ſoil in which theſe flowers will thrive extremely, may be compoſed in the following manner. Take from a common or paſture land a quantity of untried or virgin earths of a light ſandy loom, or hazel mould, obſerving not to take it above ten inches deep below the ſurface; and if the turf be taken with it the better, provided it have time to rot thoroughly before it is uſed: mix this with a third part of rotten cow-dung, and lay it in a heap, keeping it turned over at leaſt one a month for eight or ten months, the better to mix it, and rot the dung and turf, and let it have the advantage of the free air.

This earth ſhould be mixed twelve months before it is uſed, if poſſible; but if you are conſtrained to uſe it ſooner, you muſt turn it over the oftener, to mellow and break the clods; and obſerve to rake out all the parts of the green ſward that are not quite rotten before you uſe it; for, if ſuffered to remain, would prove prejudicial to the roots.

The beginning of September is a proper time to prepare the beds for planting, when this compoſt ſhould be laid, at leaſt, two feet and a half thick; and in the bottom there ſhould be about four or five inches of rotten cow-dung, or the rotten dung of an old melon or cucumber-bed, ſo that you muſt take out the former ſoil of the beds to make room for it. Your earth ſhould be laid in the beds at leaſt a fortnight or three weeks before you plant the roots, that it may ſettle properly.

The beſt ſeaſon for planting theſe roots, if for forward flowers, is about the latter end of September, and for thoſe of a middle ſeaſon, any time in October; but obſerve to perform this work, if poſſible, at, or near the time of ſome gentle ſhowers; for if you ſhould plant them when the ground is perfectly dry, and no rain ſhould fall for three weeks or a month after, the roots will be apt to grow mouldy upon the crown; and if once they get this diſtemper, they ſeldom come to good after. The roots ſhould be planted about three inches deep, with the eye uppermoſt, and about ſix inches aſunder.

Towards the latter end of June the leaves of your firſt blown roots will begin to decay; ſoon after which you muſt take them out of the ground, clearing them from decayed ſtalks, and waſhing them to clean the earth from the roots; then ſpread them upon a mat, in a dry ſhady place, till they are perfectly dried, when you may put them up in bags, and hang them out of the reach of mice, or other vermin, which will deſtroy many of the roots if they come at them. *Miller's Gard. Dict.*

ANGORA *goat. See the article* GOAT.

ANJOU *cabbage-ſhrub*, an excellent vegetable both for the kitchen, and the food of cattle, cultivated with great ſucceſs in ſeveral provinces of France; and that ingenious huſbandman, the marquis of Turbilly, lately ſent a parcel of the ſeeds to our ſociety for the encouragement of arts, who very readily diſtributed them to ſuch gentlemen as applied to them for that purpoſe, in order to their being cultivated here; ſo that there is reaſon to hope, that this uſeful plant will ſoon become common in England. The following inſtructions are given by the marquis de Turbilly, for cultivating the Anjou cabbage.

" The great Anjou cabbage is one of the moſt uſeful leguminous plants for country people. It will grow in almoſt any ſoil, not excepting even the moſt indifferent, provided it be ſufficiently dunged. It is but little known about Paris, and in many other places, where it might be cultivated to great advantage.

" The ſeeds of this cabbage are commonly ſown in June, in a quarter of good mould, in the kitchen garden, and watered from time to time in caſe of drought. The plants will riſe pretty ſpeedily, and ſhould be thinned ſoon after, wherever they ſtand too thick. The next care is to keep them free from weeds whilſt they continue, by hoeing the ground between them. About the firſt of November, they ſhould be tranſplanted into the field where they are to remain. They ſhould be planted there in trenches dug with a ſpade, pretty deep, that is, they ſhould be buried almoſt up to the leaves. The diſtance between them ſhould be two feet, or two feet and a half every way, according to the goodneſs of the ſoil. Particular care ſhould be taken never to plant them with a dibble, as gardeners plant other ſorts of cabbages. A layer of dung ſhould be ſpread along the bottom of the trench, and the roots of the tranſplanted cabbages covered therewith. The mould taken out ſhould then be returned back upon the dung; and as the trench will then no longer hold it all, there will remain a ridge between each row of cabbages.

" Towards the middle of May enſuing, the ground ſhould be well ſtirred between the plants, with a ſpade, or ſome other proper inſtrument, and its whole ſurface laid quite level. After this nothing more remains to be done, except pulling up the weeds, from time to time, as they appear.

" Many huſbandmen ſow the ſeeds of theſe cabbages with thoſe of hemp; and though this may not be ſo ſure as the former, it often ſucceeds very well, eſpecially in wet years. When the hemp is pulled up, a multitude of little cabbages are ſeen, and which having then a free air, grow apace. They are tranſplanted about the firſt of November in the manner before directed, and are preferred to thoſe of the kitchen garden, becauſe they are not ſo apt to run up to ſeed the next ſpring; an accident which ſometimes happens to a few of theſe cabbages, in certain years; and it then becomes neceſſary to replace them by others which have not run up, and which are reſerved for this purpoſe in a ſeparate ſpot of ground.

" Several farmers uſe a plough to cut the trench for tranſplanting theſe cabbages: but then they do not remove them till the ſpring, leaving them, in the mean time, in the place where they were ſown. They afterwards give the earth a ſtirring with a ſpade, and lay it ſmooth towards the end of May, in the manner before directed. Whole fields of theſe cabbages may be ſeen on many farms in Anjou and Poitou, and which prove a very uſeful reſource.

" In the month of June, ſuch of theſe cabbages as are already large, and do not turn in their leaves for cabbaging, but ſtill continue green, begin to be fit for uſe, and ſoon ariſe at their full perfection, which they retain till the next ſpring, when they begin to run up, and afterwards bloſſom. Their ſeeds ripen towards the end of July, and what is intended for ſowing ſhould then be gathered.

“ In Anjou, when theſe cabbages are entirely run up, they generally grow to the height of ſeven or eight feet: ſometimes they reach to eight feet and a half, or nine feet; nay, ſome have even been ſeen of a greater height.

“ From the month of June, when theſe cabbages begin to be fit for uſe, their leaves are gathered from time to time, and they ſhoot out again. They are large, excellent food, and ſo tender that they are dreſſed with a moment's boiling. They never occaſion any flatulencies or uneaſineſs in the ſtomach; and are alſo very good food for cattle, which eat them greedily. They likewiſe greatly increaſe the milk of cows.

“ Such are the properties of this kind of cabbage, greatly eſteemed in Anjou, Poitou, Britany, Le Maine, and ſome other neighbouring provinces. In Anjou farmers are bound by their leaſes to plant yearly a certain number of theſe cabbages, and to leave a certain number of them ſtanding when they quit their farms.

“ This cabbage forms a kind of ſhrub, the great utility of which may be gathered from this, that its leaves afford nouriſhment to men and cattle; and its ſtalk, which is about the thickneſs of one's wriſt, is uſed, when dry, for fuel.

“ It ſometimes happens in extremely ſevere winters, that ſome of theſe cabbages are frozen; and this, in the above provinces, is conſidered as a very great loſs; but that accident is rare, becauſe this kind of cabbage reſiſts froſts better than moſt others.

“ The ground where theſe cabbages are planted ſhould be fenced in very carefully by hedges or ditches, to preſerve it from the depredations of cattle, which are extremely fond of them. With this precaution I have made ſeveral plantations of them, near the houſes erected in the midſt of the heaths and commons I have broken up and improved; and they have ſucceeded very well, though the ſoil is but indifferent in many places.

“ I have, near my houſe in Anjou, two well incloſed fields, deſtined for this ſort of plantation. They are planted alternately every year with young cabbages. When theſe are pulled up, after they have ſeeded in the ſecond year, at the time already mentioned, the ground where they ſtood is dug up, and ſowed with peaſe or beans, the crop of which being taken off before the firſt of November, makes room for planting new cabbages at the proper ſeaſon. The ſoil is looſened and enriched by the peaſe and beans, and by this means the land is never reſted; nor is it ever exhauſted, becauſe it is dunged whenever the cabbages are planted.

“ Theſe cabbages are of ſuch excellent ſervice to me, that I have often wondered at their not being cultivated in all the different countries of Europe. I believe they would ſucceed every where, and I adviſe all huſbandmen to make plantations of them.

“ I wiſh that this ſhort memoir, founded on my own experience, may contribute to extend the culture of this uſeful plant.”

ANNUAL *plants*, ſuch as continue one year only; or ſuch as ſpring up, ripen their ſeed, and periſh in that ſpace of time. Thus wheat, barley, oats, beans, peaſe, &c. are annual plants.

Annual *meadow-graſs*, called in ſome parts of England, Suffolk-graſs, a ſpecies of very beautiful graſs, making the fineſt turfs, and ſeems particularly well adapted to dairy farms. *See* Plate I. Fig. 1. *which repreſents this graſs in its perfection.*

“ I have, ſays Mr. Stillingfleet, ſeen whole fields of it in High Suffolk, without any mixture of other graſſes; and as ſome of the beſt ſalt butter we have in London comes from that country, it is moſt likely to be the beſt graſs for the dairy.” He adds, that he obſerved, upon Malvern-hill, a walk made there for the convenience of the water drinkers, which was, in many places, covered over with this graſs, in leſs than a year, though he could not find a ſingle plant of it beſides in any other part of the hill. This was doubtleſs owing to the frequent treading, which has the greateſt tendency to make this graſs flouriſh; and therefore it is very evident, that rolling muſt be very ſerviceable to it. As the flowers and ſtems of this plant do not grow brown ſo ſoon as thoſe of other graſſes, nor cover the radical leaves ſo much, becauſe they are conſiderably ſhorter, this affords a more pleaſing turf than any other graſs.” *Stillingfleet's Miſcel. Tracts.*

Mr. Ray obſerves of the common meadow graſs, that it is a ſlender and ſucculent plant, very agreeable to cattle, and a fattener of them; that it delights in a rich ſoil; and that it is not injured by being trodden under foot, and therefore is commonly found along the ſides of paths and roads. It ſpindles and ears in the ſpring, and continues to ſhoot during the whole ſummer. *Ray's Hiſtory of Plants.*

As plenty of the ſeeds of this graſs might be very eaſily procured from Suffolk, it might be propagated and cultivated in all parts of England, where the ſoil and ſituation are adapted to its growth.

It is indeed amazing, that amidſt the great variety of graſſes which grow naturally in England, that ſo few farmers have had any thoughts about improving their meadows and paſtures; they ſeem to take every thing upon truſt, imagining, perhaps, that the graſs they find growing naturally in their grounds, is much better, and more adapted to the nature of the ſoil, than any other they could ſow, or adopt in its ſtead.

But this is ſurely a very narrow way of thinking, and, ſhould it be encouraged, would ſoon put a ſtop to all improvements in huſbandry. We have been too long influenced by cuſtom: it is time for us to ſhake off our fetters, and rouze ourſelves from the deep lethargy which has prevented us from receiving, or at leaſt from removing, the diſadvantages of the old huſbandry, which, in many reſpects, is highly diſadvantageous both to the farmer and his country.

Annual *poa-graſs*. *See* Poa.

ANTICOR, a diſeaſe among horſes, conſiſting of a malignant ſwelling in the breaſt, which extends ſometimes to the very ſheath under the belly; and is attended with a fever, great depreſſion and weakneſs, and a total want of appetite.

The cure ſhould be firſt attempted by large and repeated bleedings, to abate the inflammation; emollient clyſters ſhould be injected twice or thrice a day, with an ounce of ſal prunella in each. The ſwelling ſhould be bathed with marſhmallow ointment, and an opening poultice, with onions boiled in it, ſhould be daily applied over it. If by this method continued four or five day, the inflammation in the throat and gullet be removed, the attention ſhould more particularly turn to encourage the ſwelling on the breaſt, and bring it, if poſſible, to matter: let the poultice therefore be continued, and give the horſe two ounces of Venice treacle, diſſolved in a pint of beer, every night. When the ſwelling is grown ſoft, it muſt be opened with a knife, and dreſſed with turpentine digeſtive, the danger being then over.

But ſhould it be found impracticable to bring the ſwelling to matter, and the ſwelling upwards ſhould increaſe ſo as to endanger ſuffocation, authors have adviſed to pierce the humour with a hot pointed cautery, and dreſs part with the turpentine digeſtive, ſharpened with a ſmall quantity of Spaniſh flies and euphorbium in powder, in order to ſtimulate and promote a greater diſcharge; at the ſame time fomenting and bathing the adjacent parts with ointment of marſhmallows.

M. Gueriniere, as well as Soleyſel, have adviſed opening the ſkin, when the tumour cannot be brought to matter, in order to introduce a piece of black helebore-root ſteeped in vinegar, and to confine it there for twenty-four hours; this alſo is intended as a ſtimulant, and is ſaid to anſwer the intention, by occaſioning ſometimes a ſwelling as big as a man's head. *Bartlet's Farriery.*

ANTS, or *piſmires*, are injurious both to paſture lands and gardens; in the former by throwing up hills, and in the latter, by feeding on the fruit, &c.

The method of keeping them from trees is by encompaſſing the ſtem with a circle or roll of wool, newly plucked from the ſheep's belly, four fingers in breadth, or by laying ſaw-duſt round the tree. The ſame will be effected when you anoint the tree with tar; but as tar is prejudicial to trees, human ordure will, perhaps, do better; becauſe if any of it be put into their hills, it will kill them. *Mortimer's Huſbandry.*

Ant-*hills*, the habitations of the ants, conſiſting of little eminences, compoſed of ſmall particles of ſand, lightly and artfully laid together.

Theſe hills, or habitations of the ants, though very convenient for themſelves and their own ſocieties, are very deſtructive to the farmer, depriving him of as much land as theſe hills cover; which may be often computed at a tenth part, or more, of his valuable graſs lands. Nay, in ſome places, where negligence has ſuffered them to multiply, almoſt half of it has been rendered uſeleſs: the hills ſtanding as thick together as graſs-cocks in hay time: and what is moſt ſurprizing, this indolence is defended by affirming, that the area or ſupeficies of their land is thereby encreaſed: whereas it is well known, by the induſtrious, that very little or no graſs ever grows thereon; and, therefore, if the ſurface be increaſed, the produce is proportionably decreaſed. *See the article* Mole-Hill.

It has been a cuſtom in many places at the beginning of winter, and often when the weather was not very cold, to dig up the ant-hills, three or four inches below the ſurface of the ground; and then to cut them in pieces, and ſcatter the fragments about: but this only diſſeminates the inſects inſtead of deſtroying them; they can hide themſelves among the roots of the graſs for the preſent; and then collect themſelves together again upon any little eminence, of which there are great numbers ready for their purpoſe, viz. the circular ridges round the hollows, where the hills ſtood, as is very ſoon viſible to a curious obſerver. A much better method ſeems therefore to be pointed out by a writer in the *Muſeum Ruſticum*, vol. vi. namely, to cut off the hills entire, and even with the ſurface; and to let them lie whole at a little diſtance, with their bottom upwards: by this means the ants, which are known to be very tenacious of their neſts, will continue in their habitations, while the rains, by running into their holes of communication, aſſiſted afterwards by the froſts, which will now ſooner penetrate to their dwellings, will deſtroy them. Perhaps a little ſoot ſown on the places, and waſhed in with the rains, would have a better effect. The hills when rendered mellow by the froſts, may be broken and diſperſed about the land. This method of cutting the hills even with the ſurface, has one advantage; it leaves the paſture-land even and fit for mowing; and at the ſame time the little eminences being taken away, the inſects are expoſed to the wet, which is diſagreeable to them.

In wet weather theſe inſects accumulate cavernous heaps of ſandy particles among the graſs, called by the labourers ſprout-hills; which quickly take off the edge of a ſcythe. Theſe hills, which are very light and compreſſible, the above writer aſſures us from experience, may be readily ſtamped down, by the feet of the hay-makers, and the inſects, together with their eggs and earth, eaſily pounded to a mortar. This ſhould be repeated a ſecond, and perhaps a third time, after the itinerant foragers have returned from their queſt of food, and have begun to raiſe new ſtructures near the old demoliſhed habitations.

APHERNOUSLI, or *arkenouſli*, a ſpecies of pine, or pinaſter, growing wild on the Alps, where one would think it impoſſible that any tree could vegetate and proſper; and therefore would probably thrive to great advantage on our bleak, barren, rocky, mountainous tracts of land. See Plate I. Fig. 2.

The timber is large, and has many uſes, eſpecially within-doors, or under cover. The branches reſemble theſe of the pitch-trees, commonly called the ſpruce fir: but the cones are more round in the middle, being of a purpliſh colour, ſhaded with black. The bark of the trunk, or bole of the tree, is not reddiſh like the bark of the pine, but of a whitiſh caſt, like that of the fir. The huſk, or ſort of ſhell, which incloſes the kernels, is eaſily cracked, and the kernels are covered with a brown ſkin, which peels off: they are about as large as a common pea, triangular like buck-wheat, and white and ſoft as a blanched almond, of an oily agreeable taſte, but leaving in the mouth that ſmall degree of aſperity, which is peculiar to wild fruits, and is not unpleaſing. Theſe kernels make a part ſometimes in a Swiſs deſert; they ſupply the place of muſhroom-buttons in ragouts; and are alſo recommended in conſumptive caſes, on account of their balſamic oil.

Wainſcoting, flooring, and other joiner's work, made with the planks of aphernouſli, are of a finer grain, and more beautifully variegated than deal, and the ſmell of the wood is more agreeable. From this tree is extracted a white odoriferous reſin.

The aphernouſli is of a healthy, vigorous nature, and will bear removing when it is young, even in dry warm weather. The wood makes excellent firing in ſtoves, ovens, and kilns; but is dangerous to be uſed on the hearth or in grates, being apt to ſplinter and fly to a conſiderable diſtance.

This tree is the *pinus cembra* of Matthioli and Linnæus, the *pinus foliis quinis* in Haller, the *larix ſemper-virens* in the German Ephemeris, the *libanus carpathius* of ſome writers, and the *pin a cinque feüeilles*, N° 20. in Du Hamel. It grows in great abundance on the moſt mountainous and coldeſt parts of the Briançonnois, where it is called by the natives *alviez*. It bears ſome reſemblance to the white Canada-pine, which is better known in England by the name of Weymouth-pine. *Eſſays on Huſbandry.*

APIARY, a bee-garden, or place where bees are kept. See the article Bees.

APOPLEXY, or, as the farriers generally call it, the *ſtaggers*, a diſeaſe to which the horſe is ſubject, and by which the creature drops down ſuddenly without ſenſe or motion, except a working of his flanks, proceeding from the motion of the heart and lungs, which never ceaſes while any ſpark of life remains.

The previous ſymptoms are drowſineſs, watry moiſt eyes, ſomewhat full and inflamed, a diſpoſition to reel, feebleneſs, a bad appetite, and almoſt continual hanging of the head, or reſting it in his manger, ſometimes with little or no fever, and ſcarce any alteration in the dung or urine. When the apoplexy proceeds from water collected in the ſinuſes and ventricles of the brain, the horſe has generally, beſides all the foregoing ſymptoms, a diſpoſition to rear up, and is apt to fall back, when any one goes to handle him about his head. The reaſon of his falling backwards ſeems to be obvious, becauſe when the head is raiſed with his mouth upwards, the water in the ventricles cauſes a weight upon the cerebellum, or part lying under the brain, and origin of the nerves, ſo as to deprive the creature of ſenſe and motion at once: this does not, however, prove ſuddenly mortal. Young horſes are moſt ſubject to it, and, with proper helps, and good uſage, ſometimes get over it: but when the apoplexy proceeds from wounds or blows on the head, or from any other cauſe producing ruptures in the blood-veſſels, or from matter collected in the brain, or its membranes; or if any part of the brain or its membranes be indurated, or grown callous, by long continuance, the horſe will not only have moſt of the ſymptoms already deſcribed, but will be frantic by fits, eſpecially after his feeds, ſo as to ſtart and fly into motion at every thing that comes near him. Theſe caſes are extremely dangerous, and ſeldom admit of a perfect recovery. But when horſes fall down ſuddenly and work violently at their flanks, without any ability to riſe, even after plentiful bleeding, ſuch horſes ſeldom recover.

All that can be done in ſuch caſes is to ſtrike the veins in ſeveral parts at once, to raiſe up the horſe's head and ſhoulders, propping them with plenty of ſtraw; and if he ſurvive the fit, to cut ſeveral rowels; though in caſe of ruptured veſſels, or if any kind of extraneous matter be lodged on the brain, or its membranes, all theſe helps will be of little ſervice.

But if the apoplectic fit happens to be only the effect of a plethora, or fulneſs of blood, from high-feeding, and want of ſufficient exerciſe; or if it be the effect of a ſizy blood, which is often the caſe of many young horſes, that have been fed for ſale, or from catching cold while the blood is in this ſtate, the cure will not be attended with any great difficulty, notwithſtanding a horſe, in theſe circumſtances, may reel and ſtagger, and ſometimes fall down ſuddenly.

Firſt of all bleed plentifully, and keep the horſe for ſome time to an opening diet of ſcalded bran, and ſometimes ſcalded barley, leſſening the quantity of his hay. After two days repeat the bleeding, but in a ſmaller degree. If the horſe has a cold, it will be proper to give him pectoral drinks, proper for that diſorder. *See* Cold.

But if no ſymptom of a cold appear it will be neceſſary, after bleeding and a ſpare diet, to give him two or three

PLATE I. *Facing* APHERNOUSLI.

Annual Meadow Graſs.

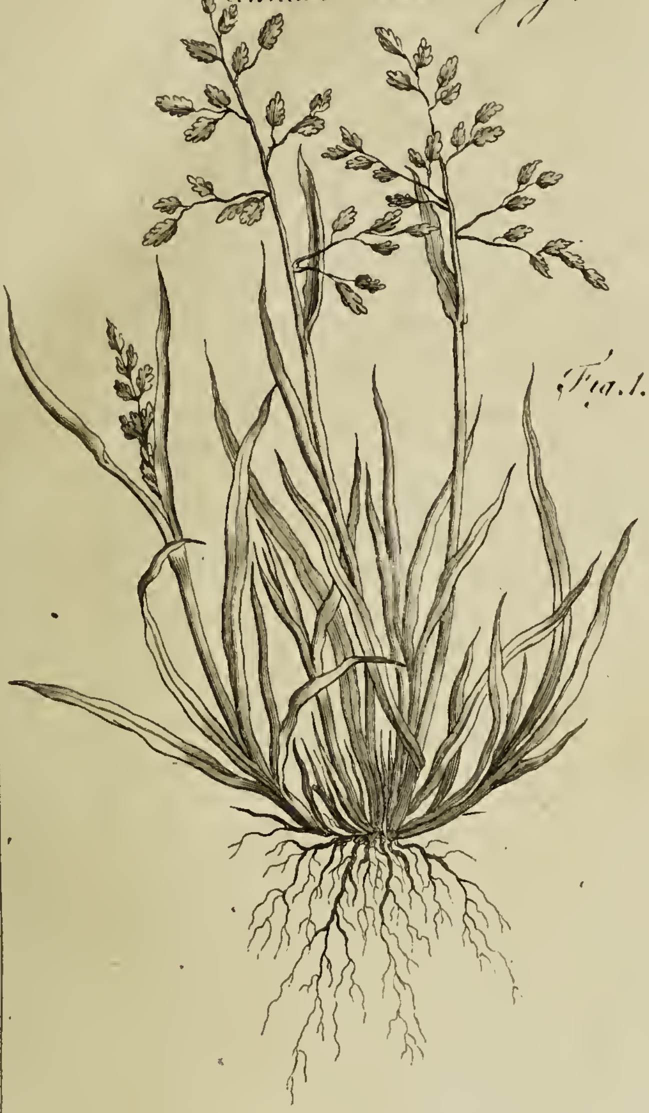


Fig. 1.

A Branch of the Aphernousli..

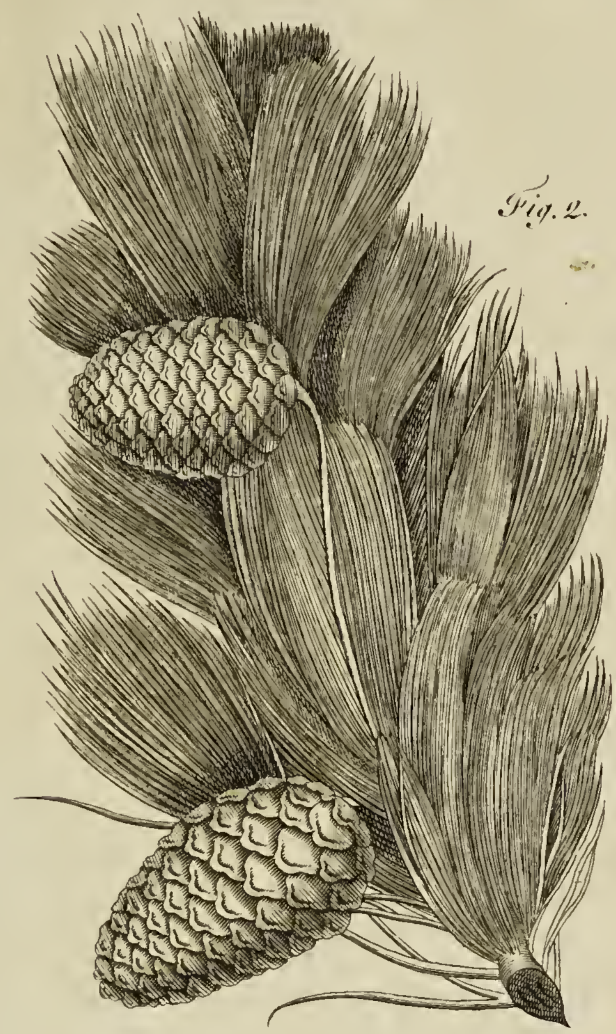


Fig. 2.

Fig. 3.

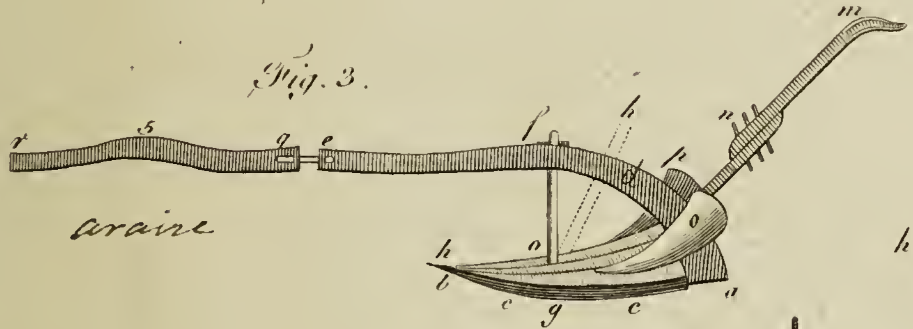
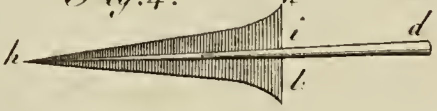
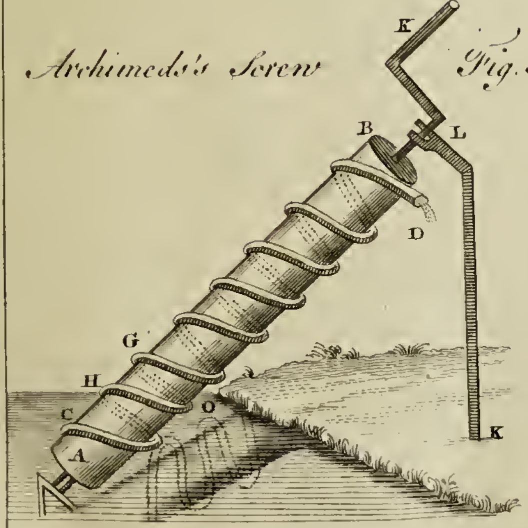


Fig. 4.



Archimeds's Screw Fig. 5.



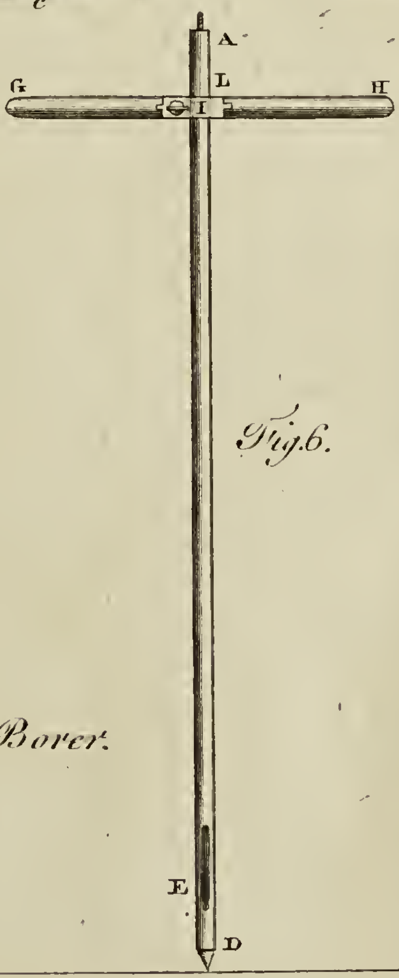


Fig. 6.

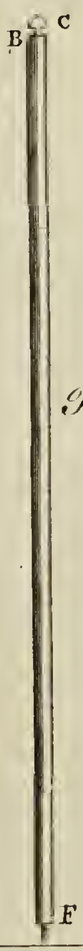


Fig. 7.

Fig. 8.

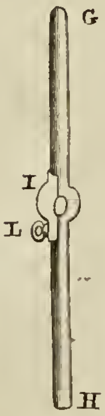
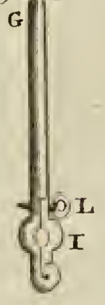


Fig. 9.



Borer.

J. Hulett Sculp.

purges, not only to remove the plethora or fulneſs, but to attenuate and thin his blood, for which the following is recommended:

"Take of the fineſt ſuccotrine aloes, an ounce and a quarter; freſh jallap, two drams; ſalt of tartar, three drams; native cinnabar, or the cinnabar of antimony, half an ounce; make it into a ball with a ſufficient quantity of ſyrup of roſes or marſhmallows; adding twenty or thirty drops of chemical oil of anniſeeds, making the whole into a ball, rolling it in liquorice-powder."

The purge may be made ſtronger or weaker by increaſing or diminiſhing the jallap. Let this be repeated two or three times, and the horſe will probably recover, without a relapſe. Powder of antimony, or its preparations, as the liver, the *crocus metallorum*, its cinnabar, or the native cinnabar, mixed with equal parts of gum guiacum, may be alſo given in ounce doſes, for three or four weeks, to mend his blood, and take off its ſizineſs. Nor ſhould exerciſe, as ſoon as the horſe is able to bear it, be omitted.

When a horſe drops down ſuddenly with hard riding, or violent driving, it in many reſpects reſembles an apoplexy, and all the organs of the head are affected as in an apoplexy; but as this proceeds only from the extraordinary rarefaction of the blood, and its rapid motion, whereby the ſmall veſſels of the brain, heart, and lungs, are ſo extremely diſtended as to cauſe an univerſal preſſure on the origin of the nerves; the horſe by this means loſes all ſenſe and motion, and generally falls ſuddenly, eſpecially upon any ſudden ſtop; becauſe when the bodily motion ceaſes, the circulation of the blood in the veins is not accelerated in proportion to its influx from the arteries, which ſoon produces a ſuffocation and a falling down, without ſenſe or motion. Inſtances of this kind are not uncommon, eſpecially in very hot weather, when the external heat adds greatly to the blood's motion and rarefaction. But as we ſuppoſe in this caſe, little or no fault in the blood, except, perhaps, a plethora, or weakneſs of the veſſels, the quickeſt and readieſt remedy is bleeding; and unleſs the horſe dies with the violence of the fall, which ſometimes happens, or by burſting the ſmall veſſels of the brain or lungs, or happens through polipuſes in the heart or principal veins, he will ſoon riſe of himſelf, or without much help, and may be preſerved from ſuch accidents for the future, by better uſage. *Gibſon on the Diſeaſes of Horſes.*

APPETITE, a certain painful or uneaſy ſenſation, always accompanied with a deſire to eat or drink.

Horſes, more than moſt other creatures, are ſubject to diſeaſes of the ſtomach, particularly to a *want of appetite*, and a *vitiated*, or *voracious appetite*.

Want of APPETITE is when a horſe feeds poorly, and is apt to mangle his hay, or leave it in the rack, and the ſame time gathers little fleſh, and his dung habitually ſoft, and of a pale colour.

Theſe are evident ſigns of a relaxed conſtitution, wherein the weakneſs of the ſtomach and guts may have a very great ſhare. This habitual weakneſs may be either natural and hereditary, or may be cauſed by ſome previous ill management; ſuch as too much ſcalded bran, or too much hot meat of any kind, which relaxes the tone of the ſtomach or guts, and in the end produces a weak digeſtion, and conſequently a loſs of appetite.

The beſt method to harden and recover ſuch horſes, is to give them much gentle exerciſe in the open air, eſpecially in dry weather; never to load their ſtomachs with large feeds, and to keep them as much as poſſible to a dry diet, indulging them now and then with a handful of beans among their oats; but in caſe the horſe grows weak, and requires the help of phyſic, a few laxative purges like the following, ſhould be given.

"Take ſuccotrine aloes, ſix drams; rhubarb in fine powder, two drams; ſaffron dried and powdered, one dram: make it into a ſtiff ball, with a ſufficient quantity of ſyrup of roſes, and add two drams of the elixir proprietatis, prepared with oil of ſulphur by the bell."

This purge will work very gently, and bring the horſe to a better appetite, and ſtrengthen his digeſtion. It may be repeated once a week, or once in ten days, and after the operation of each purge,

"Take a large handful of the raſpings or ſhavings of guaiacum, pomegranate bark, and balauſtines bruiſed; of each an ounce; galangals and liquorice root ſliced; of each half an ounce: let theſe be boiled in ſix quarts of ſmith's forge-water, to three pints; and while it is warm, infuſe in the decoction two drams of ſaffron, and half an ounce of diaſcordium."

Let this be divided into two drinks, and give one after the purge has done working, and the other after two day's intermiſſion; in cold weather the drinks ſhould be warmed before they are adminiſtered: the ſame may be complied with after the laſt purge, and repeated as often as may be neceſſary, continuing to give the horſe conſtant exerciſe in the open free air; and this will be the likelieſt method to ſtrengthen ſuch horſes, as are of weak relaxed conſtitutions.

But where ſuch a habit is contracted by too much feeding, eſpecially on hot ſcalded diet, which is often the caſe of young horſes kept up for ſale, the beſt way is to bleed and purge ſuch horſes, and at the ſame time to rowel them in the belly; for this ſort of feeding eaſily occaſions horſes to be lax, that have no natural diſpoſition to it; for when they grow ſuddenly fat by ſuch management, the ſecretions from the guts become greaſy, which always cauſes weakneſs and relaxation in them, and often forms a proper nidus for the breeding of vermin; all which may be eaſily remedied by purging in the firſt place, and afterwards by proper exerciſe, and a clean diet.

As for thoſe horſes that are of a hot fiery diſpoſition, and loſe their appetites by their heat and fretting, it is a caſe that cannot eaſily be remedied, becauſe of the natural inflammatory diſpoſition of their blood; the only method is to keep them to a cool diet while they are young, and, in country places, to let them run abroad, eſpecially where they have ſtables and warm ranges, to keep them from the inclemency of the weather in winter; for theſe ſort of horſes are always tender, being, for the moſt part, extremely thin ſkinned, and their blood of a thin texture, and eaſily put in motion. For the ſame reaſon, the beſt way, in ſummer, is to bring them up in the day time, and only let them run abroad in the night, they being more hunted with the flies than any other, which keeps them continually upon the fret, and hinders them from thriving. When ſuch horſes live till they are full aged, their heat and fierineſs often abates, ſo that they grow more uſeful; but while they are young, they are more ſubject to inward impoſtumations than horſes of a cooler temperament; and theſe often kill them ſuddenly, or bring them into lingering conſumptive maladies, which in ſome meaſure may be prevented by the above method. *Gibſon on the Diſeaſes of Horſes.*

Vitiated, or *Voracious* APPETITE, is that where the animal is always craving for meat. *See* FOUL-FEEDING.

APPLE-TREE, a fruit-tree ſo well known in this country, that any deſcription of it would be ſuperfluous.

There are a great variety of apples, ſome of which have been introduced from France; but three only of thoſe foreign ſorts are much eſteemed in England, viz. the French rennet, the rennet-griſe, and the violet apple; the other being early fruit, which do not keep long. Beſides, their fleſh is generally mealy, ſo that they do not deſerve to be propagated, as we have many better fruits in England.

The firſt apple which is brought to the London markets is the codlin; a fruit too well known to need any deſcription.

The next is the Margaret apple: this fruit is not ſo long as the codlin, and of a middle ſize; the ſide next the ſun changes to a fair red when ripe, the other ſide is of a pale yellow green; the fruit is firm, and of a quick pleaſant taſte, but does not keep long.

The ſummer pearmain is an oblong fruit, ſtriped with red next the ſun; the fleſh is ſoft, and in a ſhort time mealy; ſo that it is not greatly eſteemed.

The Kentiſh fill-baſket is a ſpecies of codling, of a large ſize, and longer ſhaped than the codlin. This ripens a little later in the ſeaſon, and is generally uſed for baking, &c.

The tranſparent apple. This was brought to England about the year 1724, and was eſteemed a curioſity: it came from Peterſburgh, where it is affirmed to be ſo tranſparent, that the kernels may be perfectly ſeen, when the apple is held to the light; but, in this country, it is a mealy inſipid fruit, ſo as not to be worth propagating.

Loan's pearmain, is a beautiful fruit to the ſight, of a middling ſize; the ſide next the ſun is of a beautiful red, and the other ſide ſtriped with the ſame colour; the fleſh is vinous; but as it ſoon grows mealy, it is not greatly eſteemed.

The quince-apple. This is a ſmall fruit, ſeldom larger than the golden-pippin, but longer, and reſembles the quince in ſhape, eſpecially towards the ſtalk; the ſide next the ſun is of a ruſſet colour, on the other ſide inclining to yellow. This is an excellent apple for about three weeks in September, but it will not keep much longer.

The golden-rennet is a fruit ſo well known in England as to need no deſcription. This ripens about Michaelmas, and for about a month is a very good fruit, either for eating raw, or baking.

The aromatic pippin is alſo a very good apple. It is about the ſize of a nonpareil, but a little longer; the ſide next the ſun is of a bright ruſſet colour: the fleſh has an aromatic flavour: it ripens in October.

The Hertfordſhire pearmain, by ſome called the winter pearmain. This is a good ſized fruit, rather long than round, of a fine red next the ſun, and ſtriped with the ſame colour on the other ſide; the fleſh is juicy, and ſtews well, but is not eſteemed for eating by any nice palates. This is fit for uſe in November and December.

The Kentiſh pippin is a large handſome fruit, of an oblong figure; the ſkin is of a pale green colour; the fleſh is full of juice, which is of a quick acid flavour. This is a very good kitchen fruit, and will keep till February.

The Holland pippin is larger than the former; the fruit is ſomewhat longer, the ſkin of a darker green, and the fleſh firm and juicy. This is a very good kitchen fruit, and will keep late in the ſeaſon.

The monſtrous rennet is a very large apple, of an oblong ſhape, turning red towards the ſun, but of a dark green on the other ſide; the fleſh is apt to be mealy, and is therefore not much valued by thoſe that are curious, and only preſerved for the magnitude of the fruit.

The embroidered apple is a pretty large fruit, ſomewhat ſhaped like the pearmain; but the ſtripes of red are very broad, from whence the gardeners have given it this title. It is a middling fruit, and commonly uſed as a kitchen apple, though there are many better.

The royal ruſſet, by ſome called the leather-coat ruſſet, on account of the deep ruſſet colour of the ſkin. This is a large fair fruit, of an oblong figure, broad towards the baſe; the fleſh is inclinable to yellow. This is one of the beſt kitchen apples we have, and the trees are very great bearers; they grow large and handſome, and the fruit is in uſe from October till April; it is alſo a pleaſant fruit to eat.

Wheeler's ruſſet is an apple of a middling ſize, flat and round; the ſtalk is ſlender; the ſide next the ſun of a light ruſſet colour, the other ſide inclining to a pale yellow when ripe; the fleſh is firm, and the juice has a quick acid flavour; but it is an excellent kitchen fruit, and will keep a long time.

Pile's ruſſet is not quite ſo large as the former, but is of an oval figure, of a ruſſet colour towards the ſun, and of a dark green on the other ſide. It is a very firm fruit, of a ſharp acid flavour; but is much eſtemed for baking, and will keep ſound till April or later, if well preſerved.

The nonpareil is a fruit pretty generally known in England, though there is another apple frequently ſold in the markets for it, which is what the French call *haute-bonne*. This is a larger fruit than the nonpareil, more inclining to yellow, the ruſſet colour brighter, it is earlier ripe, and ſooner gone. This is not ſo flat as the true nonpareil, nor is the juice ſo ſharp, though it is a good apple in its ſeaſon; but the nonpareil is ſeldom ripe before Chriſtmas, and, when well preſerved, will keep till May perfectly ſound. This is juſtly eſteemed one of the beſt apples yet known.

The golden pippin is a fruit peculiar to England. There are few countries abroad where this ſucceeds well, nor do the trees produce ſo good fruit in many parts of England as could be wiſhed. This is in ſome meaſure owing to their being grafted on free ſtocks, which enlarges the fruit, but renders it leſs valuable; becauſe the fleſh is not ſo firm, nor the flavour ſo quick; it is alſo apt to be dry and mealy. This ſhould therefore always be grafted upon the crab-ſtock, which will not canker like the others; and though the fruit will not be ſo fair to the ſight, yet it will be better flavoured.

Beſides the above variety of apples, there are a great many more; but theſe will be ſufficient to furniſh the table and kitchen during the whole ſeaſon of fruits. And with regard to the apples chiefly preferred for making cyder, they will be enumerated under that article. *See* CYDER.

All ſorts of apples are propagated by grafting, or budding upon the ſtocks of the ſame kind, for they will not take on any other ſort of fruit-tree. In the nurſeries there are three ſorts of ſtocks generally uſed to graft apples upon; the firſt are called free-ſtocks, which are raiſed from the kernels of all ſorts of apples indifferently, and theſe are alſo by ſome called crab-ſtocks; for all thoſe trees which are produced from ſeeds, before they are grafted, are termed crabs, without any diſtinction; but ſuch ſtocks as are raiſed from the kernels of crabs preſſed for verjuice, ſhould be preferred. For it is very certain, that by frequent grafting ſome ſorts of apples upon free-ſtocks, the fruits have been rendered larger, but leſs firm, poignant, and of ſhorter duration.

The ſecond ſort of ſtocks is the Dutch creeper; theſe are deſigned to ſtint the growth of the trees, and keep them within compaſs for dwarfs, or eſpaliers.

The third ſort is the paradiſe apple, which is a very low ſhrub, and therefore only proper for trees which are kept in pots by way of curioſity, for theſe do not continue long.

Some perſons have made uſe of codlin ſtocks for grafting of apples, in order to ſtint their growth; but as theſe are commonly propagated by ſuckers, it is not adviſable to uſe them. Nor are the codlin trees raiſed from ſuckers equal to thoſe grafted upon crab ſtocks; for the fruit of the latter will be firmer, laſt longer, and have a ſharper flavour. The trees ſo propagated will alſo laſt much longer ſound, and never put out ſuckers, as the codlins always do, which, if not conſtantly taken off, will weaken the trees, and cauſe them to canker; nor is it only from their roots, but alſo from the knots of the ſtems, that a great number of ſtrong ſhoots are produced, which fill the trees with uſeleſs ſhoots, and render them unſightly, and the fruit ſmall and crumpled.

The method of raiſing ſtocks from the kernels of crabs, or apples, is, to procure them where they are preſſed for verjuice, or cyder; and after they are cleared from the pulp, they may be ſown upon a bed of light earth, covering them over about half an inch thick with the ſame light earth; theſe kernels may be ſown in November or December, where the ground is dry, but in wet ground it will be better to defer it till February; but then the ſeeds muſt be preſerved in dry ſand, and kept out of the reach of vermin; for if mice or rats can get to them, they will devour the ſeeds: there ſhould alſo be care taken of the ſeeds, when ſown, to protect them from thoſe vermin, by ſetting traps, &c. to take them. In the ſpring, when the plants begin to appear, they muſt be conſtantly kept clear from weeds, which, if ſuffered to grow, will ſoon overtop the plants, and ſpoil their growth; if theſe thrive well, ſome of them will be fit to tranſplant into the nurſery the October following; for the ſooner theſe ſeedling plants are removed from the ſeed bed, the leſs danger there will be of their ſhooting down tap-roots, which, in fruit trees, ſhould always be prevented. The ground where theſe young ſtocks are to be planted, ſhould be carefully digged, cleanſed from the roots of all bad weeds, and laid level; then the ſtocks ſhould be planted in rows three feet aſunder, and the plants one foot diſtant in the rows, cloſing the earth pretty faſt to their roots; when the ſtocks are tranſplanted out of the ſeed bed, the firſt autumn after ſowing, they muſt not be headed; but ſuch as are inclined to ſhoot downward, the tap-root muſt be ſhortened, in order to force out horizontal roots. If the ground is pretty good in which theſe ſtocks are planted, and the weeds conſtantly cleared away, the ſtocks will make great progreſs; ſo that thoſe which are intended for dwarfs, may be grafted the ſpring twelve months after they are planted out of the ſeed beds; but thoſe which are deſigned for ſtandards, will require two or three years more growth, before they are fit to graft, by which time they will be upwards of ſix feet high. The other neceſſary work to be obſerved while theſe trees remain in the nurſery, the reader will find under the article NURSERY.

If theſe trees are deſigned for eſpaliers in the kitchen garden, and there be a proper extent of ground, it will be proper to plant not only ſuch ſorts as are adapted to the uſe of the table, but alſo a ſufficient number of trees to ſupply the kitchen; but where the kitchen garden is ſmall, the latter muſt be ſupplied from ſtandard trees, either from the orchard, or wherever they are planted; but as many of theſe kitchen apples are large, and hang late in the autumn upon the trees, they will be much more expoſed to the ſtrong winds on ſtandard trees, than in eſpaliers, whereby many of the fruit will be blown down before they are ripe, and others ſo bruiſed as to prevent their keeping: the planting of them therefore in eſpaliers, where it can be done, ſhould always be preferred.

The diſtance between theſe trees ſhould not be leſs than twenty-five or thirty feet, for ſuch ſorts as are of moderate growth, if grafted upon crab or free-ſtocks; but the larger growing ſorts ſhould not be allowed leſs room than thirty-five feet, which will be found full near enough, if the ground is good, and the trees properly trained; for as the branches of theſe trees ſhould not be ſhortened, but trained at their full length, ſo in a few years they will be found to meet. Indeed, at the firſt planting, the diſtance will appear ſo great to thoſe perſons who have not obſerved the vigorous growth of theſe trees, that they will ſuppoſe they never can extend their branches ſo far as to cover the eſpalier; but if ſuch perſons will but obſerve the growth of ſtandard trees of the ſame kinds, and remark how wide their branches are extended on every ſide, they will be ſoon convinced, that as theſe eſpalier trees are allowed to ſpread on two ſides only, the progreſs muſt conſequently be greater, as the whole nouriſhment of the roots will be employed in theſe ſide branches, than where there is a greater number of branches on every ſide of the tree, which are to be ſupplied with the ſame nouriſhment.

The trees ſhould not be more than two years growth from the graft, but thoſe of one year ſhould be preferred: be careful that their ſtocks are young, ſound, and ſmooth, free from canker, which have been cut down in the nurſery. When they are taken up, all the ſmall fibres ſhould be entirely cut off from their roots, which, if left on, will turn mouldy and decay, and by that means obſtruct the new fibres in their growth; the extreme parts of the roots muſt be ſhortened, and all bruiſed roots cut off; and if there are any miſplaced roots, which croſs each other, they ſhould alſo be cut away. As to the pruning the head of theſe trees, there needs be nothing more done, than to cut off any branches, which are ſo ſituated, as that they cannot be trained to the line of the eſpalier; in the planting there muſt be care taken not to place their roots too deep in the ground, eſpecially if the ſoil be moiſt, but rather raiſe them on a little hill, which will be neceſſary to allow for the raiſing of the borders afterwards. The beſt ſeaſon for planting theſe trees in all ſoils that are not very moiſt, is, from October to the middle, or latter end of November, according as the ſeaſon continues mild; but ſo ſoon as the leaves fall they may be removed with great ſafety. After the trees are planted, it will be proper to place down a ſtake to each tree, to which the branches ſhould be faſtened, to prevent the wind from ſhaking or looſening their roots, which will deſtroy the young fibres; for when theſe trees are planted very early in the autumn, they will ſoon puſh out a great number of new fibres, which, being very tender, are eaſily broken, and the trees thereby greatly injured. If the winter ſhould prove ſevere, it will be proper to lay ſome rotten dung, tanner's bark, or ſome ſort of mulch, about their roots, to prevent the froſt from penetrating the ground, which might damage theſe tender fibres; but the mulch ſhould not be laid before the froſt begins; for if it be laid over the roots ſoon after the trees are planted (as is often practiſed) it will prevent the moiſture from entering the ground, and do much hurt to the trees.

The following ſpring, before the trees begin to puſh, two or three ſhort ſtakes ſhould be driven down on each ſide of the tree, to which the branches ſhould be faſtened down as horizontally as poſſible, never cutting them down, as is by ſome practiſed, for there will be no danger of their putting out branches enough to furniſh the eſpalier, when the trees are once well eſtabliſhed in their quarters.

In the pruning of theſe trees, the chief point is never to ſhorten any of their branches, unleſs there be an abſolute want of ſhoots to fill the places of the eſpalier; for where the knife is much uſed, it only multiplies uſeleſs ſhoots, and prevents their fruiting; ſo that the beſt method of managing theſe trees is, to go over them three or four times in the growing ſeaſon, and rub off all ſuch ſhoots as are irregularly produced, and train the others down to the ſtakes, in the poſition they are to remain; if this be carefully performed in ſummer, there will be little left to be done in the winter; and by bending their ſhoots from time to time as they are produced, there will be no occaſion to uſe force to bring them down, nor any danger of breaking the branches. The diſtance theſe branches ſhould be trained from each other, for the largeſt ſorts of fruits, ſhould be about ſeven or eight inches, and for the ſmaller five or ſix. If theſe plain inſtructions are followed, it will ſave much unneceſſary labour of pruning, and the trees will, at all times, make a handſome appearance; whereas, when they are ſuffered to grow rude in ſummer, there will be much difficulty in bringing down their ſhoots without breaking, eſpecially if they are grown ſtubborn. All the ſorts of apple trees produce their fruit upon curſons, or ſpurs; ſo that theſe ſhould never be cut off, for they will continue fruitful a great number of years. *Miller's Gard. Dict.*

For the method of making the eſpaliers, ſee the article ESPALIER.

And for the method of planting ſtandard trees in orchards, ſee ORCHARD.

APRICOT-TREE, a fruit tree now well known in the Engliſh gardens.

There are about ſeven varieties of apricots cultivated in the Engliſh gardens, viz. 1. The maſculine apricot. 2. The orange apricot. 3. The Algier apricot. 4. The Roman apricot. 5. The Turkey apricot. 6. The Breda apricot. 7. The Bruſſels apricot.

The maſculine is the firſt ripe of all the apricots; it is a ſmall roundiſh fruit, of a red colour towards the ſun; as it ripens the colour fades to a greeniſh yellow on the other ſide. The tree is very apt to be covered with flowers; but as they come out very early in the ſpring, they are frequently deſtroyed by the cold, unleſs the trees are covered to protect them.

The orange is the next ripe apricot; this fruit is much larger than the former, and, as it ripens, changes to a deep yellow colour. The fleſh of this is dry, and not high flavoured; it is fitter for tarts, than for the table.

The Algier is the next in ſeaſon; this is of an oval ſhape, a little compreſſed on the ſides; it turns to a pale yellow, or ſtraw colour, when ripe; the fleſh is dry, and not high flavoured: this, and what is by ſome perſons called the common apricot, are often confounded.

The Roman is the next ripe apricot; this is a larger fruit than the former, and not compreſſed on the ſides; the colour is deeper, and not ſo dry as the former.

The Turkey apricot is yet larger than either of the former, and of a globular figure; they turn to a deeper yellow than the former; the fleſh is firmer, and of an higher flavour than either of the former.

The Breda apricot (as it is called from its being brought from thence into England) was originally brought from

Africa: this is a large, roundiſh fruit, changing into a deep yellow, when ripe; the fleſh is ſoft, full of juice, and of a deep orange colour on the inſide; the ſtone is rounder and larger than that of the other ſorts: this is the beſt apricot we have; and, when ripened on a ſtandard, is preferable to all other kinds.

The Bruſſels is the lateſt ripe of all the apricots; for, when it is planted againſt a wall, it is generally the beginning of Auguſt before it is ripe, unleſs when it is planted to a full ſouth aſpect; which is what ſhould not be practiſed, becauſe the fruit is never well taſted which grows in a warm expoſure. This fruit is of a middling ſize, rather inclining to an oval figure; red on the ſide next the ſun, with many dark ſpots, and of a greeniſh yellow on the other ſide; the fleſh is firm, and of an high flavour; the fruit often cracks before it is ripe.

Moſt people train theſe trees up to ſtems of ſix or ſeven feet high, or bud them upon ſtocks of that height; but this is a practice that ſhould not be recommended, becauſe the higher the heads of theſe trees are, the more they are expoſed to the cutting winds in the ſpring, which too frequently deſtroy the bloſſoms; and the fruit is alſo more liable to be blown down in ſummer, eſpecially if there ſhould happen to be much wind at the time they are ripe; which, by falling from a great height, will be bruiſed and ſpoiled; therefore half ſtandards, of about two and a half, or three feet in the ſtem ſhould be preferred to thoſe which are much taller.

Theſe fruits are all propagated by budding them on plum ſtocks, and will readily take upon almoſt any ſort of plum, provided the ſtock be free and thriving (except the Bruſſels kind, which is uſually budded on a ſort of ſtock, commonly called the St. Julian, which better ſuits the tree, as being generally planted for ſtandards, than any other ſort of plum will.) The manner of raiſing the ſtocks, and budding theſe trees, are treated of under their particular articles.

Theſe trees are all (except the two laſt ſorts) planted againſt walls, and ſhould have an eaſt or weſt aſpect; for, if they are planted full ſouth, the great heat cauſes them to be mealy before they are well eatable. The borders under theſe walls ſhould be ſix feet wide at leaſt, and, if it were more, the better; but they ſhould never be made ſo deep, as is the general cuſtom; for, if the earth be two feet deep, or two and a half at moſt, it is enough.

If your ground is a wet cold loam or clay, you ſhould raiſe your borders as much above the level of the ſurface as it will admit, laying ſome ſtones or rubbiſh in the bottom, to prevent the roots from running downwards; but, if you plant upon a chalk or gravel, it will be better to raiſe the borders to a proper thickneſs with good loamy earth than to ſink the borders by removing the chalk or gravel.

The beſt ſoil to be uſed for theſe and all other ſorts of fruit trees, is freſh untried earth, from a paſture ground, taken about ten inches deep, with the turf, and laid to rot and mellow at leaſt twelve months before it is uſed; and this muſt be kept often turned, to ſweeten and imbibe the nitrous particles of the air.

Your borders being thus prepared, make choice of ſuch trees as are but of one year's growth from budding; and, if your ſoil is dry, or of a middling temper, you ſhould prefer October for the beſt ſeaſon for planting, eſpecially having, at that time, a greater choice of trees from the nurſeries, before they have been picked and drawn over by other people. The manner of preparing theſe trees for planting being the ſame in common as other fruit trees, we refer the reader to the article Peaches.

But do not cut off any part of the head at that time, unleſs there are any ſtrong fore-right ſhoots which will not come to the wall, which may be taken quite away.

Your trees being thus prepared, you muſt mark out the diſtances they are to ſtand, which, in a good ſtrong ſoil, or againſt a low wall, ſhould be twenty feet, or more: but, in a moderate ſoil, and againſt taller walls, eighteen feet is a good reaſonable diſtance; then make an hole where each tree is to ſtand, and place its ſtem about four inches from the wall, inclining the head thereto: and, after having fixed the tree in the ground, nail the branches to the wall, to prevent their ſhaking. In this ſtate let it remain till the middle of March, when, if the weather is good, you muſt unnail the branches of your trees, ſo as not to diſturb the roots, and, being provided with a ſharp knife, put your foot cloſe to the ſtem of the tree; and, having placed your left-hand to the bottom of the tree, to prevent its being diſturbed, with your right-hand cut off the head of the tree, if it has but one ſtem, or where it may have two or more ſhoots, each of them muſt be ſhortened to about four or five eyes above the bud, ſo that the ſloping ſide may be towards the wall.

In the ſpring, if the weather proves dry, you muſt, now-and-then, give your trees a gentle refreſhing with water all over their head, which will greatly help them; and alſo lay ſome turf, or other mulch, round their roots, to prevent their drying during the ſummer-ſeaſon: as new branches are produced, obſerve to nail them to the wall in an horizontal poſition; and ſuch ſhoots as are produced fore-right, muſt be intirely diſplaced. This muſt be repeated, as often as is neceſſary, to prevent their hanging from the wall; but by no means ſtop any of their ſhoots in ſummer.

At Michaelmas, when the trees have done growing, you muſt unnail their branches, and ſhorten them in proportion to their ſtrength; a vigorous branch may be left eight or nine inches long, but a weak one ſhould not be left above five or ſix.

When you have ſhortened the ſhoots, be ſure to nail them as horizontally as poſſible; for upon this it is that the future good of the tree chiefly depends.

The ſecond ſummer obſerve, as in the firſt, to diſplace all fore-right ſhoots, as they are produced, nailing in the other cloſe to the wall horizontally, ſo that the middle of the tree may be kept open; and never ſhorten any of the ſhoots in ſummer, unleſs to furniſh branches to fill vacant places on the wall; and never do this later than April. At Michaelmas ſhorten theſe ſhoots, as was directed for the firſt year; the ſtrong ones may be left nine or ten inches, and the weak, ſix or ſeven at moſt.

The following year's management will be nearly the ſame with this; but only obſerve, that apricots produce their bloſſom-buds, not only upon the laſt year's wood, but alſo upon the curſons or ſpurs, which are produced from the two year's wood: great care ſhould therefore be had in the ſummer management, not to hurt or diſplace theſe: obſerve alſo to ſhorten your branches at the winter pruning, ſo as to furniſh freſh wood in every part of the tree.

Theſe few rules, well executed, together with a little obſervation and care, will be ſufficient; and, to pretend to preſcribe particular directions for all the different accidents, or manners of treating fruits, would be impoſſible; the reader will find what has been ſaid, if duly attended to, ſufficient.

The Bruſſels and Breda apricots, being, for the moſt part, planted for ſtandards, will require very little pruning or management; only obſerve to take out all the dead wood, or ſuch branches as croſs each other; this muſt be done early in autumn, or in the ſpring, after the cold weather is paſt, that the part may not canker where the inciſion is made. *Miller's Gard. Dict.*

APRIL, the fourth month of the civil year, conſiſting of thirty days.

This month is the beſt month, if the weather be dry, to ſow barley and white oats, to deſtroy weeds, and alſo to fallow land.

Fell the timber you intend to bark, if the ſpring be forward: cleanſe and rid your coppices, and preſerve them from cattle: keep geeſe and ſwine out of commons and paſtures, and water new planted trees, if the weather prove dry.

Pick up ſtones on the new ſown land: ſow hemp and flax.

Cleanſe ditches, and get in your manure that lies in the ſtreets or lanes, or lay it in heaps.

Set oſiers, willows, and other aquatics, before they are too forward, and alſo ſlips of roſemary or lavender.

You may throughout this month ſow clover graſs, St. Foyn, and all French and other graſſes, or hays:

plant madder, and be ſelling of your winter fed cattle. *Mortimer's Huſbandry.*

AQUATICS, or *aquatic* plants, ſuch plants and trees as grow in water.

Thus, the willow, oſier, water-creſſes, brook-limes, &c. are aquatics.

ARABLE *land*, ſuch land as is tilled, or cultivated for the production of corn.

ARAIRE, the name of a ſmall plough uſed in Provence and Languedoc, in France.

It conſiſts of a ground wriſt, *a*, *b*, (Plate I. Fig. 3.) from three to four feet long, ending in a point towards *b*. The under part of this wriſt, inſtead of being flat, is formed into a ridge, which extends the whole length of it.

This ground wriſt, at the end *a*, terminates in a ſtrong tenon fixed in a large mortiſe, formed at the extremity *d* of the beam *d e*, and is beſides faſtened to the beam by two iron uprights *f g*, which have a head at *g*, and going through the beam are keyed at *f*: the diſtance between the under part of the beam about *f*, and the upper part of the ground wriſt towards *g*, is about fifteen inches. Inſtead of theſe uprights there is ſometimes put a piece of ſharpened wood or iron, as repreſented by the pricked line *h g*, which ſerves inſtead of a coulter.

On the upper part of the ground wriſt is fixed a large iron ſhare *d h* (Fig. 4). the part *d i*, is received into the ſame mortiſe of the extremity *d* (Fig. 3.) in which the tenon of the ground wriſt is faſtened; and the wings of the ſhare *k l* (Fig. 4.) reſt upon the iron uprights *f g* (Fig. 3.)

On the hindermoſt part of this plough is a ſingle lever *m d* (Fig. 3.) which ſerves for a handle: at the end *d*, where it is bent, it enters, as well as the ground wriſt and ſhare, into the great mortiſe *d*, at the end of the beam; and the whole is ſecured with wedges. The handle ſometimes conſts of two pieces lapped one over the other, as at *n*, to lengthen or ſhorten it, according to the height of the ploughman.

By means of the wedges juſt mentioned, the angle which the ground wriſt forms with the beam, may be altered at pleaſure, which makes it plough more or leſs deep. At the hinder parts of the ground wriſts are two earth boards, faſtend at *o*, by a ſtrong wooden pin, which paſſes through both the boards and the ground wriſt.

The beam *d*, *f*, *e*, which is from eight to ten feet long, has an iron bolt at the end *e*, which enters with great eaſe into a large mortiſe made at the extremity *g*, of the piece of wood *q* 5 *r*, intended to paſs between the oxen, and to which their harneſs is to be faſtened. When a ſingle horſe is uſed in the plough, a ſhaft is ſubſtituted inſtead of the piece of wood *q* 5 *r*, and faſtened to the end of the beam *e*, by an iron ringlet.

It is evident that this plough goes a greater or leſs depth, according as the draught is more or leſs raiſed. The ploughman, as has been already obſerved, can alter the angle which the ground wriſt forms with the beam, by means of the wedges he drives into the mortiſe of the beam, which receives both the ground wriſt and handle. But theſe directions not being ſufficiently exact, it is neceſſary that the ploughman ſhould lean on the handle *m*, when it cuts too deep, and raiſe it when it makes too ſhallow a furrow: this labour is ſo conſtant, that were the plough to work in a ſtrong ſoil, the ploughman could not ſupport it. The two little earth boards *p p*, turn over to the right and left the earth that has been looſened by the ſhare; but this is not done ſo regularly, as when there is but one earth board, which throws the earth into the furrows before made, as faſt as it comes out of that which the plough is forming: it is however certain, that the ground wriſt being ridged, the ploughman always reſts it on one ſide, which occaſions the greater part of the earth to be thrown one way.

Theſe ploughs having no coulters, the earth is not cut vertically at all: for neither the piece of ſharpened wood, nor the ſheath which joins the ground wriſt to the beam, and which is placed a little before the ſmall iron bars *f*, *g*, can be eſteemed a coulter. The bar repreſented by the pricked line *h g*, may ſerve inſtead of a coulter, but it muſt then be made of iron; and in this caſe the coulter would be very improperly ſituated, for it ſhould by rights be before the ſhare.

Theſe ploughs are very convenient to uſe among trees, or in vineyards: they may alſo ſerve to ſtir the ground in the intervals between the rows of ſaintfoin and lucerne; but then ſhould be rather called cultivators, than ploughs. *Du Hamel's Elemens d'Agriculture.*

ARCHIMEDES's *ſcrew*, a kind of ſpiral pump, for raiſing water, ſo called from Archimedes, its inventor.

It conſiſts of a long cylinder, with a hollow pipe, tube, or groove coiled round it, as repreſented on Plate I. Fig. 5. where A B ſhews the cylinder, and C D the tube open at each end. It is placed in an oblique poſition to the horizon, with the lower end in the water to be raiſed, and the other ſupported by the pivot below the winch J K, by which the tube and cylinder are turned round.

As ſoon as the ſcrew is immerſed in the water, it immediately riſes therein by the orifice C, to the level of the ſurface of the water E F; and if the point of the ſpiral tube, which in the beginning of the motion is coincident with the ſurface of the water, happens not to be on the lower ſide of the cylinder, the water will, upon the motion of the ſcrew, move on the ſpiral tube, till it comes to the point which is on the other ſide, and coincident with the ſurface of the water; when it is arrived at that point, as ſuppoſe at O, it cannot afterwards poſſeſs any part of the ſpiral, but that which is upon the loweſt part of the cylinder; for it cannot move from O towards H or G, becauſe they are ſituated higher above the horizon; and ſince this will conſtantly be the caſe, after the water in the ſpiral has obtained the point O, it is plain that it muſt always be on the under part of the cylinder.

But becauſe the cylinder is in motion, every part of the ſpiral ſcrew from O to D, will, by degrees, ſucceed to every part thereof from O to D, as it comes on the lower ſide; that is, it muſt aſcend on the lower part of the cylinder through all the length of the pipe, till it comes to the orifice at D, where it will run out, as having nothing farther to ſupport it.

This engine may be very uſeful in raiſing water, foul with ſand, &c. as the leathers of pumps will be ſoon deſtroyed by theſe particles. And it was principally this reaſon that induced the ingenious Mr. Smeaton to erect a machine of this kind in the gardens of her royal highneſs the princeſs dowager of Wales at Kew, where it is worked by horſes, and ſupplies all the ponds, &c. in that extenſive garden with water. A machine of this kind, turned by a wind-mill, might be of great uſe in draining lands in ſeveral parts of England, as it is not ſubject to be out of order, and might be made to raiſe a very large quantity of water to a ſmall height. We ſhall deſcribe ſeveral other contrivances for this purpoſe when we come to treat of draining of lands, there being many very curious and uſeful engines of this kind depoſited in the machine room of the ſociety for the encouragement of arts, &c. *See the article* DRAINING *of* LANDS.

ARDERS, fallowings, or plowings of land.

ARK, a large cheſt to put corn or fruit in, like the bin of a buttery.

ARLES, or EARLES, earneſt; thus an arles-penny, ſignifies an earneſt penny.

AROMATIC, an epithet applied to ſuch plants, and other bodies, as yield a fine fragrant ſmell, and have a warm ſpicy taſte.

ARPENT, the French name for an acre. *See* ACRE.

We have already obſerved under the article *acre*, that the French arpent contains 100 perches of twenty-two French ſquare feet, which is equal to about one acre and three quarters of a rood Engliſh meaſure. But it may be neceſſary to add here, that the French have three different arpents, diſtinguiſhed by the epithets *little*, *middle*, and *great* arpent.

The little ARPENT contains 100 perches of eighteen feet and a half ſquare; conſequently its ſuperficial meaſure is 32,400 French feet, equal to 34,603 feet, or three rood, ſeven perches, and twenty-ſeven feet Engliſh meaſure.

The middle ARPENT, conſiſts alſo of 100 perches, twenty feet ſquare, which make 40,000 French feet ſuperficial meaſure; equal to 42,720 feet, or three rood, thirty-ſix perches, and 149 feet Engliſh meaſure.

The great ARPENT, contains ten perches of twenty-two ſquare perches. *See the article* ACRE.

ARTICHOKE, a plant well known in the Engliſh gardens, where there are two ſorts cultivated, namely, the globe artichoke, and the French artichoke.

The globe artichoke is much the better plant. This hath large heads, with brown ſcales, which turn inward: the fleſhy part at the bottom of the ſcales is very thick, and therefore preferred to the French artichoke, whoſe ſtalks generally grow higher; but the head ſmaller, and of a more conical form, than thoſe of the globe. The ſcales alſo are narrower, of a greener colour, and frequently turned outward. The fleſhy part, which is eaten, is not near ſo thick, and hath a diſagreeable perfumed taſte. This ſpecies was almoſt wholly deſtroyed in the Engliſh gardens during the hard froſt in 1739-40.

The manner of propagating this plant is from ſlips or ſuckers taken from the old roots, in February or March, which, if planted in a good ſoil, will produce large fair fruit the autumn following.

About the beginning of March, according to the goodneſs of the ſeaſon, or forwardneſs of the old artichoke ſtocks, will be the proper time of dreſſing them, which muſt be thus performed: with your ſpade remove all the earth from about your ſtock, down below the part from whence the young ſhoots are produced, clearing the earth from between the ſhoots, ſo as to be able to judge of the goodneſs of each, with their proper poſition upon the ſtock; then make choice of two of the cleareſt, ſtraiteſt, and moſt promiſing plants that are produced from the under part of the ſtock, which you are to let remain for a crop; then with your thumb force off all the other plants and buds, cloſe to the head of the ſtock, from whence they are produced, being very careful not to leave any of the buds, and with your ſpade draw the earth about the two plants which are left, and with your hands cloſe it faſt to each of them, ſeparating them as far aſunder as they can conveniently be placed without breaking them, obſerving to crop off the tops of the leaves, which hang down, with your hands: your ground being levelled between the ſtocks, you may ſow thereon a ſmall crop of ſpinage, which will be taken off before the archichokes will cover the ground; and be ſure to keep them clear from weeds; and towards the latter end of April, or the beginning of May, when your plants begin to ſhew their fruit, you muſt carefully look over your ſtocks, and draw up all young plants from them, which may have been produced ſince their dreſſing, and cut off all ſuckers which are produced from the ſtems of the artichokes, leaving only the principal head, by which means your fruit will be larger: when your artichokes are fit to gather, you muſt break, or cut them down cloſe to the ſurface of the ground, that your ſtocks may make ſtrong freſh ſhoots by the middle of November, which is the ſeaſon for earthing, or, as the gardeners term it, landing them up: which is thus done:

Cut off all the young ſhoots quite cloſe to the ſurface of the ground; then dig between every ſtock, raiſing all the earth between each row of ſtocks into a ridge, as is done in the common method of trenching ground, ſo as that the row of artichokes may be exactly in the middle of each ridge; this will be ſufficient to guard them againſt froſt: and I would here recommend it to the public, as infinitely preferable to long dung, which is by the unſkilful often uſed to cover the roots, and is the occaſion of their fruit being ſmall, and almoſt without any bottoms to them. Obſerve, that, although I have mentioned November as the ſeaſon for earthing them, yet, if the weather proves mild, it may be deferred till any time in December.

When you have thus earthed them up, you have nothing more to do till February or March, by which time they will have grown through the ridge of the earth; and, when the weather is proper, muſt be dreſſed as was before directed.

When you have a mind to make a new plantation of artichokes, after having digged in and buried ſome very rotten dung in the ground you have allotted for that purpoſe, make choice of ſuch of your plants, taken from your old ſtocks, as are clear, ſound, and not woody, having ſome fibres at the bottom; then with your knife cut off that knobbed woody part, which joined them to the ſtock; and if that cuts criſp and tender, it is a ſign of its goodneſs; but if tough and ſtringy, throw it away as good for nothing: then cut off the large outſide leaves of the plants, intended for ſetting, pretty low, that the middle or heart leaves may be above them.

Your plants being thus prepared (if the weather be very dry, or the plants have been any time taken from the ſtocks, it will be convenient to ſet them upright in a tub of water for three or four hours before they are planted, which will greatly refreſh them) you muſt then proceed to planting, which muſt be done by ranging a line acroſs the ground, in order to their being placed exactly in a row, and, with a meaſure-ſtick, plant them at two feet diſtance from each other in the rows, and, if deſigned for a full crop, five feet diſtance from row to row: your plants muſt be ſet about four inches deep, and the earth cloſed very faſt to their roots; obſerving, if the ſeaſon proves dry, to keep them watered two or three times a week, until they are gowing, after which they do not require any.

Theſe plants in a kindly ſeaſon, or on a moiſt ſoil, will produce the largeſt and beſt artichokes ſome time in Auguſt and September, after all thoſe from the old ſtocks are paſt; ſo that if you intend to continue your artichokes through the whole ſeaſon, you muſt make a new plantation every year, otherwiſe you cannot poſſibly have fruit longer than two or three months.

Thoſe artichokes which are planted in a moiſt rich ſoil, will always produce the largeſt and beſt fruit; ſo that where ſuch a ſoil can be obtained, it will be proper to make a freſh plantation every ſpring, to ſucceed the old ſtocks, and ſupply the table in autumn. But the roots will not live through the winter in a very moiſt ſoil; ſo that your ſtocks which you intend ſhould remain to ſupply the table early, and to furniſh plants, ſhould be in a drier ſituation. You ſhould always obſerve to plant artichokes in an open ſpot of ground, not under the drip of trees, where they will draw up very tall, and produce only ſmall inſignificant fruit. *Miller's Gard. Dict.*

That ingenious cultivator M. de Chateauvieux, has raiſed excellent artichokes in the open field, without dunging the ground, or even watering the plants, merely by a thorough ſtirring of the earth, according to the principles of the new huſbandry. "Artichokes, ſays that ingenious gentleman, planted at the beginning of May, produced, in September, their firſt fruit, which was, in general, from twelve to fifteen inches in circumference. Their leaves entirely covered the beds ſix feet wide."

Jeruſalem ARTICHOKE, a ſpecies of the ſun flower, of the perennial kind, propagated in many gardens for the roots, which are eſteemed by ſome people; but they are watery and windy, which hath brought them almoſt into diſuſe.

Theſe are propagated by planting the ſmaller roots, or the larger ones cut into pieces, obſerving to preſerve a bud to each ſeparate piece, either in the ſpring or autumn, allowing them a good diſtance, for their roots will multiply greatly: the autumn following, when their ſtems decay, the roots may be taken up for uſe. Theſe plants ſhould be cultivated in ſome remote corner of the garden, for they are very unſightly while growing, and their roots are apt to over-run whatever grows near them; nor can they be eaſily deſtroyed, when they are once well fixed in a garden. *Miller's Gard. Dict.*

ARTIFICIAL GRASSES, ſuch as are introduced into the field with great care, and cultivated afterwards with great diligence. Such as burnet, clover, lucern, saintfoin, ray-graſs, ſpurry, &c. *See the method of cultivating each under its proper article.*

ARTIFICIAL PASTURES, ſuch lands as are properly cultivated and ſown with the above plants, or any other that yield a great deal of fodder for cattle.

ASCARIDES, ſmall worms common in horſes, reſembling needles, ſome of them white, and ſome of an azure colour, with flattiſh heads. They are often called needle-worms by the farriers.

Theſe worms are very troubleſome, and hard to be rooted out, and expoſe horſes to frequent gripes, and other fretting uneaſy diſorders in their guts. They breed at all times of the year, and often when one brood is deſtroyed another ſucceeds. They are not mortal; but when a horſe is peſtered with this ſort of vermin, though he will go through his buſineſs tolerably well, and ſometimes feed heartily, yet he always looks lean and jaded; his hair ſtares as if he was ſurfeited, and nothing he eats makes him thrive; he oftens ſtrikes his hind-feet againſt his belly, which ſhews where his grievance lies, and is ſometimes griped, but without the violent ſymptoms that attend a cholic, or ſtrangury, for he never rolls or tumbles, but only ſhews uneaſineſs, and generally lays himſelf down quietly on his belly for a little while, and then gets up and falls a feeding; but the ſureſt ſign is when he voids them with his dung.

Theſe ſmall worms ſometimes come away in great numbers with a purge, and ſome horſes get clear of them by purges only; but this does not often happen; for the horſes that breed aſcarides are, above all others, ſubject to ſlime and wormy matter. They ſeem to have their lodgment about the beginning of the ſmall guts, near the ſtomach, among the concocted aliment or chyle, both from their colour, the ſymptoms of the gripes, and the ſudden fits of ſickneſs theſe horſes are often ſeized with, which ſometimes make them abruptly leave off their food, for a few minutes, and fall greedily to it again as ſoon as the ſick fit is over. They are ſeldom ſeen, except when a horſe has had a purge given, or when he falls into a natural purging, which thoſe horſes are often ſubject to, and then they come away in very great numbers, with much ſlime and naſtineſs. They not only make a horſe grow lean, and look ſurfeited; but in opening his mouth, one may perceive a more than ordinary languid whiteneſs, and a ſickly ſmell, from the want of thoſe due ſupplies of blood and nouriſhment, which give a livelineſs to the colour that is always perceivable in ſound vigorous horſes; ſo that whatever be the primary cauſe, theſe worms ſeem, in a great meaſure, to proceed from a vitiated appetite, and a weak digeſtion, which renders them the more difficult to be removed; for which reaſon recourſe muſt be firſt had to mercurials, and after theſe, to ſuch things as are proper to ſtrengthen the ſtomach, promote digeſtion, and give a better tone to the ſolids.

To a horſe, therefore, that is troubled with theſe ſmall white, or azure coloured worms, the following method may be obſerved:

“Take of calomel that has been often ſublimed and well prepared, two drams; diapente half an ounce; make it into a ball, with a ſufficient quantity of conſerve of wormwood, or of rue, and give it in the morning, keeping the horſe from meat and water four hours before, and four hours after taking it.”

The next morning adminiſter the following purge, taking great care to keep the horſe from wet, or from any thing that may expoſe him to catch cold.

“Take Barbadoes, or plantation aloes, one ounce; ſalt of tartar, two drams; freſh ginger grated, a dram and a half; oil of amber a middling ſpoonful: make the whole into a ball with flour or liquorice powder.”

This purge may be worked off in the ſtable with warm water, which is much the ſafeſt way when mercurials are given. The calomel ball and purge may be repeated in ſix or eight days; and again in ſix or eight days more.

When a horſe has gone through a courſe of theſe mercurials purges, let the following drink be given two or three times a week, and continued till the horſe begins to thrive and look healthful.

“Take rue, camomile flowers, and horehound, of each a handful; galangals, bruiſed in a mortar, three drams; liquorice root, ſliced, two drams: boil it in a quart or three pints of forge-water five or ſix minutes, in a covered veſſel, and keep it covered till cold: then ſtrain it through a piece of coarſe canvas, and give it in the morning upon an empty ſtomach.” *Gibſon on the Diſeaſes of Horſes.*

ASH, or ASH-TREE. There are ſeveral ſpecies of the aſh-tree cultivated by curious perſons for the ſake of variety; but what deſerves attention in a work of this kind, is the common aſh, called by botaniſts, *fraxinus foliolis ſerratis, floribus apetalis*; and is ſo well known as to need no deſcription.

This tree propagates itſelf in plenty by the ſeeds which ſcatter in the autumn; ſo that when the ſeeds happen to fall in places where cattle do not come, there will be plenty of plants come up in the ſpring; but when any perſon is deſirous of raiſing a quantity of the trees, the ſeeds ſhould be ſown as ſoon as they are ripe; and then the plants will come up the following ſpring; but if the ſeeds are kept out of the ground till ſpring, the plants will not come up till the year after; the ground therefore ſhould be kept clean all the ſummer where they are ſown, and not diſturbed, leſt the ſeeds ſhould be turned out of the ground, or buried too deep to grow.

When the plants are come up, they muſt be kept clean from weeds during the ſummer; and, if they make good progreſs in the ſeed-bed, they will be fit to tranſplant by the following autumn; ſome ground ſhould, therefore, be prepared to receive them; and as ſoon as their leaves begin to fall, they ſhould be tranſplanted. In taking of them up care ſhould be taken not to break or tear off their roots; to prevent which they ſhould be taken up with a ſpade, and not drawn up, as is frequently practiſed; for as many of the plants which riſe firſt from ſeeds will out-ſtrip the others in their growth, ſo it is frequently practiſed, to draw up the largeſt plants, and leave the former to grow a year longer, before they are tranſplanted; and to avoid hurting thoſe that are left, the others are drawn out by hand, and thereby many of their roots are torn off, or broken. It is, therefore, much the better way to take all up, little or big, together, and tranſplant them out, placing the large ones together in rows, and the ſmall ones by themſelves. The rows ſhould be three feet aſunder, and the plants a foot and a half diſtance in the rows. In this nurſery they ſhould remain two years, by which time they will be ſtrong enough to plant where they are to remain, for the younger they are planted out the larger they will grow; ſo that where they are deſigned for uſe, they ſhould be planted very young; nor ſhould the ground where they are raiſed be better than that where they are deſigned to grow. For when any plants are raiſed in good land, and afterwards planted into worſe, they very rarely thrive; ſo that it is much the better method to make the nurſery upon a part of the ſame land, where the trees are deſigned to be planted, and then a ſufficient number of the trees may be left ſtanding upon the ground; and theſe will outſtrip thoſe which are removed, and grow to a larger ſize.

Where people live in the neighbourhood of aſh-trees, they may ſupply themſelves with plenty of ſelf-ſown plants, provided cattle are not ſuffered to graze on the land; for if cattle can come at them, they will eat off the young plants, and not ſuffer them to grow; but where the ſeeds fall in hedges, and are protected by buſhes, the plants will come up and thrive: in theſe hedges the trees are frequently permitted to grow till they have deſtroyed the hedge, for there is ſcarce any tree ſo hurtful to all kinds of vegetables as the aſh, which robs every plant of its nouriſhment within the reach of its roots, and ſhould therefore never be ſuffered to grow in hedge-rows; for they not only kill the hedge, but impoveriſh corn, or whatever is ſown near them. Nor ſhould any aſh-trees be permitted to grow near paſture grounds, for if any of the cows eat of the leaves or ſhoots of the aſh, all the butter that is made of their milk will be rank, and of little or no value. In all good dairy countries therefore they never ſuffer any aſh-trees to grow.

If the wood of theſe trees be rightly managed, it will turn greatly to the advantage of its owner; for by the under wood, which will be fit to cut every eight or ten years, there will be a continual income more than ſufficient to pay the rent of the ground, and all other charges; and ſtill there will be a ſtock preſerved for timber, which in a few years, will be worth forty or fifty ſhillings per acre.

This timber is of excellent uſe to the wheelwrights and cartwrights for ploughs, axle-trees, fellies of wheels, harrows, oars, blocks for pullies, and many other purpoſes.

The beſt ſeaſon for felling theſe trees is from November to February; for if it be done either too early in the autumn, or too early in the ſpring, the timber will be ſubject to be infeſted with worms, and other inſects: but for lopping of pollards the ſpring is preferable for all ſoft wood. *Miller's Gard. Dict.*

ASHES, the earthy particles of combuſtible ſubſtances remaining after they have been burnt.

If the aſhes are produced from vegetable bodies, they contain a conſiderable quantity of fixed ſalt, blended with the earthy particles, and from theſe particles, the alcaline ſalts, called pot-aſh, pearl-aſh, &c. are extracted.

Aſhes of all ſorts contain in them a very rich fertile ſalt, and are the beſt manure of any to lay upon cold lands, eſpecially if kept dry, and the rain doth not waſh away their ſalts. One load of dry aſhes will go as far as two not kept ſo. But as rain water diminiſhes their ſalts, ſo the moiſtening them with chamber-lie, or ſoap-ſuds, will add greatly to their ſtrength. Two load of theſe aſhes will manure an acre of land better than ſix load of thoſe that are expoſed to the rain, and that are not ordered ſo, which is the common allowance for an acre, though ſome lands require more, and ſome leſs. That the aſhes of any ſort of vegetables are very advantageous to land, is what is experienced in moſt places of England, by the improvement that is made by burning of fern, ſtubble, ſtraw, heath, furze, ſedge, bean-ſtalks, &c. *Mortimer's Huſbandry.*

Coal ASHES from their calcarious quality, are ſingularly beneficial to ſtiff and ſour land, for which purpoſe they are ſucceſsfully uſed in the neighbourhood of ſome great cities, where coal is burnt for fuel. They open clayey grounds, and correct their bad qualities. The gardeners and farmers about London know their value, and make a very profitable uſe of them, particularly to bring into order thoſe grounds which have been dug for brick earth. After ſpreading theſe aſhes upon the clay bottom, they either ſow horſe-beans, or ſet the early Spaniſh, and ſometimes the Windſor-bean in thoſe ſpots; or elſe they lay ſuch lands down with rye-graſs, which generally ſucceeds very well. Mr. Bradley blaming the people of Staffordſhire, and the counties adjoining, where there are coal-pits, for not improving their heavy grounds around thoſe pits, by manuring them with coal aſhes, which might be eaſily burnt out of the waſte coals, ſays, "that wherever there are plenty of coal-pits, there can be no want of good profitable land." *Bradley's Huſbandry.*

Mr. Mortimer agrees entirely with Mr. Bradley, eſteeming ſea-coal aſhes as the beſt manure of any for cold lands, the moſt laſting, and the fitteſt to kill worms. Their ſharp and drying quality opens the pores of ſtiff ſoils, and diſcharges a great deal of their viſcous quality. Mr. Worlidge looks upon them as an excellent compoſt when mixed with horſe dung; he adds, that they are a great curer of moſs and ruſhes in moſt grounds. *Worlidge's Huſbandry.*

Kiln ASHES, made of ſtraw, furze, &c. are a good manure for almoſt any kind of ſoil. In the weſt of England farmers ſift them over their corn and graſs; but this muſt not be done in windy weather, becauſe they are ſo very light that they would be eaſily blown away. They ſucceed beſt when laid on juſt before rain or ſnow. *Mills's Huſbandry, vol.* I.

Peat ASHES are likewiſe a very good manure. Mr. Miller is of opinion, that they are greatly bettered by being mixed with lime before they are laid on the land.

Mr. Ellis has rightly obſerved, that there is a conſiderable difference between the aſhes of lean peat, and thoſe produced by the fatter kind. If barley, ſays he, be ſown ſo late as the beginning of May, lean peat aſhes in particular may be applied over it, or harrowed in with the grain; but aſhes burnt from fat black peat, ſuch as is dug at Newbury, are of ſo ſulphureous a nature, that farmers are afraid to lay them on their barley; nor do they dreſs their wheat with them till the ſpring is advanced, and then they are ſown over it.

The earth of which this rich manure is made, is taken from a black mooriſh ground, with a narrow wood ſcoop, which brings it out like a long brick. Theſe pieces of ſwampy earth are laid on the ground to dry in the ſummer; after which they ſell for eight ſhillings a waggon load, for fuel. But when they are to be uſed for manure, after being dried, they are burnt in heaps of ten, twenty, or thirty loads, laying on more peat upon the outſides, as the fire increaſes within, to keep it from having too much vent.

The great uſe of theſe aſhes was diſcovered about fifty years ago; but they ſoon fell into diſrepute, owing to the injudicious management of people, who imprudently laid on too great quantities of them at a time, by which means the corn was burnt. Afterwards they found that ſix, or at moſt ten buſhels, were ſufficient to be ſown over an acre of wheat, peaſe, turnips, clover, rape-ſeed, or ſaintfoin, as early as could conveniently be done. But ſtill many are afraid to ſow them over barley, leſt a dry ſeaſon ſhould enſue, and burn it up: for theſe aſhes are thought to contain three times as much ſulphur as there is in coal aſhes. This is reaſonably ſuppoſed from their very ſtrong ſulphureous ſmell; their ſparkling and jumping when ſtirred while burning, and their drying up corn by their too great heat. Theſe peat aſhes, as likewiſe thoſe of wood or coal, will help to keep off the ſlug from peaſe and other grains, by the ſalt and ſulphur contained in them, and conduce very much to their preſervation in cold wet ſeaſons. But no danger of over-heating need be feared from the aſhes of that peat which grows, as turf, over ſandy bottoms, as great quantities do on Leighton-heath in Bedfordſhire; for theſe are as much too lean, as the others are too rank. *Ellis's Modern Huſbandman, vol.* II.

We muſt not here omit the account the ingenious Mr. du Hamel has given of a kind of peat aſhes made in France, as the ſame kind of earth with that from whence they are burnt, may be doubtleſs found in many parts England, if farmers would give themſelves the trouble to ſearch for it.

This peat is a blackiſh earth, reſembling the ſoil of ſome meadows. When burnt it emits a thick, diſagreeable ſulphureous vapour. A certain degree of moiſture helps to make it burn, though even then it waſtes but ſlowly. After it has once taken fire it burns of itſelf, but without producing any flame. It is of ſo cauſtic a nature, that it would ſtrip off the ſkin of the hands and feet of the men who knead it, if they did not take proper precautions againſt that inconvenience. Its aſhes retain this cauſtic quality; for the hands of thoſe peaſants who ſtrew them are often hurt by it, if the air be at all damp. This earth, in its natural poſition runs in veins of different ſizes; ſometimes ſeven or eight feet thick, and thirty or forty feet long; and ſometimes they extend four or five hundred feet; after which the vein often fails at once, and perhaps is not found again till two or three miles off. Theſe veins generally lie pretty near the ſurface of the earth, ſeldom deeper than twelve or fifteen feet.

This earth is found only in marſhy places, which muſt ſometimes be drained before it can be come at. It ſhews itſelf by a ſlimy ſkin over the adjacent waters.

Three pounds of this earth being diſtilled in a retort, produced fifteen ounces of a bituminous oil, reſembling that extracted from pit-coal; and the reſiduum yielded, when waſhed, about half a pound of vitriol.

The method of preparing this earth, in order to render it fit for fertilizing land, is as follows: water is thrown over it, and two or three men knead it with their feet, till they bring it to the conſiſtence of a paſte, which is then made into cakes ſeven or eight inches in diameter. Theſe cakes are laid by to dry, though not to ſuch a degree but that there ſtill remains a little moiſture in them, that being neceſſary to facilitate their burning.

The cakes thus prepared are piled up in the form of a pyramid, with ſufficient ſpaces between them for the fire to penetrate; and under this pyramid, which is built upon a kind of hearth, a little ſtraw and bruſh-wood is laid to ſet them on fire. Two or three days after their aſhes are ſpread with a rake, that they may cool. Some veins of this earth yield white aſhes, but they are not ſo good as thoſe of a reddiſh hue.

From fifty to ſeventy pounds of theſe aſhes are ſpread upon each acre of land in April or May; and in about a week's time the blades of corn, or graſs, if it be paſture ground, aſſume a new verdure, and appear ſurpriſingly ſtrong, even in the coldeſt ſoils.

Some of theſe bituminous earths are better than others. Care muſt be taken to begin to rake out the aſhes of each pyramid as ſoon as the greater part of it is burnt; for they would loſe a great deal of their virtue, if left on the fire till all that is inflammable be conſumed: nor would the fire go out in leſs than a fortnight or three weeks, if they were not ſcraped away as they are formed.

It would be needleſs to mention, that a greater quantity of the aſhes of an inferior quality muſt be uſed, than of thoſe that are ſtronger, and conſequently better; but it may not be amiſs to obſerve, that, in general, wet lands require more than dry ſoils. The effects of this manure will be manifeſt for two or three years. It might be dangerous to renew it every year. *Traitté de la Culture de Terres, tom.* V. *pag.* 226.

Pot Ashes are the refuſe or aſhes remaining after the ſalt, called pot aſhes, is extracted from them.

Theſe aſhes are of great ſervice to moſt ſorts of land; but as they have been in a great meaſure deprived of their ſalts, it is neceſſary to lay them on much thicker than other aſhes. A buſhel and a half of theſe may be uſed for a buſhel of freſh aſhes: but they ſhould always be mixed with ſome other light ingredient, which may be uſed in any quantity, if laid on very ſtiff land. If the land be not over ſtiff, they may be laid upon it with leſs mixture. *Bradley's Huſbandry.*

Soap Ashes are a compoſition of wood aſhes and lime, remaining after the ſoap-makers have drawn off their lye.

They are an excellent manure, and were firſt uſed by the Flemings with very great ſucceſs. Two loads of theſe aſhes are ſufficient for an acre of arable land; and by the aſſiſtance of this manure the ground will not only yield a large crop, but may be ſown yearly, without leaving it fallow at any time. They ſhould be laid on the ground in the beginning of winter, that the rain may more eaſily diſſolve and waſh them in. Sir Hugh Platt tells us, that by manuring a piece of barren land at Biſhop's-hall in Middleſex, in the year 1594, he obtained an excellent crop of ſummer barley; that he meaſured the ſtalk and ear of one of theſe plants, and found it to be an ell and three inches in length, from the ground to the ſummit of the ear. We have given a figure of this ear of ſummer barley in its natural ſize, on Plate III. Fig. I. *Platt's Jewel-houſe of Art and Nature.*

A writer in the *Muſeum Ruſticum* declares, that he has for many years paſt received great benefit by uſing ſoap aſhes as a manure, with which he almoſt conſtantly dreſſes his wheat lands; but never uſes it alone, on account of its hot burning quality.

“ My method, adds he, is to make a large heap of dung and earth, that is two loads of earth to one of dung, placed in alternate layers to rot. After this has undergone a ſtrong fermentation, I cauſe the whole heap to be turned and well mixed, leaving it ſome time longer to mellow.

“ I then procure the ſoap aſhes, and mix them with the compoſt, in the proportion of one load of aſhes to ten of the compoſt, leaving, for ſome time, the whole to mellow together.

“ When wheat ſeed-time comes, about the latter end of September, I cauſe about ten cart loads of this rich compoſt to be laid in little heaps on each acre of the land I intend to ſow with wheat: this manure is immediately ſpread, and, ſowing my wheat broad caſt, I plough it in together with the compoſt.

“ The advantage reſulting from this practice, on ſtiff ſoils, are many; and particularly, if the farmer is the leaſt careful in preparing his tilth, he will have a clean crop, free from ſmut or weeds; a matter of no ſmall conſequence to him.

“ I have tried this manure on lighter lands, and find it anſwer extremely well, provided it has lain a conſiderable time in the compoſt heap, to mellow and abate its natural heat; but it agrees beſt by far with clayey ſoils, and in ſuch is well worthy of being recommended as an excellent dreſſing for a wheat crop.” *Muſeum Ruſt. vol.* IV. *pag.* 339.

Turf Ashes, the aſhes procured by burning turfs, or the parings of the ſurface of heathy and mooriſh land. *See the article* Burn-Baking.

Theſe parings, or turfs, are cut in a dry ſeaſon, and ſet up to dry thoroughly, leaning one againſt another; and, when dry, are piled into ſmall heaps or piles, about a quarter or half a load, in each, carried up exactly ſquare to a certain height, and then drawn up gradually in a pyramidical manner, ſo as to throw off any accidental ſhowers. In a very dry ſeaſon even the covering of theſe piles may be carried home, and ſtacked or houſed indiſcriminately with the reſt; but in a wetter ſeaſon it is uſual to ſeparate and dry thoſe topmoſt turfs, if the weather allows, and to ſtack them ſeparately, to be uſed on the tops of fires, when large, as dampers. A ſtout labourer will, in a day, cut two waggon loads of theſe turfs. The women and children can ſet them up to dry, and the women can pile them up.

Theſe aſhes (in the moors of Yorkſhire, where, as the Rev. Mr. Comber informs us they are greatly uſed, the principal firing being turfs) are carried out daily, or once in two or three days, to the dunghill; and the farmer takes the opportunity of his firſt leiſure towards the end of the year, to carry them out to his meadow land, on which he lays them thicker or thinner, as he has more or leſs land which he apprehends to want them, or more or leſs of them. The firſt rains waſh them in, and the next ſummer never fails to ſhew their good effect.

It will be eaſily imagined, that as theſe aſhes are much finer, or more pulverized than thoſe of coals, ſo they more inſinuate themſelves into the ſoil, but are, in their effects, much leſs laſting. However, as every year brings a conſiderable ſupply, the farmer is leſs concerned that they are not a laſting manure.

In the moors of Yorkſhire, the farmer is ſo ſenſible of the efficacy of theſe aſhes, that it is become a proverb among them, “ The better fire, the richer farmer.” In conſequence of this principle, the farmer endeavours to procure all the aſhes he can from the cottagers who have no land. And hence a happy connection ariſes; for the poor cottager finding the article of carriage the chief part of the expence of his fuel, is wiſe enough to bargain with the farmer to bring him home ſuch a quantity of his turfs in conſequence of his aſhes.

Some farmers lay theſe aſhes on their ground in the ſpring; and, if ſhowers follow, they will have their effect in the ſummer crop, though not ſo great as if they had been laid on at the end of the year. It muſt however be remarked, that he who lays on his aſhes in the ſpring, lays on what has been very lately made in the winter; and he who lays on at the latter end of the year, lays on what has been evaporating during the whole ſummer; ſo that it is not eaſy to ſay which method is the better. *Muſeum Ruſticum, vol.* V. *pag.* 311.

ASPARAGUS, *ſparagus*, or *ſperage*, corruptly called *ſparrow-graſs*, a plant well known in the Engliſh gardens. Mr. Miller has enumerated ten ſpecies of this plant; but that generally cultivated is the garden aſparagus, called by botaniſts, *aſparagus caule herbaceo erecto, foliis ſetaceis, ſtipulis paribus.*

The garden aſparagus is propagated by ſowing of the ſeed; in the procuring of which, you ſhould be particularly careful to get it from ſome perſon of integrity; or, if you have any opportunity, ſave it yourſelf, or in ſome other neighbouring garden. In order to which a ſufficient number of the faireſt buds ſhould be marked early in the ſpring. Theſe buds will, many of them, produce great numbers of red berries; which ſhould be ſuffered to remain upon the branches until the latter end of September, when the haulm will begin to decay; then cut off the branches, and ſtrip the berries into a tub, where they may lie in an heap to ſweat for three weeks; by which means the outer huſks will be rotten: then fill the tub with water, and break all the huſks, by ſqueezing them between your hands. Theſe huſks will all ſwim upon the water, but the ſeed will ſink to the bottom; ſo that, by pouring off the water gently, the huſks will be carried along with it; and by putting freſh water two or three times, and ſtirring your ſeed about, you will make it entirely clean; then ſpread your ſeed upon a mat, and expoſe it to the ſun and air in dry weather, until it is perfectly dry; when you may put it into a bag, and hang it up in a dry place till the beginning of February; at which time, you muſt prepare a bed of good, rich earth, made very level, whereon you muſt ſow you ſeed (but not too thick, which will cauſe your plants to be ſmall) and, having trod your ſeed into the ground, rake it over ſmooth.

In the following ſummer keep it diligently cleared from weeds, which will greatly add to the ſtrength of your plants; and, towards the latter end of October, when the haulm is quite withered, you may ſpread a little rotten dung over the ſurface of the ground, about an inch thick; which will preſerve the young buds from being hurt by the froſts, &c.

The ſpring following your plants will be fit to plant out for good (for I would never chuſe plants of more than one year's growth, having very often experienced them to take much better than older, and to produce finer roots) you muſt therefore prepare your ground by trenching it well, burying therein a good quantity of rotten dung at the bottom of each trench, that it may lie at leaſt ſix inches below the ſurface of the ground: then level your whole plot very exactly, taking out all large ſtones; but this ſhould be done not long before you intend to plant your aſparagus; in which you muſt be governed according to the nature of your ſoil, or the ſeaſon; for if your ſoil is dry, and the ſeaſon forward, you may plant early in March; but, in a very wet ſoil, it is better to wait till the middle of April; which is about the ſeaſon that the plants are beginning to ſhoot. I know many people have adviſed the planting of aſparagus at Michaelmas; but this I have experienced to be very wrong; for in two different years I was obliged to tranſplant large quantities at that ſeaſon; but I had better have thrown away the plants; for, upon examination, in the ſpring, I found moſt of the roots were grown mouldy, and decaying: and, I am ſure, not one in five of them ſucceeded; and thoſe which did, were ſo weak, as not to be worth their ſtanding.

The ſeaſon being now come, you muſt, with a narrow pronged dung-fork, carefully fork up your roots, ſhaking them out of the earth, and ſeparating them from each other; obſerving to lay their heads even, for the more convenient planting them; which muſt be performed in this manner: your plot of ground being levelled, you muſt begin at one ſide thereof, ranging a line very tight croſs the piece; by which you muſt throw out a trench exactly ſtraight, and about ſix inches deep; into which you muſt lay your roots, ſpreading them with your fingers, and placing them upright againſt the back of the trench, that the buds may ſtand forward, and be about two inches below the ſurface of the ground, and at twelve inches diſtance from each other; then, with a rake, draw the earth into the trench again, laying it very level, which will preſerve the roots in their right poſition: then remove your line a foot farther back, and make another trench in like manner, laying therein your plants, as before directed, and continuing the ſame diſtance row from row; only obſerving, between every four rows, to leave the diſtance of two feet and a half, for an alley to go between the beds, to cut the aſparagus, &c.

Your plot of ground being finiſhed and levelled, you may ſow thereon a ſmall crop of onions, which will not hurt your aſparagus; and tread in your ſeeds, raking your ground level.

There are ſome perſons who plant the ſeed of aſparagus in the place where the roots are to remain; which is a good method, if it be performed with care. The way is this: after the ground has been well drenched and dunged, they lay it level, and draw a line acroſs the ground (in the ſame manner as is practiſed for planting of the young plants) then, with a dibble, make holes at a foot diſtance; into each of which you muſt drop two ſeeds, for fear one ſhould miſcarry: theſe holes ſhould not be more than half an inch deep: cover the ſeeds, by ſtriking the earth in upon it; and go on, removing the line a foot back for another row; and, after four rows are finiſhed, leave a ſpace for an alley between the beds, if it is deſigned to ſtand for the natural ſeaſon of cutting; but, if it is to be taken up for hot-beds, there may be ſix rows planted in each bed; and the diſtance in the rows need not be more than nine inches. This ſhould be performed by the middle of February, becauſe the ſeeds lie long in the ground: but, if onions are intended to be ſown upon the ground, that may be performed a fortnight or three weeks after, provided the ground is not ſtirred ſo deep as to diſturb the aſparagus-ſeeds, in raking the onion ſeed into the ground.

As the roots of aſparagus always ſend forth many long fibres, which run deep into the ground; ſo, when the ſeeds are ſown where they are to remain, theſe roots will not be broken or injured, as thoſe muſt be which are tranſplanted; therefore they will ſhoot deeper into the ground, and make much greater progreſs; and the fibres will puſh out on every ſide; which will cauſe the crown of the root to be in the center; whereas, in tranſplanting, the roots are made flat againſt the ſide of the trench.

When your aſparagus is come up, and the onions have raiſed their ſeed-leaves upright, (which will be in three weeks or a month after planting) you muſt, with a ſmall hoe, cut up all the weeds, and thin your crop of onions, where they may have come up in bunches; but this muſt be done carefully, and in dry weather, that the weeds may die as faſt as they are cut up, being careful not to injure the young ſhoots of aſparagus. This work muſt be repeated about three times; which, if well done, and the ſeaſon not too wet, will keep the ground clear from weeds, until the onions are fit to be pulled up, which is commonly in Auguſt; and is known, when their greens fall down, and begin to wither. When you have drawn off your onions, you muſt clean your ground well from weeds; which will keep it clean till you earth your beds, which muſt be done in October, when the haulm begins to decay; for if you cut off the haulm, while green, the roots will ſhoot freſh again, which will greatly weaken them. This young haulm ſhould be cut off with a knife, leaving the ſtems two or three inches above ground; which will be a guide to you to diſtinguiſh the beds from the alleys; then, with an hoe, clear off the weeds into the alleys, and dig up the alleys, burying the weeds in the bottom; and throw the earth upon the beds, ſo that the beds may be about five inches above the level of the alleys: then you may plant a row of coleworts in the middle of the alleys; but do not ſow or plant any thing upon the beds, which would greatly weaken the roots: nor would I ever adviſe the planting of beans in the alleys (as is the practice of many) for it greatly damages the two outſide rows of the aſparagus. In this manner it muſt remain till ſpring, when you muſt hoe over the beds, to deſtroy all young weeds; then rake them ſmooth, and obſerve, all the ſucceeding ſummer, to keep them clear from weeds; and in October dig up the alleys again, as was before directed, earthing the beds, &c.

The ſecond ſpring after planting, you may begin to cut ſome of your aſparagus, though it will be much better to ſtay until the third; therefore now you muſt fork up your beds with a flat pronged fork, made on purpoſe, which is commonly called an aſparagus fork: this muſt be done before the buds ſhoot in the ſpring, and with care, leſt you fork too deep, and bruiſe the head of the root; then rake the beds over ſmooth, juſt before the buds appear above ground; which will deſtroy all young weeds, and keep your beds clean much longer, than if left unraked, or done ſo ſoon as forked: and, when your buds appear about four or five inches above-ground, you may then cut them; but it ſhould be done ſparingly, only taking the large buds, and ſuffering the ſmall to run up to ſtrengthen the roots; for, the more you cut, the greater will be the increaſe of buds; but they will be ſmaller, and the roots ſooner decay. When you cut a bud, you muſt open the ground with your knife (which ſhould be very narrow and long in the blade, and filled with teeth like a ſaw) to ſee whether any more young buds are coming up cloſe by it, which might be either broken or bruiſed in cutting the other; then, with your knife, ſaw it off about three inches under-ground. This may appear a troubleſome affair, to people unacquainted with the practical part; but thoſe who are employed in cutting aſparagus, will perform a great deal of this work in a ſhort time; but care in doing it is abſolutely neceſſary to be obſerved by all who cut aſparagus.

The manner of dreſſing your aſparagus-beds is every year the ſame as directed for the ſecond; viz. keeping them from weeds, digging the alleys in October, and forking the beds towards the end of March, &c. only obſerve, every other year, to lay a little rotten dung (from a melon or cucumber-bed) all over your beds, burying ſome in your alleys alſo, at the time for digging them up. This will preſerve the ground in heart to maintain your roots in vigour; and by this management, a plat of good aſparagus may be continued for ten or twelve years in cutting, and will produce good buds, eſpecially if it be not cut too long each ſeaſon; for when it is not left to run up pretty early in June, the roots will be greatly weakened, ſo that the buds will be ſmaller: therefore in thoſe families where aſparagus is required late in the ſeaſon, a few beds ſhould be ſet apart for that purpoſe, which will be much better than to injure the whole plantation, by cutting it too long.

The quantity of ground neceſſary to be planted with aſparagus, to ſupply a ſmall family, ſhould be at leaſt five or ſix rods; leſs than that will not do: for if you cannot cut one hundred at a time, it will ſcarcely be worth while; for you muſt be obliged to keep it after it is cut two or three days, to furniſh enough for one meſs; but for a larger family, twelve rods of ground ſhould be planted, which, if a good crop, will furniſh two or three hundred each day in the height of the ſeaſon. *Miller's Gard. Dict.*

Asparagus-*fork*, a flat pronged fork, made on purpoſe to fork up the beds of aſparagus.

ASPECT, among gardeners, the ſame with expoſure. *See the articles* Exposure.

ASPEN-TREE, a ſpecies of the poplar, and called by botaniſts, *populus foliis ſubrotundis dentato angulatis utrinque glabris*. Poplar-tree with roundiſh leaves, having an angular indenture, and ſmooth on both ſides.

The leaves of this tree ſtand upon long ſlender footſtalks, ſo as to be ſhaken by the leaſt wind, from whence it has been called the trembling poplar, or aſpen-tree.

The method of cultivating this tree is the ſame in every reſpect as that of the abele-tree. *See* Abele-Tree.

ASS, a creature well known in moſt parts of Europe, and proves very uſeful in many reſpects, if taken proper care of.

The horſe is trained up, great care is taken of him, he is inſtructed and exerciſed; while the poor aſs is left to the brutality of the meaneſt ſervants, and the wantonneſs of children, that ſo far from improving, he muſt be a loſer by his education: and indeed had he not a large fund of good qualities, the manner in which he is treated is ſufficient to exhauſt them. He is the ſport, the but, and the drudge of the vulgar; who, without the leaſt thought or concern, drive him along with a cudgel, beating, overloading, and tiring him. We do not remember, that, if there were no horſes, the aſs would be conſidered, both with regard to himſelf and us, as the moſt uſeful, moſt beautiful, and moſt diſtinguiſhed of animals. Inſtead of being the firſt, he is now the ſecond; and from this accident alone he is held in no eſtimation. It is the compariſon that degrades him: he is conſidered, not in himſelf, but relatively to the horſe. We forget that he is an aſs; that he has all the qualities of his nature, all the gifts annexed to his ſpecies; and think only on the figure and qualities of the horſe which are wanting in him, and which it would be improper for him to have.

By his natural temper he is as humble, as patient, and as quiet, as the horſe is proud, fiery, and impetuous; he bears with firmneſs, and perhaps with courage, blows and chaſtiſements. He is ſober, both with regard to the quantity and quality of his food, contenting himſelf with the moſt harſh and diſagreeable herbs, which the horſe, and other animals, will not touch. In water he is very nice, drinking only of that which is perfectly clear, and at brooks with which he is acquainted. *Buffon's Hiſtoire Naturelle, tom.* IV.

The aſs, though a contemptible creature, is very ſerviceable to many that are not able to buy or keep horſes; eſpecially where they live near heaths or commons, the barreneſt of which will keep them, being contented with any traſh, dry leaves, ſtalks, thiſtles, briars, chaff, and any ſort of ſtraw is excellent food for them; they require very little looking after, and will ſuſtain labour, hunger, and thirſt, beyond moſt creatures. They are ſeldom or never ſick; and endure longer than any other creature. They may be made uſe of to plough light lands, to carry burdens, to draw in mills, for which they are very excellent, to fetch water, or any other odd things. They are very uſeful for their milk, which is an excellent reſtorative in conſumptions, and other weakneſſes: but they would be of much more advantage were they uſed, as they are in foreign countries, for the breeding of mules. *See the article* Mule.

The ſhe-aſs, if you have any regard to their breed, ſhould be covered between the months of March and June. The beſt age to breed from is from three years old to ten, and you ſhould let the young aſs ſuck two years, and not work them till they are three years old.

Thoſe are reckoned the beſt ſhaped that are well ſquared, have large eyes, wide noſtrils, long necks, broad breaſts, high ſhoulders, a great back, ſhort tail, the hair ſleek and of a blackiſh colour: their ſkins make the moſt durable ſhoes of any ſort of leather. *Mortimer's Huſbandry, vol.* I. *pag.* 222.

ATMOSPHERE, the vaſt body, or collection of air which ſurrounds the earth to a very conſiderable height.

Clouds, which are precipitated in drops of rain for the ſervice of mankind, do not conſiſt wholly of watery particles; for beſides aqueous vapours, and what theſe contain, there are raiſed from the ſurface of the earth into the air, ſulphureous and ſaline particles, which are alſo carried up into the clouds, and mixed with the aqueous vapours. Here we have a mixture of all ſuch ſubſtances, as it were, in their extremely ſmall parts, floating in the air together, and the effects of theſe ſulphureous and ſaline particles, thus mingled with aqueous vapours, are ſometimes very ſenſible, eſpecially in thunder and lightning; when the ſulphureous and nitrous particles taking fire, by the motion ariſing from heat, break out with the violence of flaſhes and noiſe, very much reſembling the effects of gunpowder.

Another proof that there are nitrous particles raiſed into the air, we have in the nouriſhment which rain, replete with theſe ingredients, gives to plants, more than any other water; and alſo from the collection of nitre, or ſaltpetre, in heaps of earth, out of which theſe principles derived from rain are known to be extracted, if theſe heaps of earth be expoſed to the air, ſo as to keep the wet weather from ſpoiling the operation. It is alſo a convincing argument, that theſe nutritive ingredients are of conſequence in vegetation, by plants in water refuſing to grow in droughty weather, notwithſtanding they have ſuch plenty of moiſture; from their being abſolutely at a ſtand when rain has been long a ſtranger to the earth, they are plainly ſeen to go forward with the buſineſs of vegetation, like thoſe plants which have been deprived of motion or growth, when the fine ſhowers deſcend, and continue to do ſo for ſome time.

Here then, in both caſes of the plants in a pond, there is water, but there are only in one theſe vegetative principles, which give motion to the plants, and conſequently thoſe ingredients are abſolutely neceſſary to vegetation; and therefore we may conclude, that water, when properly dilated by fermentation at the roots, is only an aſſiſtant to plants, in applying thoſe neceſſary principles, or helping to conduct them through the tubular interſtices of the fibres, or to float the nitrous particles through the whole ſyſtem of the operation in motion, or growth of vegetables, and not the food itſelf, or any ſort of nouriſhment when diveſted of thoſe principles. Whether, therefore, the ſyſtem of exceeding fine fibres, or tubes of a plant at a ſtand in a pond, in a very droughty ſeaſon, admits that water undilated, for want of nutritive, or fermenting principles, into its body, during the great want of rain; or whether it abſolutely refuſes to imbibe, or cannot attract, for want of a finer diviſion of its parts, any of it, as there are in it no nutritive ingredients, does not ſeem to admit of any doubt in favour of the latter queſtion, which, if true in nature, may poſſibly be of ſervice in the growth of ſome ſorts of plants, and perhaps ſave much trouble in attempting to force others forwards with ſome ſort of water.

Since it is plain, that there is a vaſt quantity of nitrous, ſulphureous, and bituminous matter all over the ſurface of the earth, and that plants and animals abound with volatile ſalts, we need not wonder that the heat of the ſun fills the air with ſuch fine particles, and all ſorts of unctuous exhalations, by firſt expanding them, after which they riſe till they meet with air and other mixtures of the ſame ſpecific gravity. What are uſually called *ignes fatui*, ſeem to conſiſt of a more unctuous ſubſtance than other exhalations, for we find their oily particles are eaſily fixed, but not ſo ſoon ſpent as thoſe of ſulphur and nitre. Shooting ſtars are improperly ſo called, becauſe they are nothing more than exhalations kindled in the air; and if a long train of ſubſtances take fire at once, it is commonly termed a *dart*; and if there be many, and they continue in the ſame place, they are then called *beams*.

Thus we plainly ſee how full the atmoſphere is of theſe rich ingredients for the buſineſs of vegetation; and becauſe they are of ſuch vaſt conſequence to the growth of plants, we will enumerate the ſources of them upon the frame of the globe; from whence the ſun and wind borrow them, in order to diſperſe them properly in the air, that they may intimately mix, and deſcend with the rain drops, and ſo be conveyed to the mouths of the fibrous tubes of plants with the greateſt care and ſkill; from theſe ingredients firſt leaving the ſurface of the earth, through the whole proceſs of their various motions, configurations, and combinations, till they are prepared in the moſt exquiſite manner to be received into the bowels of vegetables, which we plainly ſee ſtand in great need of them, as without their friendly aſſiſtance, or ſome compoſitions of dung to reſemble them, they are unable from water and earth alone to get forward to maturity.

Salts are of various kinds, but all have a ſharp pungent taſte, though not all alike; and of theſe ſome are dug out of the earth like ſtone out of a quarry; others are made by art, by letting the ſea-water into ſhallow pits on the ſhore, and continue there till the aqueous particles are exhaled by the ſun and wind, and then the ſalt remains at the bottom. The ſalt is in its nature the ſame in both caſes; for the ſaline particles are not made by art in the combination of ingredients to imitate it; they are only ſeparated from the watery particles wherein they floated. The qualities of this excellent ingredient in vegetation are, that it eaſily diſſolves, and melts readily in the open air, if it be refined from all heterogeneous matter; when the water wherewith it is entangled is any ways drawn off, there remains a groſs ſediment, but the finer parts are carried away with it; this ſediment is the only part the fire cannot melt, but reduces it to a calx.

This facility of the finer parts ſwimming, as they are ſpecifically lighter than water, contributes to the benefit of plants; or rather theſe fine ſaline particles are of the ſame ſpecific gravity with the water; that they may intimately mix with it, and be carried in thoſe vapours through all the neceſſary ſtages, till they return to the earth again. This quality of melting and diſſolving in water and air, ſets the finer parts at liberty, and prepares them to take wing with the common exhalations. And yet the ſediment, or groſſer parts, which are left behind, have their excellent uſes in helping the embrios of plants to ſend out their fibrous tubes, in ſearch after more refined particles, which either adhere to the ſuperficies of the particles of earth, or are contained in their internal pores.

Nitre, of which there are ſeveral ſorts, natural and artificial, the former refining itſelf, and the latter refined by art, is a kind of ſalt, which eaſily takes fire, but like ſea-ſalt is eaſily reducible to a calx. The vapours, or particles of nitre, when they deſcend for the uſe of plants, are found to contain abundance of ſpirits; for the nitre, as a ſalt, is impregnated with them, which render it volatile, and the fluid extracted from it is very ſharp and corroſive. The calx to which nitre is reducible, as well as the calx of common ſalt, has its excellent uſe in vegetation; and when it is reduced by fire to this ſtate, it then takes the name of fixed ſalt, or rather the aſhes of ſalts: the benefit of this calcination to land is manifeſt from the aſhes of burnt vegetables, and other natural bodies reducible to a calx: for the rich principles, or food, if we may call it ſo, of vegetables, are contained more or leſs in all bodies, whoſe parts can be thus ſeparated, as is evident from the operations in chemiſtry, which reduce bodies to their component parts, by the help of fire.

Sulphur is a liquid clammy ſubſtance, whoſe parts are ſoon ſeparated, and riſe up into the air with other vapours, and ſoon occaſions violent motions in the atmoſphere, and becomes entombed in the aqueous particles, and is with the rain brought down to the plants. Bitumen is pretty much of the ſame nature with ſulphur, and with it is found in great plenty in moſt bodies, but in the moſt remarkable manner, and in the greateſt quantities, in pit-coal; yet not in equal quantities, as ſome coals burn better than others, and conſequently may contain more or leſs of theſe principles, which are apt to burn. Naptha is a kind of bitumen, and the only difference is, that it takes fire ſooner than bitumen is obſerved to do, and is not ſo eaſily quenched; and this facility of admitting the heating particles, which throw theſe inflammatory bodies into a ſpeedy motion internally, is of great uſe in the different degrees of the plant's growth.

Maltha ſeems to be a ſpecies of naptha; its properties, as they appear to common obſervation, are, that if it touches any thing, it ſticks ſo faſt to it, as not eaſily to be ſeparated; and water thrown on it in moderate quantities, does but the more inflame it, and earth alone is able to quench it. This valuable ingredient, when it deſcends in the drops of rain, adheres very intimately to the internal parts of the ſoil, both in the ſuperficies and the concave parts of the pores; and other deſcents of rain increaſe the motion of the internal parts of the particles of maltha, and thereby promote a fine dilatation in the tubular interſtices of the fibres of plants, and duly contribute to the acceleration of that motion in them, which is neceſſary to the different ſtages of their growth and nouriſhment. Before the fine parts of the maltha are in readineſs, or duly prepared by moiſture, and their well regulated fermentation, and while it is waiting for the deſcent of more rain, it is diveſted of all internal motion, and confined as a priſoner, till the other requiſites to the plant's welfare are properly aſſembled, and ready to perform their offices.

Theſe are the chief materials which give motion to plants, and of which the latter are found to conſiſt, when they are analized, unfolded, or ſeparated into their component parts by chemiſtry. The profeſſors of that art call the volatile ſpirits, ſulphur, and ſaline particles, the active principles; becauſe theſe, when duly prepared, and exactly applied to the mouths of the fibres, become the ſole agents, and by their continual motion, cauſe the whole action of the plant.

The vapours thus raiſed from the ſurface of the earth, become the original matter of all meteors, or heterogeneous ſubſtances, fit for the production of the vegetable world; and conſequently an inſtrument in the wiſe appointment of Divine Providence, for the preſervation of man, and all ſubordinate animals. When theſe heterogeneous vapours are thus lifted up above the earth, one degree of cold condenſes them into larger globules, which then becoming ſpecifically heavier than the atmoſphere, fall in drops of rain, and bring down all thoſe treaſures entombed in them. A greater degree of cold produces a coagulation of the heterogeneous vapours, which ſhoot like ſalts into various forms, united into certain angles, and make the flakes of ſnow, which ſtill contain the nutritive principles.

A third, or ſtill greater degree of cold, combines the vapours into a harder ſubſtance, wherein the valuable ingredients are intombed, and they deſcend in what we call hail; but if the cold condenſes the vapours before they riſe high above the ſurface of the earth, they will be unable to aſcend, but will hover about, and fill the lower part of the atmoſphere with what is uſually called a fog, or miſt; and if the cold be ſtill more intenſe, the miſt is frozen to every twig and blade of graſs in form of a white incruſtation, which is called rime. When the air in the day-time is warm, and the vapours buoyed up in it are too fine to be then viſible, they will be condenſed by the coolneſs of the evening, and deſcend on the vegetables in the form of dew: and if the evening of ſuch a fine day be cold enough to freeze, then inſtead of a dew, the ſurface of the ground will be covered with what is commonly called a white froſt. Theſe are the various ways appointed to bring down again upon the earth the treaſures that were taken from it, in order to be prepared and properly ſpread over the globe, by methods and contrivances equally beautiful and ſurprizing; and all this for the ſupply of needy man, who is, when theſe bleſſings are for a conſiderable time withheld from him, turned to deſtruction.

But amongſt the riches of the atmoſphere for the production of vegetables, we muſt not forget the conſequences which the air itſelf is of to them, as we have already obſerved under the article air. *See* Air. *Randall's Semi-Virgilian Huſbandry.*

AVENUE, a walk planted on each ſide with trees, leading to an houſe, wood, &c.

The Engliſh elm will do in all grounds, except ſuch as are very wet and ſhallow; and this is preferred to all other trees, becauſe it will bear cutting, heading, or lopping in any manner, better than moſt others. The rough or ſmooth Dutch elm is approved by ſome, becauſe of its quick growth; this is a tree that will bear removing very well; it is alſo green almoſt as ſoon as any plant whatever in ſpring, and continues ſo as long any, and it makes an incomparable hedge, and is preferable to all other trees for lofty eſpaliers. The lime is valued for its regular growth, and fine ſhade: the horſe cheſnut is proper for all places that are not too much expoſed to rough winds. The common cheſnut will do very well in a good ſoil, and riſes to a conſiderable height, when planted ſomewhat cloſe, though, when it ſtands ſingle, it is rather inclined to ſpread than grow tall. The beech is a beautiful tree, and naturally grows well with us in its wild ſtate, but it is leſs to be choſen for avenues than the before-mentioned, becauſe it does not bear tranſplanting well, but is very ſubject to miſcarry. Laſtly, the abele is fit for any ſoil, and is the quickeſt grower of any foreſt-tree. It ſeldom fails in tranſplanting, and ſucceeds very well in wet ſoils, in which the others are apt to fail. The oak is but little uſed for avenues, becauſe of its ſlow growth.

The old method of planting avenues was with regular rows of trees, and this has been always kept till of late; but we have now a much more magnificent way of planting avenues: this is by ſetting the trees in clumps or platoons, making the opening much wider than before, and placing the clumps of trees about three hundred feet diſtant from an one other. In each of theſe clumps there ſhould be planted either ſeven or nine trees; but it is to be obſerved, that this is only to be practiſed where the avenue is to be of ſome conſiderable length, for, in ſhort walks, this will not appear ſo ſightly as ſingle rows of trees. The avenues made by clumps are fitteſt of all for parks. The trees in each clump ſhould be planted thirty feet aſunder, and a trench ſhould be thrown up round the whole clump, to prevent the deer from coming to the trees to bark them. *Miller's Gard. Dict.*

AVER, a general name for a labouring beaſt of any kind.

AVERAGE, a term uſed by the farmers of many parts of England for the breaking up of corn fields; otherwiſed called eddiſh, or roughings.

AVER-CORN, a name formerly given to the corn conveyed to the lord's granaries by his tenants.

AVER-LAND, the land ploughed by the tenants for the uſe of their lord.

AUGUST, the eighth month of the civil year.

This month returns the countryman's expences into his pockets, and encourages him to another year's adventure. If it proves dry, warm, and free from high winds, it ſaves a great deal of the huſbandman's expence.

You may yet twiſallow, alſo lay on your compoſt or ſoil, as well on your lands intended either for barley or wheat.

Carry wood, or other fuel home, before winter approaches, and renders the roads deep and heavy.

Provide good ſeed, and well picked, againſt feed-time.

Put your ewes and cows you do not like to fatten.

This is generally the principal harveſt-month for all ſorts of grain, therefore make the beſt uſe of good weather while you have it.

About the end of this month you may mow your after-graſs, and alſo clover, ſaintſoin, and other French graſs. Geld lambs, and make the ſecond return of your fat ſheep and cattle. *Mortimer's Huſbandry, vol.* II.

AUGRE, an inſtrument much uſed by carpenters, wheelrights, &c. for boring large round holes. It conſiſts of a wooden handle and an iron blade, terminated with a ſteel bit.

A common augre may be very uſefully applied to try the nature of the under ſoil, and layers of earth, in order to know what may be expected from them, with regard to the vegetation of plants. In order to this three augres will be neceſſary; the firſt of them about three feet long; the ſecond ſix; and the third ten. Their diameters ſhould be near an inch, and their bits large; and capable of bringing up part of the ſoil they pierce. An iron handle ſhould be fixed croſs-ways to wring it into the earth; from whence the inſtrument muſt be drawn up, as often as it has pierced a new depth of about ſix inches, in order to cleanſe the bit, and examine the ſoil. But the borer, an inſtrument invented by the marquis de Tourbilli, is much better adapted to this operation. *See the article* Borer.

AVIARY, a place ſet apart for the feeding and propagating birds. An aviary ſhould be ſufficiently large as to allow the birds a conſiderable freedom of flight; and turfed, to avoid the appearance of foulneſs on the floor.

AUMBRY, *Ambry*, or *Aumery*, a pantry, or cupboard to ſet victuals in.

AURICULA, the name of a plant, which has of late years been cultivated with extraordinary care and pains by the curious in gardening, being highly eſteemed for its producing a very beautiful flower, which is diverſified of a greater variety of colours, and exhibits more properties to complete the idea of the fancy of a floriſt, than any other ſpecies of the flowery tribe.

The characters of a good auricula are the following: 1. The ſtem of the flower ſhould be lofty and ſtrong. 2. The foot-ſtalk of the ſingle flower ſhould be ſhort, that the umbel may be regular and cloſe. 3. The pipe, or neck of each flower ſhould be ſhort, and the flowers large, and regularly ſpread, being no ways inclinable to cup. 4. The colours ſhould be very bright, and well mixed. 5. The eye of the flower ſhould be large, round, and of a good white or yellow; and the tube, or neck, not too wide.

In order to obtain good auriculas from ſeeds, you muſt make choice of the beſt flowers you have; which ſhould be expoſed to the open air, that they may have the benefit of ſhowers, without which they ſeldom produce good ſeeds. The time of their ripening is in June or July, which you may eaſily know by the ſeed-veſſel turning to a brown colour, and opening; you muſt therefore be careful leſt the ſeeds be ſcattered out of the veſſel, for it will not be all fit to gather at the ſame time.

The general time for ſowing this ſeed is in Auguſt, but if it be ſown before Chriſtmas it will be time enough.

The beſt foil for this ſeed is good freſh ſandy mould, mixed with very rotten neats dung, or very rotten dung from the bottom of an old hot-bed: with this you ſhould fill your pots or boxes in which you intend to ſow your ſeeds; and having levelled the ſurface of the earth very ſmooth, ſow your ſeeds thereon, covering it very lightly with rotten willow mould, taken out of the ſtems of decayed hollow willow-trees; then cover the box, &c. with a net or wire, to prevent the cats, fowls, &c. from ſcratching out, or burying your ſeeds too deep. Let theſe boxes, &c. be placed ſo as to receive only the morning ſun, during the winter ſeaſon; but in the beginning of March remove them where they may have ſcarce any ſun, for your plants will now ſoon begin to appear; and if expoſed to one whole day's ſun, would be all deſtroyed.

During the ſummer ſeaſon, refreſh them often with water in dry weather, but never give them too great great quantities at once. In the month of July following, your young auriculas will be large enough to tranſplant, at which time you muſt prepare a bed or boxes, filled with the above-mentioned ſoil, in which you may plant them at about three inches diſtant; and, if in beds, you muſt ſhade them every day, till they are thoroughly rooted, as alſo in very hot dry weather; but if they are in baſkets or boxes, they may be removed into a ſhady place.

When the ſeedling auriculas are planted in beds, there ſhould be ſome rotten neat's dung laid about ten inches under the ſurface, and beaten down cloſe and ſmooth: this will prevent the worms from drawing the young plants out of the earth, which they generally do where this is not practiſed. This dung ſhould be laid about a foot thick, which will entirely prevent the worms getting through it, until the plants are well eſtabliſhed in the beds; and the roots of the auriculas will ſtrike down into the dung by the ſpring, which will make their flowers ſtronger than uſual: theſe beds ſhould be expoſed to the eaſt, and ſcreened from the ſouth ſun.

The ſpring following many of theſe flowers will ſhew; when you may ſelect ſuch of them as have good properties, which ſhould each of them be removed into a ſeparate pot of the ſame prepared earth, and preſerved until the next ſeaſon, at which time you will be able to form a judgment of the goodneſs of the flower; but thoſe that produce plain coloured, or ſmall flowers, ſhould be taken out and planted in borders, in the out-parts of the garden; and the others which do not produce their flowers the ſame year, may be taken up, and tranſplanted into a freſh bed, to remain till you ſee how they will prove.

The manner of propagating theſe flowers when obtained, is from off-ſets, or ſlips, taken from the old roots in April, when the flowers are in bloom: theſe off-ſets muſt be planted into ſmall pots filled with the ſame ſort of earth, as was before directed for the ſeedlings; and during the ſummer ſeaſon ſhould be ſet in a ſhady place, and muſt be often, but very gently, refreſhed with water. In the autumn and winter they muſt be ſheltered from violent rains. The ſpring following theſe young plants will produce flowers, though weak; ſoon after they are paſt flowering, you muſt put them into large pots, and the ſecond year they will blow in perfection. *Miller's Gard. Dict.*

AWMS, the beard of wheat or barley. The word is, in ſome parts of England, pronounced *ails*.

AXIS, or *axle-tree*, of a waggon, cart, &c. is the ſtrong piece of wood or iron, which ſupports the carriage, and round the extremities of which the wheels turn. *See the articles* CART *and* WAGGON.

B.

BACK-SINEW, in a horſe, is that ſtrong ſinew extending along the hinder part of the ſhank from the knee to the heel, into which it is inſerted.

The back-ſinew is ſo very ſubject to be hurt or ſtrained, that it is conſidered as one of the moſt common and uſual accidents that happens to a horſe; it generally proceeds from hard riding upon dry grounds, and from other cauſes, where the roads are ſtony and hard, and ſometimes where they are poachy.

It is eaſily perceived by the ſwelling of the ſinew, which ſometimes extends from the knee down to the heel; and when it is ſo, a horſe does not care to ſet his foot even upon the ground; but, for the moſt part, in his ſtanding, ſets it before the other.

The uſual way of curing this malady, is with cold charges, which often ſucceed very well, if often renewed; ſome uſe curriers ſhavings bound round the knee with a bandage, and this alſo anſwers very well in ſome caſes; but there is nothing either ſo ready or efficacious as vinegar or verjuice mixed with bole, being often in a day ſoaked well into the ſinew warm; and if any thing of the lameneſs or ſwelling remains after this, and after the heat and inflammation is gone off, a mild bliſter, that has nothing corroſive in it beſides the cauſtic ſalt of the flies, will, generally ſpeaking, effectuate a cure, and bring the ſinew fine.

When hot and relaxing oils mixed together are uſed to the back-ſinew, which many practitioners are fond of, becauſe they ſometimes ſucceed in horſes that have their ſinews ſtrong and rigid, yet they are apt to engender wind-galls of a bad kind, or make the veins on each ſide the ſinew to be full and gorged; and horſes have been known to be lame for two or three years together with theſe varixes in the veins. Bliſtering in this caſe has very little or no effect, firing through the vein till the blood comes being only ſufficient to remove that weakneſs. After the firing, the whole leg from the knee down to the heel, and all the hollow places on both ſides, muſt be charged with a good ſtrengthening plaiſter, which will perfect the cure, eſpecially if the horſe be turned to graſs for a month or five weeks, or, in the winter, if he run a little while in a ſmooth yard, where he has good dry litter. *Gibſon on the Diſeaſes of Horſes.*

BACON, the fleſh of a hog dried in the ſmoke.

A writer in the *Muſeum Ruſticum*, vol. III. pag. 234, has given us the following method of making bacon in Somerſetſhire.

The ſeaſon for killing hogs for bacon is between September and Chriſtmas. When you kill a large hog for bacon, lay the ſides in the ſalting-troughs, and ſprinkle them pretty heavily with bay-ſalt: then leave them twenty-four hours to drain away the blood, and ſome of the over abounding juices.

After this take them out, wipe them very dry, and throw away the drainings. Then take ſome freſh bay-ſalt, and heating it well in a large iron frying-pan, rub the meat very well with it; repeating this work every day for four days, and turning the ſides every other day.

If the hog be large, keep the ſides in brine (turning them ten times) for three weeks; after which take them out, and let them be thoroughly well dried in the uſual manner: if they are not fully dried, they will neither keep ſo well, nor eat ſo fine.

BADGER, the name of an animal, common in many parts of England; and called by ſeveral names, as a gray, a brock, a boreſon, or a bauſon.

Badgers are almoſt as pernicious a creature to the huſbandman as the fox, though not ſo ſubtile, nor can they ſo eaſily catch their prey; but for what they can catch, as new fallen lambs, young pigs and poultry, they are as bad. The way to catch them is with a ſpringe, or a ſteel trap, or to dig a pit acroſs their path five feet deep, and about four feet long, making it narrow at the top and bottom, and wide in the middle. This muſt be covered with ſome ſmall ſticks and leaves, ſo as that the badger may fall in when he comes upon it. Some hunt them into their holes in a moon-ſhine night, and then dig them out. *Mortimer's Huſbandry, vol.* I. *pag.* 314.

BAG, a name given by farriers to a medicine for recovering a horſe's appetite when loſt. It is done in this manner: they take an ounce of aſſa fœtida, and an equal quantity of the powder of ſavin; theſe ingredients they put into a bag, which they faſten to the horſe's bit, keeping him bridled for two hours, two or three times a day: as ſoon as the bag is taken off, he will immediately eat. The ſame bag will ſerve a long time.

BAKING *of land.* If ſome ſorts of ſtiff and binding land be ſown dry, and a ſcudd of rain falls before the earth has time to ſettle, it is obſerved that the cruſt of ſuch land will bake, ſo that the corn cannot come through, to the great damage of the crop; this evil does not happen if ſuch a ſcudd of rain be followed by cool cloudy weather, and not hot ſun-ſhine; for then the earth will not lie ſo hollow as to be baked. The beſt way to prevent this is, to roll it immediately after ſowing, which faſtens the earth together, whereby the ſun has not that power of piercing into it, and conſequently not of baking it.

Land of this kind ſhould, therefore, be ſown as often as poſſible with winter corn, ſuch as wheat and vetches; for though, if wet follows the ſowing, the ſun is not ſtrong enough at that time of the year to ſcorch the ground up, and bind it; and it is obſerved, that this ſort of ground has been always lucky for vetches, probably for the above reaſon. *Liſle's Obſervations in Huſbandry, vol.* I. *pag.* 26.

BALK, a piece of land which has been either caſually overſlipped, or not turned up in ploughing; or carefully left untouched by the plough, for a boundary between lands, or ſome other uſe.

BALK, alſo ſignifies the ſummer-beam, or dorman of a houſe.

BALKS, or *bawks*, implies poles laid over a ſtable, or other building, for a roof.

BALM. *See the article* BAUM.

BANDS, a ſmall parcel of the longeſt wheat taken from the grips, and twiſted together at the ear ends, for binding the wheat into ſheaves.

The bands ſhould be laid in the morning, that they may not crack; for the ſtraw will not twiſt after the ſun is up, but will be brittle, and break off below the ears. The turning of three or four of the ſtubble or bottom ends of the ſtraw to the ears of the band, helps greatly to add to its ſtrength and toughneſs.

The bands for binding up the ſheaves ſhould not be ſpread but in fair weather, becauſe being preſſed down by the grip or two which it is neceſſary to lay upon them to keep them in their places, and prevent their being untwiſted by the ſun, they will grow ſooner than any other part of the corn, if rain ſhould come; for they cannot dry on account of their lying undermoſt. But though the bands muſt always be made while the morning dew is upon them, the ſheaves ought by no means to be bound up wet: if they are, they will certainly grow mouldy.

Farmers do not always attend ſufficiently to the binding up of their ſheaves, but ſuffer the reapers, for diſpatch, to tie the bands juſt underneath their ears, inſtead of binding them at the other end; the conſequence of which is, that they will hardly hold together to be flung into the cart, and will certainly be in great danger of falling to pieces before they are thraſhed.

If a little rain be foreſeen in harveſt time, it is beſt to bind the grips into ſheaves as faſt as they are made; becauſe ſmall ſhowers will wet the ſingle grips ſo much, that they cannot be bound up, and theſe ſhowers may be the fore-runners of greater rains. The ſheaves being bound will ſoon dry after ſuch wet. But if a hard rain is foreſeen, the beſt method is not to bind the wheat into ſheaves, becauſe they will then be wet to the bands, and muſt be opened again. Mr. Liſle tells us, that one of his neighbours to whom this happened, unſheafed ſome of his wheat to dry it, and opened it and turned it ſo often, that the ears broke off, whereby he loſt half his corn; caution therefore ought to be uſed in this caſe, leſt by curing one evil we create a worſe. *Liſle's Obſervations in Huſbandry, vol.* I. *pag.* 333.

BANDS *of a ſaddle* are two pieces of iron, flat, and three fingers broad, nailed upon the bows of a ſaddle, one on each ſide, contrived to hold the bows in the ſituation that makes the form of a ſaddle.

BANE, in ſheep, the ſame with rot. *See the article* ROT.

BANGLE-EARS, an imperfection in a horſe, which may be remedied in the following manner: place his ears as you would have them ſtand, and then with two little boards, or pieces of trenchers, three fingers broad, having two long ſtrings faſtened to them, bind the ears ſo faſt in the places where they ſtand, that they cannot ſtir; then behind the head, and the root of the ears, you will ſee a great deal of empty, wrinkled ſkin, which you muſt pull up with your finger and thumb, and clip away with a pair of ſharp ſciſſars all the empty ſkin cloſe by the head; then with a needle and red ſilk, ſtitch the two ouſides of the ſkin together, and heal the wound with a mixture of honey and turpentine: when this is done, take away the ſplints that hold up the ears, and in a little time they will keep the place where you fixed them without alteration.

BANK, a heap of earth piled up to keep out the water of a river, lake, or the ſea.

Sloping banks are the beſt ſecurity againſt the incroachments of the ſea, of rivers, or of lakes; making proper allowance for the weight of water, and violence of the waves. Theſe banks ſhould be raiſed about two feet above the level of the water at the higheſt tides, and their ſtrength ſhould be proportioned to the force of the water intended to be fenced off. When a river is too much confined, it ſwells conſiderably upon a flood, and conſequently requires banks of greater height and ſtrength than would otherwiſe be neceſſary; though it will ſometimes break even theſe, and carry all before it, if a ſufficient ſpace be not allowed for the increaſe of its water: but when ſuch a ſpace is left, the waters ſpread, and ſeldom riſe more than two or three feet above their uſual level. In ſome caſes a breadth of fifteen or eighteen feet, on each ſide may do; but in others, fifty, eighty, or an hundred feet, or perhaps ſo many yards, according to the largeneſs of the river, muſt be left open for that purpoſe. It is beſt to err on the ſafe ſide; eſpecially as the ground that is left between the banks and the river will be far from being loſt; for it will afford good grazing in the dry ſeaſons of the year, and may be planted with oſiers, and willows, and other trees of that kind; but theſe ſhould never be planted upon the banks, leſt the winds ſpoil and tear them, by ſhaking the trees, and looſening their roots.

In the iſle of Ely, it is common to ſee great banks diſtant one or two hundred yards on each ſide from the channel of the river; and when they are ſo made, they are always ſafe: but where the diſtance between the banks is narrow, there, and there only, the banks are in danger of being broken down, and the country of being overflowed.

If a conſiderable body of water is to be guarded againſt, dig a trench ten or twelve feet wide, and two or three deep, or more, according to the height of the bank required. Lay all the ſoil that is taken out of this trench, on that ſide of it which lies towards the water, and leave a ſpace of two or three feet between the trench, and the foot of the bank. Let the bank be made with an eaſy ſlope of fifteen or eighteen feet in length towards the water, allowing the ſlope two and a half, or three feet fall to one in height; but the inſide ſlope need not be more than eight or nine feet, which is a foot and a half ſlope to one foot perpendicular. The bank thus raiſed five or ſix feet high, according as the floods require, will be two feet wide at the top, where it ſhould be well flatted, that people may walk upon it. Let it then be covered with gravel dug out of the channel of the water, by which means the river will be deepened, and the bank rendered ſtronger; and to add to the latter, ſow it very thick with graſs-ſeed. This will be found much better than turfing it with ſods taken from off the trench, or ſome neighbouring ground; becauſe the ſods are apt to ſhrink, open, and part from one another in dry weather, and are then liable to be waſhed away with the next flood; whereas in this much cheaper way, a cloſe covering of graſs, even long enough to mow, will be formed in a month or two: far fitter than ſods to break the ſurface of the bank; for any tolerable ſoil may be very ſoon brought to have a coat of graſs, by only raking it fine, and ſowing it with graſs-ſeeds. In a week or ten days in the ſpring, or ſummer, the graſs will be up, and grow to ſuch a height in a month or ſix weeks, as to be fit for mowing.

Some have attempted to guard againſt inundations by building walls of ſtone and lime, where the materials are in plenty. The great danger here is their being undermined, and that chiefly by the water's ſtriking with force againſt the bottom, upon meeting with reſiſtance from the wall. But this may be eaſily guarded againſt by laying a row of flat ſtones lower than the bottom of the river; for the water ſtriking againſt theſe ſtones, turns off without any danger to the foundation.

The broad trench within the bank, beſides affording materials for making the bank and ſlopes, is attended with the farther advantage of ſerving for a drain to the inland ground. Theſe trenches ſhould always be carried as far as the banks, particularly when theſe are intended to fence off a riſing tide; and in the loweſt part of the ground a ſluice with a valve, flap-door, or flood-gate ſhould be placed in the bank, where it will both diſcharge the inland water, when the tide is out, and prevent its flowing in. The ſeaſon of the year freeſt from floods ſhould be choſen for making theſe banks, that the bank may have time to ſettle and grow firm before the heavy rains come on. It is alſo adviſable to be as expeditious as poſſible in this work. For if it be begun in a dry ſummer, and finiſhed in a month or two, there will be little danger of being interrupted by extraordinary floods or violent ſtorms, either of which might do more harm in one day, than could be repaired in a fortnight.

The exact dimenſions of the bank, and of the ditch within it, cannot be preciſely aſcertained by any general rule; becauſe both tides and floods riſe to different heights, and have different force, in different places and circumſtances. The ſtrength above-mentioned may be ſufficient for banks in common caſes; but in others, where a great body of water, or a powerful tide is to be oppoſed, they may be, as the memoirs of the Berne Society (*tom.* II. *part* II. *pag.* 262) adviſe, four feet or more wide at the top, with a baſis proportioned to their height, as three and a half are to one; or, if it be deſired to make them ſtill more ſolid, as four to one; ſo that if the bank be four feet and a half high, its baſis in the former caſe will be fourteen feet wide, and in the latter eighteen.

The Dublin Society for the advancement of agriculture informs us (Numb. XVII. *for April* 1737) that "Lord Limerick has recovered between four and five hundred acres of very rich ſalt marſh, at Dundalk in Ireland, and effectually ſecured them from the ſea, by ſuch banks as are above deſcribed; and by the ſame method many hundred thouſand acres have been recovered from the ſea in Cambridgeſhire, Lincolnſhire, and other parts of England; not to mention the low lands of Holland; which are indeed ſecured againſt the violence of the ſea by no other means.

"If there be a neceſſity for making banks on a ſtrand where nothing but ſand can be met with, thoſe banks ſhould be large, and the ſlope very broad and extended; and if graſs-ſeed will not grow on them, let ſea-weeds be planted. Theſe with ſticking furze, ſtraw, or loppings of trees, will help to keep the banks together."

But a better method, and more effectual, is given by Dr. Hales in the Philoſophical Tranſactions, from the experience of Dr. Wark, a clergyman in Scotland. The method conſiſts in fixing to the bottom of the channel, a breadth of furze proportioned to the force it is to reſiſt. The ſand or ſlime, as either abounds, will ſoon ſettle among the branches of the furze; and when the firſt bed of the furze is thus interwoven or covered, another bed of furze is to be laid on as before, and ſo on, till the bank is raiſed to a ſufficient height. Dr. Wark aſſures us, that by this ſimple method a bank was made near Holy-iſland ſo ſtrong, that it became a bar againſt the ſea itſelf.

"It ſometimes happens, that the ſea flows in through a narrow gut or paſſage, by which the inland waters are diſcharged, and then extends itſelf, and covers a great deal of ground. When this happens, if the inland waters cannot be diverted into another courſe, ſince a paſſage muſt be left for their diſcharge; let a ſtrong ſluice be fixed in the loweſt part of the channel, with large piers of ſtone, running out for its ſupport, and a ſtrong foundation of wood or broad ſtones for the water to run over. When this is done, let the banks of ſand, or other ſoil near at hand, be made in the manner already mentioned, on each ſide of the ſluice.

"The reaſon why it is adviſed, in places where a ſluice is to be made, to begin the work by this rather than by the bank, is, that while the tides have liberty to flow in and out at a great breadth, the ſluice may be made in any part of the channel without being much incommoded by the tide; whereas if it be deferrred till the banks on each ſide are made, the force of the tide, when confined to a narrow paſſage, will tear up all before it, and render the building of the ſluice impracticable: and upon the ſame account, the banks ſhould be begun at the loweſt part of the channel, and carried on from thence to the upper grounds.

"If, by any accident, the waters ſhould ſwell ſo high as to overflow and tear the banks, farther miſchief may be prevented by fixing with all expedition, a ſail-cloth, or ſheet of linen at the bottom of the bank, where the flood breaks in; for if this be done in time, the water will flow over the cloth, without waſhing away the bank.

"In every improvement, the expence ſhould be particularly conſidered. That of making banks in this method is ſmall. In low grounds the ſoil is ſoft, and dug with eaſe, and all the work may be done with the ſpade and ſhovel, without pick-axes, which muſt be uſed in upland ground; and the materials are on the ſpot. All the charge will be often more than repaid by the firſt years improved crop of graſs, and the ſafety of the meadows. The produce of ſucceeding years will amount much higher, and the huſbandman will be out of all danger for the future of having his lands overflowed and ſpoiled. Farmers have frequently ſuſtained more damage from the hay deſtroyed in one ſeaſon by floods, than the whole value of what it would have coſt them to incloſe and bank their meadows, and free them from all hazards."

BANNOCK, an oat-cake kneaded with water only, and baked in the embers.

BANQUET, is that ſmall part of the branch of the bridle that is under the eye, which being rounded like a ſmall rod, gathers and joins the extremities of the bit to the branch, and that in ſuch a manner, that the banquet is not ſeen, but covered by the cap, or that part of the bit which is next the branch.

To BAR *a vein*, implies an operation in farriery performed in the following manner: they open the ſkin above and below the place where the operation is to be performed, and after freeing the vein from the ſurrounding parts, they tie it at thoſe openings with two ligatures; after which they open the vein between the ligatures in order to diſcharge the blood. This operation is performed upon the veins of a horſe's leg, and other parts of his body, in order to ſtop the courſe, and leſſen the quantity of malignant humours that prevail there.

BARB, a general name for horſes imported from Barbary.

The cheſt of the barb is long and ſlender, riſes beautifully from the withers, his mane little, his head well ſhaped, ſmall, and lean; his ſhoulders flat and ſlender; his withers narrow and plump; his back ſtrait and ſhort; his flanks and ſides round, and not bellying out; his haunches firm and well ſhaped; his croup generally ſomewhat long, and his tail placed pretty high; his thigh well ſhaped, and ſeldom flat; his legs handſome, well ſhaped, and without long hair at the paſtern joint; his foot well made, but his paſtern often long.

Barbs are of all colours, but generally brown. They are ſomething negligent in their goings; but, properly encouraged, ſhew an amazing ſwiftneſs and vigour: they are very light and fit for running; and ſeem of all others the fitteſt to breed from. It were, however, to be wiſhed that they were a little taller, the largeſt rarely exceeding fourteen hands; and one of fourteen hands and an inch, is very extraordinary. Experience has, however, ſhewn, that in England, France, &c. they get colts larger than themſelves. Among the barbs, thoſe from the kingdom of Morocco are accounted the beſt, except the mountain barbs. Thoſe of the reſt of Mauritania are inferior to them, as are alſo thoſe of Turkey, Perſia, and Armenia. All horſes from a hot climate have a ſmoother coat than others. *Buffon's Hiſtoire Naturelle, tom.* IV.

BARBELS, or *barbs*, are excreſſences or knots of ſuperfluous fleſh, growing under the tongue, and may be ſeen by drawing it aſide.

They are cured by cutting them cloſe off, and waſhing the wounded part with brandy, or ſalt and water. *Bartlet's Farriery, pag.* 262.

BARBERY, or pipperidge-buſh, a ſhrub that grows naturally in the hedges in many parts of England; it is alſo cultivated in gardens for its fruit, which is pickled, and uſed for garniſhing diſhes. This ſhrub riſes with many ſtalks from the root, to the height of eight or ten feet. The flowers appear in May, and the fruit ripens in September.

Theſe ſhrubs are propagated either by ſuckers, of which there are plenty about the old roots, or by layers.

The beſt time for laying down the branches, is in the autumn, when their leaves begin to fall; the young ſhoots of the ſame year are the beſt for this purpoſe. Theſe will be rooted by the next autumn, when they may be taken off, and planted where they are deſigned to remain. *Miller's Gard. Dict.*

A fooliſh ſuperſtition has for many ages prevailed among the farmers in many parts of England, namely, that a field of corn will always be blaſted, if a barbery-ſhrub grows in any one of the hedges that ſurround it. But theſe ridiculous notions are now pretty well baniſhed from the generality of our huſbandmen, and it is hoped the reſt will ſoon follow their example.

BARBS. *See the article* BARBELS.

BARG, a horſe-way up a ſteep hill.

BARING *of trees. See the article* ABLAQUEATION.

BARK, the exterior part of trees, ſerving them for a ſkin or covering.

Dr. Agricola ſays, that the bark of a tree may be compared to the ſkin of an animal, which is deſigned for the preſervation of the inward parts. It is generally of a ſpongy texture, and communicates with the pith, by a multiplicity of ſmall fibres paſſing between the capillary tubes, of which the wood conſiſts; ſo that the roots having imbibed the proper nutriment of the tree, it is carried up by the warmth of the ſun, through the fine arterial veſſels of the tree to the top of it; and being there condenſed by the cold, it returns by its own gravity down by the veſſels which lie between the wood and the inner bark, which perform the office of veins; and as it paſſes by leaves ſuch part of its juices as the texture of the bark will receive, and requires for its ſupport.

Some are of opinion, that the ſoft whitiſh rind, or ſubſtance which lies between the inner bark and the wood, performs the office of veins; and ſome call this a third bark, ſuppoſing it to differ from the other only in having its fibres cloſer; adding that this is the part which contains the liquid ſap, gums, &c. found in plants during the ſpring and ſummer months, and which hardening by degrees, is imperceptibly conveyed into the woody part of the tree, forming every year a new circle of wood between the bark and the trunk. Theſe circles are not equally thick, that circumſtance depending on the fertility of the year.

The bark of trees in general, and eſpecially that of the oak, contains a very rich ſalt, extremely uſeful in vegetation. One load of oak bark laid in a heap and rotted, after the tanners have uſed it for dreſſing their leather, will do more ſervice to ſtiff cold land, and its effects will laſt longer, than two loads of the richeſt dung. Mr. Miller ſays it is much better for cold, ſtrong land, than for light, hot ground, if it be uſed alone, as taken from the tan-yard; becauſe it is of a warm nature, and will looſen and ſeparate the earth ſo effectually, that, by only uſing it two or three times, a ſtrong ſoil, not eaſy to be wrought, will be rendered perfectly light and looſe: but by mixing it with earth of a nature contrary to that which it is intended to correct, and in a proportion ſuited to the nature of the ſoil it is to be laid on, it will prove a fine manure for almoſt any land; its ſalts being ſuch as will always fertilize the ground. Mr. Mortimer aſſerts, that it will alter and change the very nature of the ſoil, and turn it into a very rich black mould. *Mortimer's Huſbandry, vol.* I. *p.* 121.

It neceſſarily abounds in vegetable parts, derived from the tree to which it once belonged; and cannot but be ſtrongly impregnated with animal juices, as it lies a long time in the tan-vats, with the ſkins and hides of animals: circumſtances which muſt render it ſingularly beneficial to all poor lands.

If laid on graſs, it ſhould be ſpread ſoon after Michaelmas, that the winter rains may waſh it into the ground: for if it be laid on in the ſpring, it will be apt to burn the graſs, and, inſtead of improving, will do it a conſiderable injury for that ſeaſon. When uſed for corn land it ſhould be ſpread before the laſt ploughing, that it may be turned down for the fibres of the corn to reach it in the ſpring; for if it lies too near the ſurface, it will forward the growth of the corn in winter; and in the ſpring, when the nouriſhment is chiefly wanted to encourage the growth of the plants, it will be ſo nearly conſumed, that the corn will receive very little advantage from it.

Mr. Bradley tells us, that he adviſed a gentleman to whom a conſiderable quantity of bark was left upon the extirpation of the leaſe of a tan-yard, to lay ſome of it upon a piece of ſtubborn ſour land, which he did with ſuch ſucceſs, that his product was admired by all the gardeners and farmers in the neighbourhood. For ſuch ground, he thinks it ſhould be mixed with a ſandy ſoil; and that one third of bark to two thirds of ſand, will be a very ſufficient proportion for clays; laying on about one hundred and fifty cart loads upon an acre. *Bradley's Huſbandry, pag.* 90.

All barks or rinds of trees, though not of ſo high a value as that of the oak, which is the ſort principally uſed by tanners, muſt of neceſſity enrich either corn or paſture ground, if broken into ſmall pieces, and laid upon it. They muſt needs be much richer than the mould or earth, uſually found in the bodies of old, large, hollow, willow-trees, though this is juſtly eſteemed very efficacious. *Worlidge's Huſbandry, pag.* 84.

For the manner of making hot-beds with tanner's bark, *ſee the article* TAN.

BARK-BOUND, a diſeaſe common to fruit-trees, and may be cured by making a ſlit through the bark, from the top of the tree to the bottom, in February or March; and if the gaping be pretty conſiderable, fill up the rift with cow-dung. *Mortimer's Huſbandry, vol.* II. *pag.* 85.

BARKING *of trees*, the operation of ſtripping off the bark or rind, particularly that of the oak, for the uſe of tanners.

It is neceſſary in our climate to perform this operation in the month of May, becauſe at that ſeaſon only, the bark is, by the great quantity of ſap, ſeparated from the wood. This alſo renders it neceſſary to fell the trees in that month; but by this method the timber is much leſs valuable than it would be if felled after the fall of the leaf.

BARLEY, a ſpecies of grain well known in England, and of which Mr. Miller has enumerated four ſpecies.

1. The ſpring barley, which has a double row of beards or awns ſtanding erect. This is the ſort principally cultivated in England, and of which the farmers make two ſorts, viz. the common, and the rath-ripe barley: but theſe two ſorts are in reality the ſame; for the rath-ripe is only an alteration of the common barley, occaſioned by being long cultivated upon warm gravelly lands. The ſeeds of this, when ſown in cold or ſtrong land, will, the firſt year, ripen near a fortnight earlier than the ſeeds taken from ſtrong land, and therefore the farmers in the vales generally purchaſe their ſeed barley from the warm lands; for if ſaved in the vales two or three years, it will become full as late in repening as the common barley of their own product: on the other hand, the farmers on the warm land are alſo obliged to procure their ſeed barley from the ſtrong land, otherwiſe their grain would degenerate in bulk or fulneſs, which, by this change, is prevented. This ſort of barley is eaſily diſtinguiſhed by the two orders of beards or awns, which ſtand erect; the rind is alſo much thinner, and therefore eſteemed better for making malt.

2. The long-eared barley, which is cultivated in many parts of England, and is an exceeding good ſort; but ſome farmers object to this barley, becauſe they ſay the ears being long and heavy, it is more apt to lodge. This ſort of barley hath its grains regularly ranged in a double row, lying over each other, like the tiles on a houſe, or the ſcales of fiſh. It has no beards or awns; but its rind is very thin, and therefore eſteemed for making malt.

3. The ſprat barley, called alſo Battledore, Fulham, and Patney barley, from the great quantities cultivated in the neighbourhoods of thoſe places, has ſhorter and broader ears than either of the former ſorts; the awns or beards are longer, which tend greatly to preſerve it from the bird, and the grains placed cloſer together. This ſeldom grows ſo tall as the other ſpecies; the ſtraw is alſo coarſer, and therefore not ſo good fodder for cattle.

4. The winter barley, called alſo ſquare-barley, bear-barley, or big, is ſeldom cultivated in the ſouthern parts of England; but in the northern counties, and in Scotland it is the general ſort ſown, as being much hardier than the other ſpecies. There are two ſorts of this barley, the one with four rows of grains, and the other with ſix, the latter of which is commonly diſtinguiſhed by the name of barley-big. The grain is large and plump, but the rind or chaff of it being thicker than that of either of the preceding ſorts, it is leſs eſteemed for making malt, and therefore not cultivated in the ſouthern parts of England, where the ſorts which are ſo much better for that purpoſe thrive ſo well.

Both the four and ſix rowed barley are generally ſown in the autumn, nearly at the ſame time with wheat, not only in temperate climates, but alſo in very cold countries; their hardineſs being ſuch as to bear the winter's froſts, even in the mountainous parts of the northern regions. In hot countries they are ſown in January, February, and March.

All the other ſorts are ſown in the ſpring of the year in a dry time; in ſome very light land barley is ſown early in March, but, in ſtrong clay ſoils, not till April, and ſometimes not till the beginning of May; but when it is ſown ſo late, if the ſeaſon does not prove very favourable, it is very late in autumn before it is fit to mow, unleſs it be the rath-ripe ſort, which is often ripe in nine weeks from the time of ſowing: though Mr. Liſle is of opinion, that this, in particular, ought to be ſown early, for otherwiſe it will grow very thin. He likewiſe thinks, that it ſhould be ſown on better ground than the other barley, becauſe as it ripens in a ſhorter time it may be naturally ſuppoſed to exhauſt the nutritive juices of the earth faſter than other corn. But it is ſaid by others, that theſe nutritive juices in almoſt any tolerable ſoil, will probably hold out long enough to feed a crop of ſo ſhort a ſtanding as this is, though they might not ſuffice for corn which ſhould remain longer upon the ground; and it is added, that about Patney in Wiltſhire, they ſow the pooreſt ſandy ground with rath-ripe barley. *Liſle's Huſbandry, vol.* I. *pag.* 271.

Mr. Liſle adds, that he himſelf in the year 1707, ſowed in Hampſhire, rath-ripe barley in very poor white ground, and ſome of the ſame corn in good ſtrong clay land. No rain fell to bring it up till June; after which there were frequent ſhowers, and plenty of rain till harveſt. His rath-ripe barley in the poor land was miſerably bent, broken in the ſtraw, and harled, or fallen down. In the ſtrong clay land, the ſame corn ſuffered the ſame injuries, though in a leſs degree: but the ſtraw and leaves of the rath-ripe barley in both places blighted, and were full of black ſpecks; their ears were thin, and their colour was loſt; while the plants of late-ripe barley in an adjacent field were free from theſe ſpots, and ſtood upright with good ſtrength. From this experiment he infers, that ſince the clay land in the hilly country of Hampſhire, though in good heart, cannot, even in a moiſt year, ſufficiently feed the ſtraw of rath-ripe barley, ſo as to enable it to ſtand upright, but ſuffers it to be languid and withering, this ſort of corn is not proper for ſuch places, and that it is better to ſow late-ripe barley, even though three or four horſes extraordinary be provided againſt ſowing time, in order to get the corn into the ground a week before May begins. *Liſle's Huſbandry, vol.* I. *pag.* 272.

Another important obſervation made on the ſame occaſion, by the ſame judicious farmer, was, that one half of the ſeed which fell deep came up without rain, while the reſt did not ſprout till after the rain came. The half which came up firſt, could not, by reaſon of the weakneſs of the ſtems, wait for the ripening of the latter edge-grown corn, in the ſame field; but its ſtraw bent, broke, and was entangled, and the ears buried themſelves among the broad clover ſown with the barley, ſo that he was forced to cut it; not being able to ſtay a week or ten days longer for the edge-grown corn to ripen: whereas the late-ripe barley ſtood ſo upright in its ſtraw, that the corn which came up firſt would ſtay ten days for the edge-grown corn.

The ſame gentleman had another evident proof, in the year 1706, that the ſtraw of the rath-ripe barley is thinner and weaker than that of the late-ripe. All his rath-ripe barley, of which he ſowed fifty acres in different ſorts of ground, and ſome of it ſide by ſide with late-ripe barley, crumpled down in the ſtraw, while the late-ripe barley of the ſame forwardneſs and growth, ſtood upright.

Upon the whole, Mr. Liſle, after obſerving farther, that, if the ground be good, and the year a feeding one, rath-ripe barley is apt to run rank, and to fall while very green in the ear, which occaſions the grain not to fill; concludes, in regard to this ſort of corn, that it ſhould always be ſown early, that the land ſhould not have a north expoſure, and that the ſoil in which it is planted ſhould be pretty good, either naturally ſuch, or rendered ſo by art; "for we know, ſays he, that the poorer the ground is, the weaker and poorer the ſtraw will be in all ſorts of corn; and if the rath-ripe barley has by nature a weaker and thinner ſtraw than the late-ripe barley, and on that account is apter to crumple, to bend down, and to break in the ſtraw before it is ripe; much more will it be apt to do ſo, when the ſtraw is made much thinner and weaker than naturally it would be, by the poverty of the ground it is ſown in. It is very evident to me, that rath-ripe barley ought not to be ſown on poor ground, and much leſs ſo in caſe it lies declivous from the ſun towards the north." *Liſle's Huſb. vol.* I. *p.* 273, 274.

The middle-ripe barley, as Mr. Liſle calls it, meaning the common ſpring barley, bears late ſowing, even upon ground declivous from the ſun, better than the rath-ripe ſort; but not near ſo well as the late-ripe, or common long-eared barley; nor will its ſtalk ſtand ſo long. Mr. Liſle was convinced from experience, that late-ripe barley will endure being ſowed when the ground is wetter than will do for the rath-ripe ſort, and that a bottom ground, or vale pent in between two hills, though ſhaded by one of them from the ſun, will, by means of the warmth and cloſeneſs of the air, often ripen corn as faſt as the ground that lies declivous to the ſun. In a field which he ſowed with the common ſpring barley, the loweſt part of which laid on a flat, ripened regularly, and even ſooner than another part of the ſame field which lay upon the ſide of a hill declivous to the ſun: but on that ſide of the ſame hill which ſloped from the ſun, the corn was more edge-grown, lay backward, and neither looked ſo white, nor was it ſo ripe. *Liſle's Huſbandry*, *vol.* i. *p.* 275.

The land which lies both very dry and healthy, and in which both mellowneſs and lightneſs are joined to a proper ſtrength of ſoil, is that which produces the beſt body, and thinneſt rinded barley; qualities which always recommend this grain, eſpecially to the maltſters. Such generally is the barley of the growth of the hilly countries. But poverty of ſoil is by no means requiſite in land, in order to its producing a plump and thin rinded barley: though it is allowed, that poor land which lies dry and warm, will bear better corn of this kind, than rich land in a cold and wet ſituation: for barley does not ſtand ſo much in need of ſtrength in the land, as of the healthineſs and warmneſs of the ſoil; though both are beſt where they can be had. *Liſle's Huſb. vol.* i. *p.* 281.

With regard to the choice of ſeed-barley, it is neceſſary to obſerve, that the beſt grain for ſowing is that which is not blackiſh at the tail, nor has a deep redneſs, but is of a pale lively yellow colour, intermixed with a bright whitiſh caſt, and if the rind be a little ſhrivelled, it will be ſo much the better; for that ſlight ſhrivelling occaſioned by its having ſweated in the mow, is a ſure indication that its coat is thin. The huſk of thick rind barley being too ſtiff to ſhrink, will lie ſmooth and hollow, even when the inſide flour has ſhrunk from it.

The neceſſity of a change of ſeed from time to time, by ſowing that of the growth of a different ſoil, is no where more evident than in the culture of this grain, which otherwiſe becomes coarſer and coarſer every year. But at all times in this, as well as in all other grain, the utmoſt care ſhould be taken that the ſeed be full bodied.

Mr. Liſle tells us, that in order to be ſatisfied of this, he took out of a heap of barley ſixty grains, of different ſizes, viz. twenty of the biggeſt, twenty of the middle ſize, and twenty of the ſmalleſt corns. Twenty of each ſort of theſe grains he planted in three pots, each filled with the ſame ſort of mould, which was very rich. In eight or nine days time, thirteen of the fulleſt bodied grains were come up, nine of the middle ſized, and only five of the ſmalleſt, and the plants of the plumpeſt corn exceeded thoſe of the others, both in colour and breadth of blade. In three days after, he found nineteen blades of the largeſt ſort come up, ſeventeen of the middle ſize, and thirteen of the ſmalleſt; and in three days more, the blades of the beſt and of the middle ſort were all come up, while only ſeventeen of the worſt had ſprouted, with ſuch manifeſt diſadvantage in colour and ſtrength in theſe laſt, as plainly ſhewed that many of them would not have come up at all in poor ground. *Liſle's Huſb. vol.* i. *p.* 283.

It is natural to ſuppoſe that barley will, like wheat, be benefited by being ſteeped before it be ſown: for as rain cannot be depended upon ſoon after the ſowing of ſpring corn, there is ſurely an equal reaſon for extending the practice of theſe ſorts of grain, as well as to thoſe which are ſown in the autumn. Liming indeed may hurt barley, if hot weather ſhould ſoon follow after the ſowing; but a little ſprinkling of ſoot bids fair for improving it, at leaſt it will prevent the inſects from preying upon the ſeed. The Rev. Mr. Elliot informs us, that a farmer, who was obliged to attend other buſineſs in the courſe of the morning, ſowed oats at break of day, and harrowed them in before ſun-riſing. The conſequence was, that the corn thus early ſown, out-ſtripped the other oats ſown on the ſame day after the ſun was up, had larger ears, and appeared every way better, though the ſpot in which they grew was the worſt part of the field. If the dew, when buried with the corn had this effect, it is reaſonable to ſuppoſe that a much greater would have been produced, had the ſeed been ſown in the evening, left all night to have been ſoftened with the dew, and then harrowed in, in the morning. *Elliot's Eſſays on Field Huſbandry*, *p.* 29.

Mr. Liſle alſo tells us, that a malſter in Hampſhire having taken lands in the beginning of May, and no barley being to be had, he, by the perſuaſion of his malting-ſervant, made uſe of barley he had wetted, and was juſt well chitted or ſprouted; this corn came up well, and produced as good a crop as any ſown that year. *Liſle's Huſbandry*, *vol.* i. *p.* 284.

Barley is generally ſown either after a fallow, or on an erſh or ſecond crop. If after a fallow, the land muſt be ploughed at leaſt three times; and at the firſt ploughing, it ſhould be laid in ſmall ridges, and in that manner remain during the winter for the froſt to mellow it: but if another ploughing can be given it in January, or in the beginning of February, the ground will be ſtill much better broken and prepared. In March theſe ridges are ſplit, the ground is well harrowed, and laid as ſmooth as can be, and, if poſſible, it is ploughed again the ſame day, in order to ſow. But in ſtrong wet lands, the beſt way is to lay it round, and make deep furrows to receive the water.

Some at the time of twifallowing in June, make the land very fine, and ſow it with turneps, which they feed with ſheep in the winter; and in March they plough it up, and order it as before: but others, who take this method of ſowing turneps, give it only one ploughing in March, juſt before they ſow.

Thoſe who ſow barley upon an erſh, after wheat, plough up the wheat ſtubble in as dry weather as they can, as ſoon as the time of ſowing wheat is over, which is generally about the beginning of October, and lay three ridges into one, if they have dung to ſpread upon it: but if they have not, they plough it in ſmall ridges, as before directed, that it may be the drier, and be the better mellowed by the froſt: they then plough it up again in March, and order it as before. Some farmers injudiciouſly ſow their barley after oats, in which caſe, neither of theſe three ploughings ought by any means to be neglected; and the land will be in much better order if the firſt of them be given in October: or, if the harveſt be early, the weather dry, and the huſbandman can poſſibly find time to do it, he will improve his ground ſtill more, by ploughing it up before he ſows his wheat, juſt as harveſt is in: this will be half as good as a ſummer's fallow. But all years will not admit of this practice. *Mortimer's Huſbandry*, *vol.* i. *p.* 131.

Some ſow their barley on ſmall ridges, and others on broad lands; the latter cannot be laid too round.

Mr. Mortimer relates, that a farmer in Eſſex, who lived near a market-town, from whence he had good quantities of dung, uſed to ſow his land with barley and clover; reaped the corn at harveſt, fed the clover all the winter, and from ſpring till the middle of July, when he fallowed his ground. In the next ſpring he ſowed it again with barley and clover, and repeated every year this method, by which he had large crops. His land was a rich light mould, ſomewhat inclining to a gravelly bottom. *Mortimer's Huſbandry*, *vol.* i. *p.* 132.

A correſpondent of the editors of the *Muſeum Ruſticum* obſerves, that a few years ago he ſowed twenty-five acres of land, in fine tilth, with broad clover and barley; but the ſpring being backward and cold, and the ſummer wet, the clover got too forward, and overpowered the barley. At harveſt they were both cut together; and the clover being full of juice, occaſioned its being a tedious time before the barley could be houſed. When he got it into the barn, the men complained much of its threſhing ſo badly, that they could not undertake to do it unleſs he would double the price to them: as this could not be afforded, he ordered them to give it only a light beating, leaving the under corn in the ſtraw, together with the clover, for the cattle.

By this means he loſt half his crop by the clover; and what barley could be obtained was lean, and thin-bodied, fetching but a very indifferent price at market.

As this was not the firſt loſs of the ſame kind he had experienced, he was determined, if poſſible, to find out ſome remedy; and accordingly applied to a very intelligent farmer in the neighbourhood, who adviſed him to ſow his clover, for the future, a month after the barley, by which means it would not prove too rank. This advice he accordingly followed, and found it to anſwer extremely well; and has therefore, to his great advantage, continued the practice ever ſince. He adds, that there is no danger of the clover failing, though the ſeaſon ſhould prove dry; and that the ſeed is to be ſcattered on the ground without any farther care, there being no occaſion to harrow or roll it; for the ſmall blades of the barley will keep moiſture enough in the land to ſupply the ſmall wants of the clover during its infant growth, and when the barley is off, it will thrive ſurprizingly. *Muſeum Ruſticum, vol.* iii. *p.* 315.

It has been already obſerved, that the uſual time of ſowing is in March, April, or the beginning of May. It is generally thought moſt adviſable to ſow light lands the earlieſt, and to embrace the firſt dry ſeaſon that offers for doing it; dry weather being beſt for moſt ſummer corn. Clayey grounds, and lands ſubject to weeds, are thought to produce the beſt crops when ſowed late. Mr. Mortimer ſays, that barley will do well when ſown even about the middle of May, if the ſeed has been properly ſteeped. *Mortimer's Huſb. vol.* i. *p.* 132.

The common method is to ſow the barley ſeed with a broad-caſt at two ſowings; the firſt being harrowed in once, the ſecond is harrowed until the ſeed is buried; the common allowance of ſeed is four buſhels to an acre: but if the farmers could be prevailed upon to alter this practice, they would ſoon find their account in it; for if a third part of that quantity be ſown, there will be a much greater produce, and the corn will be much leſs liable to lodge, as I (ſays Mr. Miller) have many times experienced; for when corn, or any other vegetables ſtand very cloſe, the ſtalks are drawn up weak, and thence incapable of reſiſting the force of the winds, or ſupporting themſelves under heavy rains: but when they are at a proper diſtance, their ſtalks will be more than twice the ſize of the other, and therefore are ſeldom laid. I have frequently obſerved in fields where there has been a foot-path through their middle, that the corn, which has ſtood thin on each ſide of the path, hath ſtood upright, when all the reſt on both ſides has been laid flat on the ground; and whoever will give himſelf the trouble to examine theſe roots near the path, will find them tiller out (*i. e.* have a greater number of ſtalks) to more than four times the quantity of the other parts of the field. I have ſeen experiments made by ſowing barley in rows acroſs divers parts of the ſame field, and the grains ſown thin in the rows, ſo that the roots were three or four inches aſunder in the rows, and the rows a foot diſtant; the intermediate ſpaces of the ſame field were at the ſame time ſown broad-caſt in the uſual way; the ſucceſs was this: the roots which ſtood thin in the rows tillered out from ten or twelve, to upwards of thirty ſtalks on each root, the ſtalks were ſtronger, the ears longer, and the grains larger than any of thoſe ſown in the common way; and when thoſe parts of the field, where the corn was ſown in the uſual way, has been lodged, theſe parts ſown thin have ſupported their upright poſition againſt wind and rain, though the rows have been made not only lengthways, but acroſs the lands, in ſeveral poſitions; ſo that there could be no alteration in regard to the goodneſs of the land, or the ſituation of the corn: where therefore ſuch experiments have been made, and always attended with equal ſucceſs, there can be no room to doubt which of the two methods is moſt eligible, ſince if the crops were only ſuppoſed to be equal in both, the ſaving two thirds of the corn ſown is a very great advantage, and deſerves a national conſideration, as ſuch a ſaving, in ſcarce times, might be of very great benefit to the public. This ſaving of ſeed-corn muſt be underſtood to regard ſuch as is ſown broad-caſt; for if it be ſown in drills, an eighth part of the ſeed uſually ſown will be ſufficient for an acre of land, and the produce will be greater; for all ſorts of corn are naturally inclined to ſend out ſeveral ſtalks from each root, which they rarely fail to do where the roots are at a proper diſtance, and have room; nor do ſtalks grow in this caſe near ſo tall, but are much ſtronger than when they are near together, when they rarely have more than two or three ſtalks; whereas thoſe roots which have proper room, ſeldom have leſs than ten or twelve. I have had eighty ſtalks upon one root of barley, which were ſtrong, produced long ears, and the grain was better filled than any I ever ſaw grow in the common method of huſbandry, and the land on which this grew was not very rich; but I have frequently obſerved on the ſides of hot-beds in the kitchen gardens, where barley-ſtraw has been uſed for covering the beds, that ſome of the grains left in the ears have dropped out and grown, the roots have produced from thirty to ſixty ſtalks each; and thoſe have been four or five times larger than the ſtalks ever arrive at in the common way; but to this I know it will be objected, that although upon rich ground in a garden, theſe roots of corn may probably have ſo many ſtalks, yet in poor land they will not have ſuch produce: therefore unleſs a greater quantity of ſeeds be ſown, the crop will not be worth ſtanding, which is one of the greateſt fallacies that can be imagined; for to ſuppoſe that poor land can nouriſh more than twice the number of roots in the ſame ſpace as rich land, is ſuch an abſurdity, as one could hardly ſuppoſe any perſon of common underſtanding guilty of; and yet ſo it is: for the general practice is to allow a greater quantity of ſeed to poor land, than for richer ground, not conſidering that where the roots ſtand ſo cloſe, they will deprive each other of their nouriſhment, and conſequently ſtarve themſelves, which is always the caſe when the roots ſtand cloſe, which any perſon may at firſt ſight obſerve in any part of the fields where the corn happens to ſcatter when they are ſowing it; or in places where by harrowing, the ſeed is drawn in heaps, thoſe patches will ſtarve, and never grow to a third part of the ſize as the other parts of the ſame field; and yet, common as this is, it is little noticed by farmers, otherwiſe they ſurely would not continue their old cuſtom of ſowing. I have made many experiments for ſeveral years in the pooreſt land, and have always found that all crops, which were ſown or planted at a greater diſtance than uſual, have ſucceeded beſt upon ſuch land; and I am convinced if farmers could be prevailed upon to quit their prejudices, and make trial of this method of ſowing their corn thin, they would ſoon ſee the advantage of this huſbandry. *Miller's Gard. Dict.*

It is a common practice in ſome parts to ſcatter the dung of pigeons, poultry, &c. over barley and other corn, after the corn is ſown; but if this method be purſued, care ſhould be taken to ſcatter the dung immediately; becauſe then the ſhoot will eaſily make its way through: but when laid on later, it burns up, and eats the blades of the young plants. *Mortimer's Huſbandry, vol.* i. *p.* 133.

It too often happens from unfavourable weather, and an extremely dry ſpring, that it is impoſſible by the common method to break the clods, and prepare the ground ſufficiently for ſowing barley; in which caſe it has been the uſual method to break the clods with a large beetle, called, from its uſe, a clotting-beetle. But this being a very chargeable and tedious method of preparing land, induced the ingenious Mr. Randall of York, to conſtruct an inſtrument, which he calls a ſpiky roller, by the aſſiſtance of which a large quantity of land may, in ſuch a dry ſeaſon, be ſoon reduced to an exceeding fine tilth, with very little trouble. The reader will find a full account of this uſeful inſtrument, the manner of making and uſing it, together with a figure of the roller, under the article SPIKY ROLLER.

After the barley is ſown and harrowed in, the ground ſhould be rolled after the firſt ſhower of rain, to break the clods and lay the earth ſmooth; which will render it better to mow the barley, and alſo cauſe the earth to be cloſer to the roots of the corn, which will be of great ſervice to it in dry weather.

And alſo when the barley has been up three weeks or a month, it will be a very good method to roll it over with a weighty roller, which will again preſs the earth cloſe to the roots of the corn, and thereby prevent the ſun and air from penetrating the ground, which will be of ſingular ſervice in dry ſeaſons; and this rolling of it before it ſtalks, will cauſe it to tiller out into a greater number of ſtalks; ſo that if the plants ſhould be thin, this will cauſe them to ſpread ſo as to fill the ground, and likewiſe ſtrengthen the ſtalks. *Miller's Gard. Dict.*

If the corn grows too rank as it is ſometimes thought to do in a wet ſpring, mowing is then much better than feeding it; becauſe the ſcythe takes off only the rank tops, but the ſheep feed upon all indifferently: nor ſhould they even in any caſe be left upon it too long, becauſe being particularly fond of the ſweet end of the ſtalk next the root, they will bite ſo cloſe as to injure the future growth of the plant.

Barley is ripe when the red roan, as the farmers call it, meaning a reddiſh colour on the ear, is gone off, when the ears droop, and fall, as it were, double againſt the ſtraw, and the ſtalks have loſt their verdure. If it be full of weeds it muſt lie in the ſwarth till they are dry. It is not apt to ſhed; but in wet weather it will be apt to ſprout or grow muſty; and therefore every fair day after rain it ſhould be ſhook up and turned; and when it is tolerably dry, let it be made up into cocks; but be ſure never to houſe it till thoroughly dry, leſt it mow-burn, which will make it malt worſe than if it had ſpired in the field. The common produce of barley is two or three quarters upon an acre. *Mortimer's Huſbandry, vol.* i. *p.* 133.

Mr. Liſle ſays that poor thin barley and oats ſhould be cut a little ſooner than if the ſame plants were ſtrong and vigorous; for that the ſtraw, when the plants are full ripe, will not ſtand againſt the ſcythe. In this caſe the barley, in particular, muſt lie in ſwarth till it is thoroughly dry. Some of his barley, which lay out in ſwarth five or ſix days in very fine weather, though both blighted and edge-grown, grew plump, and acquired very near as good a colour as the beſt. He reckons ſhort ſcythes the beſt for mowing lodged or crumpled corn, becauſe they miſs the feweſt plants; and obſerves that a bow upon the ſcythe, which will carry the ſwarth away before it, is preferable to a cradle, the fingers of which would be pulled to pieces by the intangled corn, in drawing back the ſcythe. *Liſle's Huſbandry, vol.* i. *p.* 335.

Mr. Du Hamel tells us, that a farmer at Acou, obſerving that the chief hopes of more than common ſucceſs by means of the new huſbandry, were founded on the frequent ſtirring of the ground while the corn was in it, and on allowing each plant ſufficient ſpace to extend its roots, and thereby collect the more nouriſhment, tried an experiment which appeared to him very proper to diſcover whether the effect would anſwer. He carefully cultivated a grain of barley, which grew by chance in his vineyard. This plant, ſaid he, ſtands diſtant from any other; it can extend its roots every way; it is in a rich ſoil, and cannot want for food: by joining frequent culture to theſe advantages, this plant of barley, according to the principles of the new huſbandry, ought to yield a ſurprizing increaſe. His reaſoning was juſt, and the experiment confirmed it; for this ſingle grain of barley produced two hundred ears, and about thirty ſtalks which had no ears. Some of the ſtalks were four feet high, and moſt of them three. Mr. Du Hamel counted twenty-four grains in a middling ear. Thus one grain, planted in a good ſoil, and well cultivated, produced 4800 grains; and the ſtraw of this ſingle plant of barley made of itſelf a ſheaf. *Tranſlation of Du Hamel's Huſb. p.* 113.

We have already obſerved, under the article Soap Ashes, that Sir Hugh Platt, by ſpreading that manure over his land, had a ſurprizing crop of barley, the plants of which were of a prodigious ſize. An ear of this barley is delineated in its natural ſize, Plate III. Fig. 1.

BARM, yeaſt, or the thick cruſt that riſes on the ſurface of beer, while it is fermenting.

BARN, a covered place or houſe for laying up any ſort of grain, hay, or ſtraw.

Every farm ſhould be furniſhed with barns proportioned to the quantity of corn it produces, which will be a great advantage to the farmer. The barns ſhould have a dry ſituation, and be properly placed in the farm-yard, but not quite contiguous to the houſe for fear of fire.

A barn is uſually made of wooden frames covered with planks of oak, or built of brick or ſtone, which ever the country affords in the greater plenty; and in either caſe there ſhould be ſuch vent-holes, or openings, in its ſides or walls, as to afford free admittance to the air, in order to prevent the mouldineſs that would otherwiſe from the leaſt dampneſs lodging in the corn. The gable ends may be always of brick or ſtone, for the ſake of greater ſolidity, and the whole may be roofed with thatch or tiles, as is moſt convenient. The ſize of the barn ſhould be proportioned to the crop uſually produced by the land to which it belongs. Two large folding doors ſhould face each other, one in each ſide of the building, for the convenience of carrying in or out a waggon-load of corn in ſheaves; and theſe doors ſhould be of the ſame breadth with the threſhing-floor to afford the more light and air; the former for the threſhers, and the latter for winnowing. Over the threſhing-floor, and a little above the reach of the flail, poles are often laid a-croſs from one beam to another, to form a kind of upper floor, upon which the threſher may throw his ſtraw or haulm, to make an immediate clearing, till he has time to ſtow it more properly elſewhere: and on the outſide, over the great doors, it will be right to form a large penthouſe, made to project ſufficiently to cover a load of corn, in caſe a ſudden ſtorm ſhould come on before it can be houſed; and alſo to ſhelter the poultry in the farm-yard, in great heat, or bad weather.

It is moſt adviſable, and indeed moſt commonly practiſed in countries which abound in corn, to have a ſeparate barn for wheat, another for ſpring-corn, ſuch as barley and oats, and a third for peas, tares, lentils, clover, ſaintfoins, &c.

Some art, which muſt be the reſult of practice, is neceſſary in placing and piling up the ſheaves in barns. But it may not be uſeleſs to obſerve, that it is always neceſſary to preſs them as cloſe to the walls of the barn as poſſible, ſo as not to afford the leaſt room for rats, or other vermin to creep in between them: for if they once get admittance they will ſoon penetrate further, lodge themſelves in the mow, and do prodigious damage to the corn. Where this misfortune happens, the only remedy is to take down the mow, kill the vermin, and pile it up a-new.

But the floor, or threſhing place, is the principal part of every barn, and therefore the greateſt care ought to be taken in making it. In order to this, the ſurface of the intended threſhing place is dug away to the depth of about ſix inches, and the earth thus taken out, after being well cleared of ſtones, is mixed with the ſtrongeſt clay that can be procured, and with the dung of cows or oxen. This mixture is then worked together with water, till it is of the conſiſtence of ſtiff mortar, and the compoſt thus made is ſpread as ſmooth as poſſible with a trowel, upon the ſpot from whence the earth was taken. As it cracks in drying, it muſt be beaten down with great force; or rolled with a heavy roller till all the crevices are filled up; and this muſt be continued till it is quite ſolid, hard, and firm.

The beſt barn-floor, both for threſhing and for keeping corn, is that which is drieſt, ſmootheſt, moſt completely ſolid, and conſequently freeſt from cracks and holes, in which inſects and vermin may ſhelter themſelves, and even breed. The ancients were remarkably careful in this reſpect, as we learn from Cato, Varro, and Columella, the laſt of which excellent huſbandman relates particularly the great pains they took, firſt to dig up the ground to ſome depth, in order to moiſten it with freſh lees of oil, but not with any that had ſalt in them; then to mix it thoroughly with chaff, and ram it down as cloſe as poſſible; afterwards as it dried, to ſtop all the cracks and crevices that appeared; to continue beating it down with great force, to render it quite level; and, laſtly, to ſtrew it again with chaff, which they trod in, and then left it to be completely dried by the ſun. All theſe writers agree, that the lees of oil, thus uſed, prevent the growth of weeds in theſe floors, and contribute to preſerve the corn from being plundered by the mice and ants. Their barns were always ſeated high, and as dry as poſſible.

A floor made in the above manner muſt be greatly preferable to either ſtone, or the earthen floors, too common in many parts of England, and from which ſuch dampneſs has been communicated to the corn, as has rendered wheat, for example, ſixpence a buſhel the worſe, either for keeping or exporting.

Boarded threſhing-floors, made of ſound, thick, well ſeaſoned planks of oak, are excellent for ſervice, will laſt a long time, and may be converted into good floorings for rooms, by planing them down, after they are become two uneven for the purpoſe originally intended.

BARNACLES, horſe-twitchers, or brakes, are a ſort of inſtruments uſed by farriers to put upon horſes noſes, when they will not ſtand quietly, to be ſhod, blooded, or dreſſed.

There are ſeveral ſorts of barnacles, the common ſort are rollers of wood, bound together, with the horſe's noſe between them. Another ſort have handles, and are therefore termed pincers, to diſtinguiſh them from the foregoing. And a third ſort are held together at the top by a ring incloſing buttons, having the top buttons held by an iron pin riveting through them.

BARREN CORN, a name given to a diſtemper in corn, by M. Aimen, who firſt obſerved it. The ears of wheat or rye, the ſpecies moſt ſubject to this diſtemper, which are thus affected, are long, lean, and white; in ſome the ſtamina, or ſmall threads in the middle of the flower, are dry, tranſparent, and horned; the female organs are ſmall, whiter, and leſs velvetty, than in healthy ears: in others, the filaments are ſwelled, the apices, or knobs on the tops of the ſtamina, void of duſt, or farina, and the ſtigmata badly unfolded. The ſtigmata of all the bloſſoms of an ear are ſometimes dried and parched; at other times the apices are ſwelled.

M. Aimens thinks, with Theophraſtus, that theſe accidents happen to ſuch plants as grow with moſt vigour. Then, ſays he, the ſap, which is powerfully conveyed into the leaves and other parts of the plant, prevents the organs of fructification from unfolding themſelves.

He alſo imagines that froſt may cauſe this accident, by particularly effecting the female organs: and he thinks, that a hot gleam of ſun-ſhine coming after a hard ſhower may have the ſame effect. If this be the caſe, the diſtemper in queſtion may be ranked with the parched and ſhrivelled corn, or perhaps with the empty-eared corn. Laſtly, the ſame naturaliſt obſerves, that inſects are ſometimes, though very rarely, the cauſe of this diſtemper.

Barren Earth, a name given by ſome to the under ſtratum of earth, or that which lies below the ſtratum frequently turned up, and cultivated for the nouriſhment of plants.

This notion of the under ſtratum of earth being dead or barren, and will deſtroy every vegetable planted in it, ſeems to be founded on a miſtake; for every kind of earth, whether it be upon or under the ſurface, is certainly capable of giving nouriſhment to plants, provided it be for ſome time expoſed to the influence of the air, froſts, &c. in order to enable it to diſpenſe its nutritive qualities. An earth ſeemingly barren dug out of a deep pit, will, if ſpread on the ſurface, and properly ſtirred and expoſed, be ſoon in a condition of bearing plants, and even much more ſo than the earth, which having been long at the ſurface, is almoſt exhauſted, by the number of vegetables it has ſucceſſively nouriſhed. The notion of any earth being barren, merely becauſe it is placed at a diſtance from the ſurface, is by the moſt intelligent naturaliſts exploded: its particles may perhaps want a proper arrangement, but it always poſſeſſes the vegetative quality. This opinion has been confirmed by repeated experiments; and a very remarkable one of this kind is related by a correſpondent of the editors of the *Muſeum Ruſticum*, *vol.* i. *p.* 100. &c. where the writer tells us, that he planted a quantity of potatoes in a piece of what was called dead barren earth, the upper bed having been taken away and ſpread on the adjacent land. Yet in this ſpot of ground dug two ſpits deep by the help of ſpades and mattocks, and the earth broke as fine as poſſible, he had a prodigious crop of remarkably fine potatoes; though the earth had not been expoſed to the influence of the atmoſphere above two months, it being dug in February, and the potatoes planted the latter end of March.

Barren Springs, a name given by huſbandmen to ſuch ſprings whoſe waters are injurious to land.

Moſt waters that flow from coal-mines, or through beds of ſulphureous minerals, have this pernicious quality, deſtroying vegetables, inſtead of nouriſhing them. They have a harſh and brackiſh taſte, are generally of a reddiſh colour, and depoſit a reddiſh ſediment in the channel through which they flow. They are much better when they have run ſome diſtance, than at their firſt breaking out on the ſurface of the earth. *Mortimer's Huſbandry*, *vol.* i. *p.* 20.

BARS, the fleſhy rows that run a-croſs a horſe's mouth, reaching almoſt to the palate. They are very diſtinguiſhable in young horſes.

BARTH, a warm place, or paſture, for calves or lambs.

BARTON, *or* Barken, the yard of a houſe.

BASIL, the name of a plant, of which there are ſeveral ſpecies; but that which bears the largeſt leaves, eſpecially if they are of a purpliſh colour, are reputed the beſt.

They are all annual and very tender plants, and muſt therefore be raiſed on a moderate hot-bed from ſeeds ſown in March. When the plants are come up, they ſhould be tranſplanted into another moderate hot-bed, obſerving to water and ſhade them until they have taken root; after which they ſhould have plenty of air in mild weather, otherwiſe they will draw up very weak. In May they ſhould be taken up with a ball of earth to their roots, and tranſplanted either into pots or borders, obſerving to ſhade them until they have taken root; after which, they will require no farther care, but to clear them from weeds, and refreſh them with water in dry weather. Though theſe plants are only propagated from ſeeds, yet if you have any particular ſort which you are deſirous to increaſe, you may take off cuttings any time in May or June, and plant them on a moderate hot-bed, obſerving to water and ſhade them for about ten days; in which time they will take root, and in three weeks time be fit to remove, either into pots or borders, with the ſeedling plants. In September theſe plants will perfect their ſeeds, when thoſe ſorts which appear the moſt diſtinct ſhould have their ſeeds preſerved ſeparate, for ſowing the following ſpring. *Miller's Gard. Dict.*

BASON, a reſervoir, or place for holding water either for the uſe or ornament of a garden.

In making baſons, particular regard muſt be had to the ſoil of the garden; for in looſe ſandy land great care will be neceſſary in making the clay walls ſo as to hold water; but where the ſoil is loomy, or inclining to clay, there will be little difficulty in making baſons, nor need the clay-wall be ſo thick. Where the ground is looſe, the clay-walls at the bottom ſhould not be leſs than two feet thick, and thoſe on the ſides one and an half. The clay ſhould be well wrought over and trod when it is taken from the pit, before it is uſed in building the wall. The true ſign of good clay is, that it be cloſe and firm, without any mixture of ſand, and that it be tenacious and fat in handling. It ſhould be well worked before the clay is brought to the place, for if the clay be too long expoſed to the ſun and air, it will be leſs proper for uſe, eſpecially if it be laid in ſmall parcels.

The beſt time of the year for making baſons is in autumn, when the ſun is declining, and the weather temperate; for in the ſpring of the year, the drying eaſt and north-eaſt winds generally blow; ſo that the clay-walls, if not very carefully covered as faſt as they are made, often crack in many places, ſo that the water finds a paſſage through them. The ſame inconveniency happens from the violent heat of the ſun in ſummer; for when the clay dries very faſt, it will be very difficult, if not impoſſible, to prevent its cracking.

When the ground where the baſon is to be made, is dug out level, the clay muſt be brought in, and laid very carefully in the bottom, obſerving that no dirt or ſmall ſtones be mixed with it; ſome water muſt alſo from time to time be thrown on the clay, while the men are treading it cloſely with their naked feet; after which it muſt be very well rammed. When the bottom is finiſhed with clay, a layer of coarſe gravel about four or five inches thick ſhould be laid over it, which will greatly tend to ſecure the clay bottom, and render the water clear. But where the baſon is large, ſo that the clay bottom is long in making, it ſhould be covered with moiſt litter, to prevent its drying, which may be taken off when the whole is finiſhed to lay on the gravel; but if part of the ſide walls be finiſhed before this is done, it will be the better; becauſe there may then be ſome water let into the baſon, as ſoon as the gravel is laid, which will prevent the clay from cracking. After this the walls round the ſides of the baſon muſt be carried up with the ſame care as above directed for the bottom, obſerving alſo to cover the clay with litter while the work is carrying on, and afterwards to lay it with coarſe gravel; and as the walls are finiſhed round, the water may be let in to ſecure the walls from drying or cracking.

When the whole is finiſhed, a ſtratum of gravel four or five inches thick ſhould be laid upon the clay, then a thin ſtratum of good earth, and the whole covered with turf. The ſand will prevent the graſs from rooting into the clay, and alſo keep out the froſt. The turf on the ſide of the baſon ſhould be laid as far down as the water is apt to fall, that no part of the clay may be wholly expoſed to the weather.

No trees or ſhrubs ſhould be ſuffered to grow near a baſon, for their roots will penetrate through the clay walls, and occaſion fiſſures, through which the water will find an eaſy paſſage.

In ſome countries where clay cannot be eaſily procured, the walls of theſe baſons are frequently made with chalk, beaten into a ſoft powder, and made into a ſort of mortar, with which the walls are made by ramming and working it very hard and firm. Theſe baſons hold water very well, if never ſuffered to be dry any length of time; for whenever that happens the ſun and winds by drying the chalk, cauſe it to crack, and theſe cracks commonly extend through the thickneſs of the walls, ſo as to let out the water.

Others build the walls of their baſons with bricks laid in terraſs, which is a good method for ſuch places where the ground is looſe and ſandy; becauſe the walls, when well built, will ſupport the looſe earth from falling, or ſettling away from the ſides; but where terraſs is uſed, the walls ſhould not be long dry and expoſed; for the heat is apt to crack the terraſs.

Some make a cement of powdered tile and lime, two parts of the former to one of the latter, being very careful in the mixing of it not to add too much water, but to labour it well in beating, which is a principal thing to be obſerved. With this cement they cover the ſurface of the walls of their baſons about two inches thick, laying on the plaiſter, and being very careful that no ſticks, ſtraws, or ſtones, are mixed with it: this plaiſtering is generally performed in dry weather, and as ſoon as it is finiſhed, it is rubbed over with linſeed oil, or bullocks blood, and the water let into the baſon as ſoon as poſſible. This cement has the property of hardening under water, ſo as to be equal to ſtone, and will continue as long ſound.

But whatever the materials are made uſe of in building the walls, great care muſt be taken to render them ſo ſtrong, as to enable them to reſiſt the weight of the water; where, therefore, the ground about the baſon is not very ſolid, the walls ſhould be thicker, and ſupported on the backſide by buttreſſes of the ſame materials, placed at proper diſtances: or, if the walls are made of clay, planks ſupported by ſtrong timbers, at proper diſtances, ſhould be placed ſo as to ſuſtain them; otherwiſe there will be great danger of their being broken down, eſpecially where the baſons are large enough for the waves driven by the wind to daſh forcibly againſt the banks. *Miller's Gard. Dict.*

BASTARD *Alkanet*, called alſo *baſtard gromill*, or *ſalfarn*, a weed common among corn, eſpecially rye. It may be eaſily known by its red roots, which yield a red tincture, and are uſed by the young girls in Sweden to colour their cheeks. From the root uſually riſes a ſingle ſtem about a foot high, rough, and branching out at the top. The flowers are ſmall and white, ſurrounded with five long, narrow, hairy leaves, forming what the botaniſts call the empalement of the flower cup, and ſucceeded by four white rough ſeeds. *See a figure of this plant on* Plate III. Fig. 2.

BAVINS, bruſh-faggots, or faggots made with the bruſh-wood at length.

BAUM, a plant very common in the Engliſh gardens. It is raiſed either from ſeeds, or propagated by ſlips from its roots, which are perennial, though its ſtalks are annual. The ſeeds ſhould be ſowed in the ſpring; but the ſlips planted in October, that they may have time to get ſtrength before the froſts come on. The roots alſo of this plant may be parted into ſmall pieces, with three or four buds to each. Theſe ſhould be planted about two feet aſunder in beds of common garden earth, where they will ſoon ſpread ſo as to meet each other. The only culture they require is to water them till they have taken root, to keep the plant clean from weeds, and to cut off the dry ſtalks in autumn; ſtiring the ground between the roots. *Miller's Gard. Dict.*

BAUSON, the ſame with badger. *See* BADGER.

BAY, a colour in horſes, ſo called from its reſembling the colour of a dried bay-leaf.

There are various degrees of this colour from the lighteſt bay to the dark, which approaches nearly to the brown, but is always more gay and ſhining. The bright bay is an exceeding beautiful colour, becauſe a bright bay horſe has generally a reddiſh daſh, with a gilded aſpect, his main and tail black, with a black or dark liſt down his back. The middle colours of bay have alſo frequently the black liſt, with black main and tail. And the dark bays have almoſt always their knees and paſterns black; and we meet with ſeveral ſorts of bays, that have their whole limbs black from their knees and hocks downwards. The bays that have no liſt down their backs, are, for the moſt part, black over their reins, which goes off by an imperceptible gradation from dark to light towards the belly and flanks. Some of theſe incline to a brown, and are more or leſs dappled. The bay is one of the beſt colours, and horſes of all the different kinds of bays are commonly good, unleſs when accidens happen to ſpoil them while they are colts. *Gibſon on Horſes, vol.* I. *pag.* 44.

BAY *of a barn*, that part where the mow is placed. Hence ſuch barns as have the threſhing-floor in the middle, and a ſpace for a mow on each ſide, are called barns of two bays, &c.

BAYARD, a bay horſe.

BAY-SALT, is ſalt made from ſea-water by the heat of the ſun only, without the aſſiſtance of fire. The cryſtals of this ſalt are much larger than thoſe of the common ſalt, occaſioned by the gentle evaporation of the watry particles; whence the cryſtals have a ſufficient time to ſhoot, which they have not in the common method. From this circumſtance bay-ſalt becomes much better for ſalting meat, &c. than the common.

BEANS, a ſort of pulſe well known, and of which there are two ſpecies, diſtinguiſhed by the names of the garden-bean, and the horſe-bean.

Garden-BEANS. There are ſeveral varieties of garden-beans, diſtinguiſhed among gardeners by different names, viz.

The Mazagan bean is the firſt and beſt ſort of early beans at preſent known; they are brought from a Portugueſe ſettlement of the ſame name on the coaſt of Africa. The ſeeds of this ſort are ſmaller than the horſe-bean, and as the Portugueſe are but ſlovenly gardeners, there is commonly a great number of bad ſeeds among them. If this ſort be ſown in October, under a warm hedge, pale, or, wall, and carefully earthed up when the plants are advanced, they will be fit for the table by the beginning of May: the ſtems of this ſort are very ſlender, and therefore ſhould be ſupported by ſtrings cloſe to the hedge, or pale, to preſerve them from the morning froſts, which are ſometimes ſevere in the ſpring, and retards their growth: theſe beans bear plentifully; but they ripen nearly together, ſo that there are ſeldom more than two gatherings from the ſame plants. If the ſeeds of this ſort are ſowed two years in England, the ſeeds will become much larger, and not ripen ſo ſoon, which is called a degeneracy.

The next ſort is the early Portugal bean, which appears to be the Mazagan ſaved in Portugal; this is the moſt common ſort uſed by gardeners for their firſt crop, but they are not near ſo well taſted as the Mazagan.

The next is the ſmall Spaniſh bean; this will come in ſoon after the Portugal ſort, and being a better taſted bean, ſhould be preferred.

Then comes the broad Spaniſh, which is a little later than the other; but coming in before the common ſorts, and being a good bearer, is frequently planted.

The Sandwich bean comes ſoon after the Spaniſh, and is almoſt as large as the Windſor-bean; but being hardier, is commonly ſown a month ſooner. It is a plentiful bearer.

The Toker bean, as it is generally called, comes about the ſame time with the Sandwich, and being a great bearer, is now frequently planted.

The white and black bloſſom-beans are alſo by ſome perſons much eſteemed; the beans of the former are, when boiled, almoſt as green as peaſe, and being a ſweet bean, renders it more valuable: both theſe ſorts are very apt to degenerate, if their ſeeds are not ſaved with great care.

The Windſor-bean is allowed to be the beſt of all the ſorts for the table: when theſe are planted on a good ſoil, and are allowed ſufficient room, their ſeeds will be very large, and in great plenty; and when they are gathered young, are the ſweeteſt and beſt taſted of all the ſorts; but the ſeeds of theſe ſhould be carefully ſaved by pulling out ſuch of the plants as are not perfectly right, and afterwards by ſorting out all the good from the bad beans when they are out of the pods. This ſort of bean is ſeldom planted before Chriſtmas, becauſe it will not bear the froſt ſo well as many of the other ſorts; it is, therefore, generally planted for the great crop to come in June or July.

Thoſe beans which are planted early in October, will come up by the beginning or middle of November; and as ſoon as they are two inches above the ground, the earth ſhould be carefully drawn up with a hoe to their ſtems, and this muſt be two or three times repeated, as the beans advance in height, which will protect their ſtems from the froſt. If the winter ſhould prove ſevere, it will be very proper to cover the beans with peaſe haulm, fern, or ſome other light covering, which will ſecure them from the injury of the froſt: but this covering muſt be conſtantly taken off in mild weather, otherwiſe the beans will draw up ſo tall and weak as to come to little; and if the ſurface of the border be covered with tanner's bark, it will prevent the froſt from penetrating into the ground to the roots of the beans, and be of great ſervice to protect them from the injury they might otherwiſe receive.

In the ſpring, when the beans are advanced to be a foot high, they ſhould be faſtened up to the hedge with packthread, ſo as to draw them as cloſe as poſſible; which will ſecure them from being injured by the morning froſts, which are often ſo ſevere in April, as to lay thoſe beans flat on the ground, which are not thus guarded: at this time all ſuckers which come out from the roots ſhould be very carefully taken off, for theſe will retard the growth of the bean, and prevent their coming early. When the bloſſoms begin to open toward the bottom of the ſtalks, the top of the ſtem ſhould be pinched off, which will cauſe thoſe firſt pods to ſtand, and thereby bring them forward. If theſe rules are obſerved, and the ground kept clean from weeds, or other plants, there will be little danger of their failing.

But leſt the firſt crop ſhould be deſtroyed by froſt, it will be abſolutely neceſſary to plant more about three weeks after the firſt, and ſo to repeat planting more every three weeks, or a month, till February; but thoſe which are planted towards the end of November, or the beginning of December, may be planted on ſloping banks, at a diſtance from the hedges; for if the weather ſhould prove mild, theſe will not appear above-ground before Chriſtmas; therefore will not be in ſo much danger as the firſt and ſecond planting, eſpecially if the ſurface of the ground is covered with tan to keep the froſt out of the ground. The ſame directions which are before given will be ſufficient for the management of theſe; but only it muſt be obſerved, that the larger beans ſhould be planted at a greater diſtance than the ſmall ones; as alſo, that thoſe which are firſt planted muſt be put cloſer together, to allow for ſome miſcarrying; therefore when a ſingle row is planted, the beans may be put two inches aſunder, and thoſe of the third and fourth planting may be allowed three inches; and when they are planted in rows acroſs a bank, the rows ſhould be three feet aſunder; but the Windſor-beans ſhould have a foot more ſpace between the rows, and the beans in the rows ſhould be planted five or ſix inches aſunder.

In the management of the later crop of beans, the principal care ſhould be to keep them free from weeds and other plants, which would draw away their nouriſhment; to keep earthing them up, and when they are in bloſſom, to pinch off their tops, which, if ſuffered to grow, will draw the nouriſhment from the lower bloſſoms, and thereby prevent the pods from ſetting, ſo that only the upper parts of the ſtems will be fruitful. Another thing alſo ſhould be obſerved in planting of the ſucceeding crops, namely, to make choice of moiſt, ſtrong land, for the later crops; for if they are planted on dry ground, they rarely come to much, unleſs the ſummer proves wet.

Theſe later crops ſhould be ſucceſſively planted about a fortnight after each other, from February to the middle of May, after which time it is generally too late to plant, unleſs the land be very ſtrong and moiſt; for in warm, dry, light land, all the later crops of beans, are infeſted by black inſects, which cover all the upper part of their ſtems, and ſoon cauſe them to decay.

When the ſeeds of the beans are deſigned to be ſaved, a ſufficient number of rows ſhould be ſet apart for that purpoſe, according to the quantity deſired; theſe ſhould be managed in the ſame way as thoſe which are deſigned for the table; but none of the beans ſhould be gathered. When the ſeed is ripe the ſtalks ſhould be pulled up, and ſet upright againſt a hedge to dry, obſerving to turn them every third day, that they may dry equally; they may then be threſhed out and cleaned for uſe, or otherwiſe ſtacked up in a barn, till there is more leiſure for threſhing them out; and afterwards the ſeed ſhould be drawn over, to take out all thoſe that are not fair, preſerving the beſt for ſowing, and the ordinary for feeding cattle.

It is a very good method to change the ſeeds of all ſorts of beans, and not to ſow and ſave the ſeeds long in the ſame ground, for they do not ſucceed ſo well; if, therefore, the land be ſtrong where they are to be planted, it will be the beſt way to procure ſeeds from a lighter ground, and ſo *vice verſa*; for by this means the crops will be larger, the beans fairer, and not ſo liable to degenerate. *Miller's Gard. Dict.*

Some few trials has been lately made in France to raiſe garden beans in open fields, on the principles of the new huſbandry; and the reſult of theſe experiments ſufficiently indicate that very large crops may be procured by that method, if properly practiſed. M. Du Hamel tells us, that M. Eyma planted, in December 1755, in a field near Bourdeaux, the common ſort of garden beans, in a middling ſoil not dunged, but thoroughly ploughed a foot deep. The rows were two feet aſunder, and the plants a foot diſtant from one another. Theſe beans, which every one thought too thinly ſown, being aſſiſted by frequent hoeings, yielded a greater crop than any in the common way. When they began to ripen, M. Eyma gave the ſpaces between them a good ploughing, and on the twenty-third of June ſowed in each of them a row of red kidney-beans, which came up very well. In a fortnight after he plucked up the garden beans, and gave the ground on which they ſtood a ſlight hoeing. Theſe kidney-beans proved the fineſt he ever ſaw. He repeated the ſame experiment in 1756, and was rewarded with ſuch ſucceſs as ſurpaſſed his warmeſt expectations. *Traité de la Culture des Terres, tom.* V. *page* 81.

Horſe BEANS, delight in a ſtrong moiſt ſoil, and an open expoſure, for they never thrive well on dry warm land, or in ſmall encloſures, where they muſt, and are frequently attacked by the black dolphin fly: theſe inſects are often in ſuch quantities as to cover the ſtems of the beans entirely, eſpecially all the upper part of them; and whenever this happens, the beans ſeldom come to good; but in open fields where the ſoil is ſtrong, and the plants have room, this rarely happens.

Theſe beans are uſually ſown on land which is freſh broken up, becauſe they are of uſe to break and pulveriſe the ground, as alſo to deſtroy weeds; ſo that the land is rendered much better for corn, after a crop of beans, than it would have been before, eſpecially if they are ſown and managed according to the new huſbandry, with a drill plough, and the horſe-hoe uſed to ſtir the ground between the rows of beans, which will prevent the growth of weeds, and pulverize the ground, whereby a much greater crop of beans may, with more certainty, be expected, and the land will be better prepared for whatever crop it is deſigned for after.

The ſeaſon for ſowing beans is from the middle of February to the end of March, according to the nature of the ſoil; the ſtrongeſt wet ſoil ſhould always be laſt ſown. The uſual quantity of beans ſown on an acre of land, is about three buſhels, tho' this is double the quantity that need be ſown, eſpecially according to the new huſbandry; but it will be neceſſary firſt to ſet down the practice according to the old huſbandry, and then give directions for their management according to the new. The method of ſowing is after the plough, in the bottom of the furrows; but then the furrows ſhould not be more than five, or, at moſt, ſix inches deep. If the land be newly broken up, it is uſual to plough it early in the autumn, and let it lie in ridges till after Chriſtmas; then to plough it in ſmall furrows, and lay the ground very ſmooth. Theſe two ploughings will break the ground fine enough for beans, and the third ploughing is to ſow the beans, when the furrows ſhould be made ſhallow, as before mentioned.

Moſt people ſet their beans too cloſe; for as ſome lay the beans in the furrows after the plough, and others lay them before the plough, and plough them in; ſo by both methods the beans are as cloſe as the furrows are made, which is much too near; for when they are on ſtrong good land, they are generally drawn up to a very great height, and are not ſo apt to pod as when they have more room, and are of a lower growth. The better way, therefore, is to make the furrows three feet aſunder, or more, which will cauſe them to branch out into many ſtalks, and bear in greater plenty than when they are cloſer; by this method leſs than half the quantity of beans will be ſufficient for an acre of land, and the air being admitted between the rows, the beans will ripen much earlier, and more equally than in the common way. *Miller's Gard. Dict.*

It has been already obſerved, that the black dolphin fly often deſtroys a crop of beans, and to prevent which, a correſpondent of the editors of the *Muſeum Ruſticum* propoſes, that when theſe deſtructive inſects are firſt ſeen on the tops of the beans, one or more perſons, provided each with a ſcymeter or hanger, ſhould be ſent in the field, and ſtrike off the heads of the beans. He adds, that by this means a crop has been often ſaved, this fly being ſeldom known to riſe again when it once falls with the bean-top to the ground. *Muſeum Ruſticum, vol.* III. *pag.* 233.

Another correſpondent in the above work ſays, that as ſoon as the beans have got ſix leaves, the ſheep ſhould be turned in to feed among them; for they will eat up all the young weeds, even the melilot, without touching the beans. He adds, that the ſheep may be kept every day among the beans till they are in bloſſom; but they muſt not be ſuffered to lie down. *Muſeum Ruſticum, vol.* III. *pag.* 339.

When beans are intended to be planted according to the new huſbandry, the ground ſhould be four times ploughed before the beans are ſet, which will break the clods, and render it much better for planting. Then uſe a drill plough, to which a hopper is fixed for ſetting the beans, the drills ſhould be made at three feet aſunder, and the ſpring of the hopper ſet ſo as to ſcatter the beans at three inches diſtant in the drills. By this method leſs than one buſhel of ſeed will plant an acre of land. When the beans are up, if the ground be ſtirred between the rows with a horſe plough, it will deſtroy all the young weeds; and when the beans are advanced about three or four inches high, the ground ſhould be again ploughed between the rows, and the earth laid up to the beans; and if a third ploughing, about five or ſix weeks after be given, the ground will be kept clean from weeds, and the beans will ſtalk out, and produce a much greater crop than in the common way. *Miller's Gard. Dict.*

A correſpondent of the editors of the *Muſeum Ruſticum*, has given the following method of cultivating beans in the vale of Ayleſbury.

" Firſt, ſays he, I plough two furrows on each outſide of the land, but ſow no beans in them: I afterwards drill, with an inſtrument hereafter deſcribed, the three next furrows: then I plough two furrows without drilling any beans in them, and ſo on, ſowing three, and leaving two for intervals, till the land is finiſhed.

" When the beans are about two or three inches high, I plough two furrows up each interval, turning the furrows from the beans, ſo as to make a ridge in the middle of each interval. I have a little plough on purpoſe for this uſe, about half the ſize of a common plough, which is drawn by one horſe.

" This work ſhould be done after a rain. This year, 1764, on the fifteenth of May we had rain. I therefore went to plough in the intervals on the eighteenth, and continued at plough till all were finiſhed. On the eighth of June we had rain again. On the ninth of June I went to harrow the intervals with the triangular harrow hereafter deſcribed. About a week after that we had more rain. I then went to harrow again, going up the interval I went down before, and down that which I went up. This is what we call croſs-tining. Thus my land is laid quite ſmooth, kept clear from weeds, and the beans have a fine looſe mould to ſtrike their fibres into; and it is by far the cheapeſt way of weeding beans.

Proportions of the above DRILL (ſee Plate III. Fig. 3.)

" Diameter of the iron wheel twenty inches.

" Length of the box from A to B, twenty inches.

" Breadth of the box from B to C, ten inches.

" Depth of the Box from C to D, five inches and a half.

" Diameter of the cylinder of wood upon the iron axis of the wheel, four inches. This cylinder turns out the beans regularly.

" Length of the cylinder two inches and a half. On this cylinder are twenty-one holes, a quarter of an inch deep, and half an inch in diameter.

" E is a tongue, which drops upon the cylinder, and plays up eaſily: the tongue is half an inch thick, and three quarters wide. When a larger bean than ordinary comes, it will throw the tongue up, which naturally recovers its place again; and ſo the work goes on well and even. The tongue is repreſented ſeparately with its notch at E: the notch does not go quite through it; it falls exactly on the holes of the cylinder.

" A lid takes off to put the beans into the box, and buttons down at F."

The triangular HARROW *deſcribed* (ſee Plate III. Fig. 4.)

" From A to B eighteen inches.

" The tines are nine inches a-part.

" The three tines in the croſs-bar are only three inches and a half a-part.

" E, a cock which plays upon a pin, in which are three holes to hang the whipple tree in. If you put it into the upper hole the tines bear very heavy upon the ground: I generally uſe the middle hole." *Muſeum Ruſticum, vol.* III. *pag.* 26.

When the beans are ripe they are reaped with a hook, as is generally practiſed for peaſe; and after having lain a few days on the ground, they are turned, and this muſt be repeated ſeveral times, until they are dry enough to ſtack; but the beſt method is to tie them in ſmall bundles, and ſet them upright; for then they will not be in ſo much danger to ſuffer by wet, as when they lie on the ground; and they will be more handy to carry and ſtack, than if they were looſe.

The common produce is from twenty to twenty-five buſhels on an acre of land. *Miller's Gard. Dict.*

In the ſtiff, ſtrong land, of the vale of Ayleſbury, they annually ſow a great many acres of horſe-beans, all which they uſually mow with a bare ſcythe, in ſwarth, as they call it; that is, they mow beans towards the beans; and each mower has a boy, who follows him with a ſork, and lays the beans in wads. Their reaſon for mowing them in ſwarth, is on account of the largeneſs of their crops, and the beans leaning inwards: it is only when they have a thin crop, that they venture to mow them againſt their bending (this they call throating;) for ſhould they do it in common, it would break the hearts of the mowers, being as hard work again as the other.

When they mow in ſwarth, the workmen always keep the points of their ſcythes downwards, or they would ſtrip of great quantities of the beans.

In Hertfordſhire alſo, ſome farmers mow their beans with a ſcythe, and a three ribbed ſtrong cradle: this cuts a great deal in a day, lays the beans in regular rows, and ſaves the expence of a wadder; but in Buckinghamſhire they cannot uſe a cradle, their crops being in general ſo heavy, that the workmen could not carry over the ſwarth. *Muſeum Ruſticum, vol.* I. *page* 275.

The beans ſhould lie in the mow to ſweat, before they are threſhed out; for as the haulm is very large, and ſucculent, ſo it is very apt to give and grow moiſt; but there is no danger of the beans receiving damage, if they are ſtacked tolerably dry; becauſe the pods will preſerve the beans from injury; and they will be much eaſier to threſh after they have ſweat in the mow than before; and after they have once ſweated and are dry again, they never after give.

By the new huſbandry the produce has exceeded that of the old by more than ten buſhels an acre; for if the beans cultivated in the common method are obſerved when they are in pod, it will be found that more than half way of their ſtems have no beans on them; for by ſtanding cloſe, they are drawn up very tall, ſo the tops of the ſtalks only produce, and all the lower part is naked; whereas in the new method, they bear almoſt to the ground; and as the joints of the ſtems are ſhorter, ſo the beans grow cloſer together. *Miller's Gard. Dict.*

Beans are a part of the diet of horſes, but chiefly uſed in mixture with bran or chaff, and by ſome upon the road, with oats; but they are moſtly given to coach-horſes and others that are conſtantly in draught. They afford the ſtrongeſt nouriſhment of all other grain, and will enable horſes to go through a great deal of heavy labour; but in ſome ſeaſons they breed a kind of vermin, which the farmers call a red bug, and is reckoned dangerous, and therefore the beſt way at ſuch times is to have them well dried and ſplit, which may, in ſome meaſure, deſtroy the malignity that is engendered in them. *Gibſon on Horſes, vol.* I. *pag.* 171.

Whoever has frequented the corn markets in London cannot but know that old horſe-beans ſell from ten to fifteen, and even more, per cent. dearer than new corn: becauſe new beans will, by their abundant crudity, give a horſe the gripes, and other diſorders equally fatal. To prevent ſuch conſequences, and at the ſame time ſave the difference between the expence of old and new corn, a correſpondent of the editors of the *Muſeum Ruſticum*, tells us that he made the following experiment.

He purchaſed a quantity of new beans, and filled a large tub with them, pumping in as much water as was neceſſary to wet them: after ſoaking about ten hours he drew off the water, and laid the beans in a heap on the floor. In this manner he ſuffered them to continue till they began to heat, when he ſpread them out thinner, moving them often with a malt ſhovel, and letting them lie in beds till the germ ſwelled and became turged. Then he carried them to a malt-kiln, and dried them gradually; and gave part of them to his horſes, as ſoon as cold.

By this preparation he aſſures us new beans will agree as well with cattle as any old corn that can be procured at the market.

The greateſt nicety in the operation is to prevent the beans from ſprouting, or malting, which would injure them, and not to dry them by too quick a heat. *Muſeum Ruſticum, vol.* I. *pag.* 327.

Kidney BEANS, called alſo *French beans.* There are a vaſt number of varieties of this plant brought from America, which it would be tedious, as well as ſuperfluous, to enumerate; eſpecially as ſome of the old ſorts are preferable to any of the new for the kitchen garden. There is, however, one ſort which deſerves to be particularly mentioned, and which has been long cultivated in the Engliſh gardens for the beauty of its ſcarlet flowers, from whence it is called the ſcarlet bean. This ſort hath twiſting ſtalks, which, if properly ſupported, will riſe to the height of twelve or fourteen feet; the leaves are ſmaller than thoſe of the common kidney-bean. The flowers grow in large ſpikes, and are much larger than thoſe of the common ſort; and of a deep ſcarlet colour; the pods are large and rough, and the ſeeds are purple marked with black. This ſort requires no other treatment than the common ſort, but the ſtalks ſhould have tall ſtakes put down by them to twine round, otherwiſe they will fall on the ground, which will ſoon cauſe them to rot. Although this ſort be chiefly cultivated for the beauty of its flowers, yet Mr. Miller recommends it as the beſt ſort for the table; and adds, that whoever makes trial of this, will, he is perſuaded, prefer it to all other kinds yet known.

The beſt ſorts for the table are the ſcarlet bloſſom bean, juſt mentioned, and a white bean of a ſmall ſize and ſhape, which appears to be only a variety of the ſcarlet, as it differs in no other reſpect, than the beauty of the flowers and ſeeds, being equal in ſize and flavour. And next to theſe is the large Dutch kidney-bean, which grows as tall as either of theſe, and muſt therefore be ſupported by ſtakes, otherwiſe their ſtalks will trail upon the ground and ſpoil. The ſort with ſcarlet flowers is preferable to this in goodneſs, and is alſo hardier; and though it will not come ſo early as ſome of the dwarf kinds, yet it will continue bearing till the froſt puts a ſtop to it in autumn, ſo that it is much preferable to either of them; for the pods of this ſort when old, are ſeldom ſtringy, and have a better flavour than the young pods of theſe ſorts, and will alſo boil greener.

There are two or three ſorts of kidney-beans cultivated with erect ſtalks, which want no ſupport, as they do not put out any twining ſtalk. Theſe are much cultivated by the gardeners for that reaſon, as alſo for their producing a great plenty of pods; but they are inferior in goodneſs to the others.

All ſorts of kidney-beans are propagated by ſeeds, which are too tender to be ſown in open air before the middle of April; for if the weather ſhould be cold and wet after they are in the ground, they will rot; or if the morning froſt ſhould happen after the plants are come up, they will be deſtroyed. The beſt way therefore to have early kidney-beans, where there is no conveniency of frames for raiſing them, is to ſow the ſeeds in rows, pretty cloſe, upon a moderate hot-bed, the latter end of March, or beginning of April. If the heat of the bed be ſufficient to bring up the plants, it will be enough; this bed ſhould be arched over with hoops, that it may be covered over with mats every night, or in bad weather. In this bed the plants may ſtand till they have put out their trifoliate leaves, when they ſhould be carefully taken up, and tranſplanted in warm borders near hedges, pales, or walls. If the ſeaſon proves dry at the time of removing them, the plants ſhould be gently watered to forward their taking new root, and afterwards managed in the ſame manner with thoſe ſown in the full ground. Theſe tranſplanted beans will not grow ſo ſtrong as thoſe which are not removed, nor will they continue bearing ſo long; but they will come a fortnight earlier than thoſe which are ſown in the full ground.

The firſt crop intended for the full ground, ſhould be put in about the middle of April; but theſe ſhould have a warm ſituation, and a dry ſoil, otherwiſe the ſeeds will rot in the ground; or if the weather ſhould prove ſo favourable as to bring up the plants, yet there will be danger of their being killed by morning froſts, which frequently happen in the beginning of May.

The ſecond crop ſhould be ſown about the middle of May. Theſe will come into bearing before the early kinds are over, and if they are of the ſcarlet ſort, will continue fruitful till the froſt deſtroys the plants in autumn, and theſe will be good as long as they laſt. The manner of planting them is to draw ſhallow furrows with a hoe, at about three feet diſtance from each other, into which you ſhould drop the ſeeds about two inches aſunder; then, with the head of a rake, draw the earth over them, ſo as to cover them about an inch deep.

If the ſeaſon be favourable, the plants will begin to appear in about a week's time after ſowing, and ſoon after will raiſe their heads upright; therefore when the ſtems are advanced above-ground, you ſhould gently draw a little earth up to them, obſerving to do it when the ground is dry, which will preſerve them from being injured by ſharp winds; but you ſhould be careful not to draw any of the earth over their ſeed leaves. After this they will require no further care, but to keep them clear from weeds, until they produce fruit, when the pods ſhould be carefully gathered two or three times a week; for if they are permitted to remain upon the plants a little too long, the beans would be too large for eating, and the plants would be greatly weakened thereby.

The large ſorts of kidney-beans muſt be planted at a greater diſtance, row from row; for as theſe grow very tall, ſo if the rows are not at a farther diſtance, the ſun and air will be excluded from the middle rows, therefore theſe ſhould not be leſs than four feet and a half diſtance, row from row; and when the plants are about four inches high, the poles ſhould be thruſt into the ground by the ſide of the plants, to which they will faſten themſelves, and climb to the height of eight or ten feet, and bear plenty of fruit from the ground upward. The Dutch and French preſerve great quantities of the large Dutch beans for winter uſe, which they ſtew, and render agreeable, with gravy and other ſauces.

The beſt way of ſaving the ſeeds of theſe plants, is to let a few rows of them remain ungathered in the height of the ſeaſon; for if you gather from the plants for ſome time, and afterwards leave the remainder for ſeed, their pods will not be near ſo long and handſome, nor will the ſeed be ſo good. In autumn, when you find they are ripe, you ſhould, in a dry ſeaſon, pull up the plants, and ſpread them abroad to dry; after which you may threſh out the ſeed, and preſerve it in a dry place for uſe. *Miller's Gard. Dict.*

BEAR, or *bere*, a ſpecies of barley, called alſo winter barley, ſquare barley, and big.

This grain is chiefly cultivated in Scotland, the northern parts of England, and Ireland. It yields a very large return, but is not eſteemed ſo good for malting as the common barley, for which reaſon it is very little cultivated in the ſouthern parts of England. *See* BARLEY.

BEARD, the ſame with awm. *See* AWMS.

BEARD *of a horſe*, a name given to the hairs ſcattered on his under lip to the place where the curb of the bridle reſts.

BEARDED *oat-graſs*, the ſame with wild oats. *See the article Wild* OATS.

BEAR's EAR, the Engliſh name for the plant generally called auricula. *See* AURICULA.

BEC, a ſmall brook, a rivulet, a little ſtream of water.

BEDS, a name given by many writers on the new huſbandry to the ſpaces occupied by the rows of corn; to diſtinguiſh them from the intervals, or open ſpaces between theſe beds, which they term alleys. *See* ALLEY.

Yellow ladies BEDSTRAW, *cheeſe-rennet*, *maid's-hair*, or *petty mugwet*, a weed very common in moiſt meadows and paſture grounds. Its ſlender ſtalks riſe to about a foot in height. The leaves come out in whorls, eight or nine together. They are long, narrow, and of a green colour. Two little branches generally come out near the top of the ſtalk, ſupporting a conſiderable number of ſmall yellow flowers, conſiſting of one petal, divided into four parts, and ſucceeded by two large kidney ſhaped ſeeds.

BEE, a ſmall and well known inſect, famous for its induſtry.

This uſeful and laborious inſect is divided by two ligaments into three parts or portions, the head, the breaſt, and the belly. The head is armed with two jaws and a trunk; the former of which play like two jaws opening and ſhutting to the right and left. The trunk is long and taper, and, at the ſame time, extremely pliant and flexible, being deſtined by nature for the inſect to probe to the bottom of the flowers through all the impediments of their chives and foliage; and drain them of their treaſured ſweets: but were this trunk to be always extended it would prove incommodious, and be liable to be injured by a thouſand accidents; it is therefore of ſuch a ſtructure, that, after the performance of its neceſſary functions, it may be contracted, or rather folded up; and beſides this, it is fortified againſt all injures by four ſtrong ſcales, two of which cloſely ſheathe it, and the two others, whoſe cavities and dimenſions are larger, encompaſs the whole. From the middle part or breaſt of the bee grow the legs, which are ſix in number: and at the extremity of the paws are two little hooks, diſcernible by the microſcope, which appear like ſickles, with their points oppoſite to each other. The wings are four, two greater and two ſmaller, which not only ſerve to tranſport them through the air, but, by the noiſe they make, to give notice of their departure and arrival, and to animate them mutually to their ſeveral labours. The hairs with which the whole body is covered, are of ſingular uſe in retaining the ſmall duſt that falls from the chives of the flowers, of which the wax is formed, as will be obſerved hereafter. The belly of the bee conſiſts of ſix rings, which ſlide over one another, and may therefore be lengthened or contracted at pleaſure; and the inſide of this part of the body contains the inteſtines, the bag of honey, the bag of poiſon, and the ſting. The office of the inteſtines is the ſame as in other animals. The bag of honey is tranſparent as cryſtal, containing the ſweet juices extracted from flowers, which the bee diſcharges into the cells of the magazine for the ſupport of the community in winter. The bag of poiſon hangs at the root of the ſting, through the cavity of which, as through a pipe, the bee ejects ſome drops of this venomous liquor into the wound, and ſo renders the pain more exceſſive. The mechaniſm of the ſting is admirable, being compoſed of two darts, incloſed within a ſheath that tapers into a fine point, near which is an opening to let out the poiſon. The two darts are ejected through another aperture, which, being armed with ſeveral ſharp beards like thoſe of fiſh-hooks, are not eaſily drawn back again by the bee; and indeed ſhe never diſengages them if the wounded party happens to ſtart and put her into confuſion; but if one can have patience to continue calm and unmoved, ſhe clinches thoſe lateral points round the ſhaft of the dart, by which means ſhe recovers her weapons, and gives leſs pain to the perſon ſtung. The liquor which at the ſame time ſhe infuſes into the wound, cauſes a fermentation, attended with a ſwelling, which continues ſeveral days; but that may be prevented by immediately pulling out the ſting, and enlarging the puncture, to let the venomous matter have room to eſcape.

Let us now conſider the generation, polity, and labours of theſe inſects, the true knowledge of which is very much owing to the modern invention of glaſs-hives, through which all the ſecrets of the community are laid open to a curious obſerver. Any perſon who carefully examines a hive at different ſeaſons of the year, will diſtinguiſh three ſorts of bees; of which the far greater number are the common working bees, who do all the buſineſs of the hive, and ſeem to be neither male nor female. The working bee is repreſented at C (Plate III. Fig. 5.) The ſecond ſort, called drones, are the males, and ſomewhat larger than the former (as A, Fig. 6.) they have no ſting, nor even ſtir from the hive, but live upon the honey prepared by the others. The third ſort is a much larger and longer bodied bee, of which there are often but one in every ſwarm or colony of young bees, who are from time to time detached from the hive in ſearch of another habitation. This large bee is what the ancients called the king, from the reſpect they always ſaw paid to it by the other bees; but being the female, the moderns more properly give the title of queen, or mother of the ſwarm. *See* Plate III. Fig. 7. B.

When theſe induſtrious inſects begin their works, it is obſerved they divide themſelves into four parties, one of which is deſtined to the fields to provide materials for the ſtructure; the ſecond works upon thoſe materials, and forms them into a rough ſketch of the dimenſions and partitions of the cells; the third examines and adjuſts the angles, removes the ſuperfluous wax, poliſhes the work, and gives it its neceſſary perfection; and the fourth is employed in bringing proviſions to the labourers that build them, becauſe poliſhing is not ſo laborious. They begin their work at the top of the hive, continuing downwards to the bottom, and from one ſide to another; and to make it the more ſolid they uſe a ſort of tempered wax, reſembling glue. The form of the cells of the honey-comb is hexagonal, which figure, beſides what is common with a ſquare and equilateral triangle, has the advantage of including a greater ſpace within the ſame ſurface.

The expedition of the bees in their labour is almoſt incredible; for notwithſtanding the elegance and juſt proportions of the work, they are ſo indefatigable, that they will, in one day, finiſh a honey-comb a foot long, and ſix inches broad, capable of receiving three thouſand bees.

It is not eaſy to know, particularly, the manner in which they employ themſelves at this work, on account of the number of bees then in motion, by which means the eye can hardly diſtinguiſh any thing but confuſion. We have however been able to obſerve the following particulars: ſome bees, bearing in each of their talons a little piece of wax, are ſeen running to the places where their companions are at work upon the combs; at their arrival they faſten the wax to the work by means of the ſame talons, which they apply ſometimes to the right, and ſometimes to the left. Each bee is employed but a ſhort time on this work, when another takes its place.

While a part of the bees are at work in conſtructing the cells, others are employed in perfecting thoſe that are newly modelled, finiſhing the angles, ſides, and baſes, in ſo exquiſite a manner, and with ſuch remarkable delicacy, that three or four of theſe ſides laid upon one another, are not thicker than a leaf of common paper; and becauſe the entrance of the cell, which is adapted to the ſize of the bee, would, on account of this delicacy, be ſubject to break, they ſtrengthen the entrance of each cell with a border of wax.

We have already obſerved, that the bees which build the cells work but a little while at a time; but it is different with regard to thoſe that poliſh them, for they work a long while, and with great expedition, never intermitting their labour, unleſs it be to carry out of the cell the particles of wax taken off in poliſhing: and, to prevent this wax from being loſt, other bees ſtand ready to receive it from the poliſhers, and carry it to ſome other part in order to its being employed.

Each comb has two rows of cells oppoſite to each other, which have their common baſes. The thickneſs of each comb is ſomething leſs than an inch; and, conſequently, the depth of each cell about five lines; but at the ſame time the breadth of each is little more than two.

All the combs are conſtructed with cells of this ſize, except a ſmall number of others in ſome particular parts of the hive, which are larger, and appropriated to the lodging eggs, that afterwards become drones, or male bees.

There are alſo, in ſome parts of the hive, three or four cells bigger than the others, and conſtructed in a different manner. They are of a ſpheroidical figure, open in the inferior part, and attached to the extremeties of the combs.

When the cells are completed, the queen takes poſſeſſion of thoſe ſhe likes beſt to depoſite her eggs in, and the reſt are left to be filled with honey. She lays one egg in each cell, and ſometimes more than an hundred of thoſe eggs in a day; but what is ſtill more remarkable, ſhe lays thoſe eggs which are to produce common bees in cells of the common ſhape and ſize, thoſe that are to become drones or males, in the cells of a larger ſize, and depoſites thoſe which are to become females, like herſelf, in the ſpheroidical cells already deſcribed.

Theſe eggs, after lying ſome time in the cells, are hatched into maggots, and fed with honey ten or twelve days, after which the other bees cloſe up the cells with a thin piece of wax; and under this covering they become gradually transformed into bees, in the manner as ſilk-worms are into butterflies. Having undergone this change, the young bees pierce through their waxen doors, wipe off the humidity from their little wings, take their flight into the fields, rob the flowers of their ſweets, and are perfectly acquainted with every neceſſary circumſtance of their future conduct. As to the males or drones, which are deſtined only to propagate their ſpecies, they live very comfortably for about three months after they are hatched; but when that time is over, and the females are impregnated, the common bees either kill them, or drive them from the hive, as burdenſome to the community, and not a drone is to be found till the next ſeaſon.

The method in which the bees collect their wax and honey deſerves to be a little explained. At the bottom of all flowers there are certain glands which contain more or leſs honey, that is, the moſt exalted particles of the ſugary juices of the plant. Theſe juices the bee ſucks up with her proboſcis or trunk above-mentioned, and draws it into her mouth; and when it has thus taken a ſufficient quantity into her ſtomach, returns to the hive, and diſcharges the honey into the common magazine.

When the cells prepared to receive it are full, the bees cloſe up ſome with wax till they have occaſion for the honey; the reſt they leave open, to which all the members of the ſociety reſort, and take their repaſt with a very inſtructive moderation.

It is an excellent obſervation of a modern author, that the hive is a ſchool to which numbers of people ought to be ſent; prudence, induſtry, benevolence, public ſpiritedneſs, œconomy, neatneſs, and temperance, are all viſible among the bees. Theſe little animals are actuated by a ſocial ſpirit, which forms them into a body politic, intimately united, and perfectly happy. They all labour for the general advantage; they are all ſubmiſſive to the laws and regulations of the community: having no particular intereſt, no diſtinction but thoſe which nature or the neceſſities of their young have introduced amongſt them. We never ſee them diſſatisfied with their condition, or inclinable to abandon the hive in diſguſt, or find themſelves ſlaves or neceſſitous: on the contrary, they think themſelves in perfect freedom, and perfect affluence; and ſuch indeed is their real condition. They are free, becauſe they only depend on the laws; they are happy, becauſe the concurrence of their ſeveral labours inevitably produces abundance, which contributes to the riches of each individual. Let us compare human ſocieties with this, and they will appear altogether monſtrous. Neceſſity, reaſon, and philoſophy, have eſtabliſhed them for the commendable purpoſes of mutual aid and benefits: but a ſpirit of ſelfiſhneſs deſtroys all; and one half of mankind, to load themſelves with ſuperfluities, leave the other deſtitute of common neceſſaries.

Wax is compoſed of the farina, or duſt, formed on the apices of flowers. This the bees collect, and with their fore-feet and jaws, roll up into little balls, which they convey, one at a time, to the feet of their middle legs, and from thence to the middle joints of their hind legs, where there is a ſmall cavity like a ſpoon to receive it. Theſe balls are not, however, true wax, but the ſubſtance or baſis of it: to reduce this crude ſubſtance into wax, it muſt firſt be digeſted in the body of the bee.

After the bees have brought home this crude ſubſtance, they eat it by degrees; or, at other times, three or four bees come and eaſe the loaded bee by eating each of them a ſhare, the loaded bee giving them a hint ſo to do. Hunger is not the motive of their thus eating the balls of waxy matter, eſpecially when a ſwarm is firſt hived; but it is their deſire to provide a ſpeedy ſupply of real wax for making the combs. At other times, when there is no immediate want of wax, the bees lay this matter up in repoſitories, to keep it in ſtore.

When this waxy matter is ſwallowed, it is, by the digeſtive powers of the bee, converted into real wax, which the bees again diſgorge as they work it up into combs; for it is only while thus ſoft and pliant from the ſtomach that they can fabricate it properly. That the wax thus employed is taken from their ſtomachs, appears from their making a conſiderable quantity of comb ſoon after they are hived, and even on any tree or ſhrub where they have reſted but a ſhort while before their being hived, though no balls were viſible on their legs, excepting thoſe of a few which may be juſt returned from the field.

Bees collect crude wax alſo for food; for if this was not the caſe, there would be no want of wax after the combs are made: but they are obſerved, even in old hives, to return in great numbers loaded with ſuch matter, which is depoſited in particular cells, and is known by the name of *bee-bread.* We may gueſs that they conſume a great deal of this ſubſtance in food, by the quantity collected, which, by computation, may in ſome hives amount to an hundred weight in a ſeaſon, whilſt the real wax in ſuch an hive does not perhaps exceed two pounds.

But beſides the three ſubſtances, honey, wax, and bee-bread, already mentioned, there is another with which the bees cloſe every crevice in their hives, and which is called propolis. It is a kind of reſin eaſy to be rolled out, much more tenacious than wax, and more eaſily fixed. It does not ſeem to require any preparation, being a real reſin, which they collect from trees, and employ as they find it. It grows very hard in the hive, but may be ſoftened by heat. It is diſſoluble in ſpirit of wine. It commonly diffuſes a very agreeable ſmell when heated. Its outward colour is of a reddiſh brown; its inſide reſembles wax, and is a little yellowiſh. When the bees make uſe of it, it is ſoft and pliable; but it hardens daily, and becomes in time harder than wax. This propolis ſerves alſo for another purpoſe, which is, that when a ſnail, ſlug, or any other creature too large to be carried out by the bees, has been ſlain in the hive, they caſe it over with this ſubſtance, and thereby prevent the bad effects of the putrid ſmell ariſing from dead bodies.

When the hive is become too much crowded, by the addition of the young brood, a part of the bees think of finding themſelves a more commodious habitation, and with that view ſingle out the moſt forward of the young queens. A new ſwarm is therefore conſtantly compoſed of one queen at leaſt, and of ſeveral thouſand working bees, as well as of ſome hundreds of drones. The working bees are ſome old, ſome young.

Scarce has the colony arrived at its new habitation, when the working bees labour with the utmoſt diligence, to procure materials for food and building. Their principal aim is not only to have cells in which they may depoſit their honey; a ſtronger motive ſeems to animate them. They ſeem to know that their queen is in haſte to lay her eggs. Their induſtry is ſuch, that in twenty-four hours they will have made combs twenty inches long, and wide in proportion. They make more wax during the firſt fortnight, if the ſeaſon is favourable, than they do during all the reſt of the year. Other bees are at the ſame time buſy in ſtopping all the holes and crevices they find in their new hive, in order to guard againſt the entrance of inſects which covet their honey, their wax, or themſelves; and alſo to exclude the cold air; for it is indiſpenſably neceſſary that they be lodged warm.

When the bees firſt ſettle in ſwarming, indeed when they at any time reſt themſelves, there is ſomething very particular in their method of taking their repoſe. It is done, by collecting themſelves in a heap, and hanging to each other by their feet. They ſometimes extend theſe heaps to a conſiderable length. It would ſeem probable to us, that the bees from which the others hang, muſt have a conſiderable weight ſuſpended to them. All that can be ſaid is, that the bees muſt find this to be a ſituation agreeable to themſelves. They may perhaps have a method of diſtending themſelves with air, thereby to leſſen their ſpecific gravity; in the ſame manner as fiſhes do, in order to alter their gravity, compared with water.

When a ſwarm divides into two or more bands, which ſettle ſeparately, this diviſion is a ſure ſign that there are two or more queens among them. One of theſe cluſters is generally larger than the other. The bees of the ſmaller cluſter, or cluſters, detach themſelves by little and little, till at laſt the whole, together with the queen, or queens, unite with the larger cluſter. As ſoon as the bees are hived and ſettled, the ſupernumerary queen, or queens, muſt be ſacrificed to the peace and tranquility of the hive. This execution generally raiſes a conſiderable commotion in the hive, and ſeveral other bees, as well as the queen or queens, loſe their lives. Their bodies may be obſerved on the ground, near the hive. The queen that is choſen is of a more reddiſh colour than thoſe which are deſtroyed: ſo that fruitfulneſs ſeems to be a great motive of preference in bees; for the nearer they are to the time of laying their eggs, the bigger, larger, and more ſhining are their bodies.

For three or four nights before a ſwarm ſallies forth, there is in the hive a peculiar humming noiſe, of which authors give very different deſcriptions, probably owing to the ſtrength of imagination in each. Every ſound among bees ariſes from their ſtriking their wings againſt the air: their wings being their ſole organ of ſound, if we may be allowed the expreſſion. By moving their wings more or leſs forcibly and ſwiftly, they beat the air, and form the varied confuſed ſounds which we call humming. The noiſe which foretels their ſwarming is eaſily diſtinguiſhed by thoſe who are accuſtomed to it, and is more eſpecially obſerved before the caſts, or ſecond and following ſwarms. The hive appears ſo full of bees, that part of them hang in cluſters on the outſide; and the drones are perceived flying about in greater numbers than uſual. But the moſt certain ſign, and which indicates this event to be on that day, is, that the bees refrain from flying into the fields, though the ſeaſon ſeems inviting. Juſt before they take their flight, there is an uncommon ſilence in the hive, and this continues for ſome time: but as ſoon as one breaks forth, they all follow, and are inſtantly on the wing. They ſeldom ſwarm before the ſun has warmed the air; that is, not before ten in the morning, and ſeldom later than three in the afternoon: and the time of the year in which they moſt generally ſwarm, is from the middle of May to the end of June; but ſometimes ſooner or later, according as the ſeaſon is more or leſs favourable. The earlieſt ſwarms do not always prove the beſt, eſpecially if they are ſo early as the end of April or beginning of May: for the weather often is afterwards ſo wet and cold, that they are frequently in danger of being deſtroyed, or greatly reduced, by famine. Though ſwarms which iſſue forth ſo late as July are not in danger of a preſent famine; yet they ſcarcely have time and opportunity to lay in a ſufficient ſtore for the winter. Towards the ſeaſon of ſwarming, the door of the hive ſhould be enlarged, to give the bees the greater freedom to iſſue out; and it ſhould likewiſe remain ſo for young ſwarms, during the firſt fortnight or three weeks, to allow the freer entrance to the bees, at that time extremely buſy in collecting their neceſſary ſtores. The entrance ſhould afterwards be gradually leſſened, to prevent the otherwiſe eaſy acceſs of enemies, of which there is great danger, eſpecially as the autumn advances.

Hives continue ſometimes to ſend forth ſwarms till the old hive becomes too much weakened, and part of it is empty. It is probable, that the prolific young queens prompt the bees to ſwarm thus frequently: for it is certain that if there is not a young mother qualified to bring forth a numerous progeny, though there be ever ſo great a number of bees, they will all remain, and die rather than quit the hive.

Whenever the bees of a ſwarm fly too high, they are made to deſcend lower, and diſpoſed to ſettle, by throwing among them handfuls of ſand or duſt: probably the bees miſtake this for rain. It is uſual at the ſame time to beat on a kettle or frying-pan; perhaps from its being obſerved that the noiſe of thunder prompts ſuch bees as are in the fields to return home. Precautions of this kind are the more neceſſary, if, as Dr. Warder, in his True Amazons, obſerves, “the bees always provide a place for their habitation before they ſwarm; either in ſome hollow tree, or in the hollow part of ſome old building, or in ſome deſerted hive, which the ſwarm have already prepared, by cleaning out whatever may be offenſive to their cleanly nature.” Of this he gives an inſtance; and concludes, that “though they provide themſelves with a houſe before they ſwarm, and take much pains about it; yet if you are early enough in your taking the ſwarm, and they find themſelves at unawares in a convenient houſe, they have no mind generally to leave it: but if they riſe again the ſame or next day, be ſure hive them not in the ſame hive again, for it is plain they have ſome diſlike to it.”

As ſoon as the ſwarm is ſettled, the bees which compoſe it ſhould be got into a hive with all convenient ſpeed, to prevent their taking wing again. If they ſettle on a ſmall branch of a tree, eaſy to be come at, it may be cut off, and laid upon a cloth; the hive being ready immediately to put over them. If the branch cannot be conveniently cut, the bees may be ſwept from off it into a hive. Lodge but the queen in the hive, and the reſt will ſoon follow. If the bees muſt be conſiderably diſturbed, in order to get them into a hive, the moſt adviſable way is to let them remain in the place where they have pitched, till the evening, when there is leſs danger of their taking wing. If it be obſerved that they ſtill hover about the place they firſt alighted upon, the branches there may be rubbed with rue, or elder leaves, or any other thing diſtaſteful to them, to prevent their returning to it.

The hive employed on this occaſion ſhould be cleaned with the utmoſt care, and its inſide be rubbed very hard with a coarſe cloth, to get off the looſe ſtraws, or other impurities, which might coſt them a great deal of time and labour to gnaw away. It may then be rubbed with fragrant herbs or flowers, the ſmell of which is agreeable to the bees, or with honey.

The hive ſhould not be immediately ſet on the ſtool where it is to remain, but ſhould be kept near the place at which the bees ſettled, till the evening, leſt ſome ſtragglers ſhould be loſt. It ſhould be ſhaded, either with boughs, or with a cloth, that the too great heat of the ſun may not annoy the bees.

We ſometimes ſee a ſwarm of bees, after having left their hive, and even alighted upon a tree, return to their firſt abode. This never happens but when the young queen did not come forth with them, for want of ſtrength, or perhaps courage to truſt to her wings for the firſt time; or poſſibly from a conſciouſneſs of her not being impregnated.

Bees are not apt to ſting when they ſwarm; therefore it is not neceſſary then to take much extraordinary precaution againſt them. It is however adviſable for thoſe who are not accuſtomed to them, to cover their face and hands.

A ſecond ſwarm ſcarcely is, and much leſs are the ſubſequent ones, worth keeping ſingle; becauſe, being few in number, they cannot allow ſo large a proportion of working bees to go abroad in ſearch of ſtore, as more numerous ſwarms can, after having appointed a proper number for the various works to be done within. For this reaſon it is adviſable to unite two or more of theſe laſt or latter ſwarms into one hive, ſo as to procure a ſufficient number of bees in one hive. Bees ſometimes ſwarm ſo often, that the mother-hive is too much weakened. In this caſe, the ſwarms ſhould be reſtored back; and this ſhould alſo be done when a ſwarm produces a ſwarm the firſt ſummer, as it ſometimes does. The beſt way, indeed, is to prevent ſuch ſwarming, by giving the bees more room: though this, again, will not anſwer where there is a young pregnant queen; ſhe well knowing that her life is the forfeit of her remaining at home.

The uſual method of uniting ſwarms is very eaſy. Spread a cloth at night upon the ground cloſe to the hive in which the two caſts or ſwarms are to be united; lay a ſtick a-croſs this cloth; then fetch the hive with the new ſwarm, ſet it over the ſtick, give a ſmart ſtroke on the top of the hive, and all the bees will drop down upon the cloth, in a cluſter. This done, throw aſide the empty hive, take the other from off the ſtool, and ſet this laſt over the bees, who will ſoon aſcend into it, mix with thoſe already there, and become one and the ſame family. Others, inſtead of ſtriking the bees down upon the cloth, place with its bottom upmoſt the hive in which the united ſwarms are to live, and ſtrike the bees of the other hive down into it. The former of theſe hives is then reſtored to its natural ſituation, and the bees of both hives ſoon unite. If ſome bees ſtill adhere to the other hive, they may be bruſhed off on the cloth, and they will ſoon join their brethren. Or one may take the following method, which gives leſs diſturbance to the bees. Set with its mouth upmoſt the hive into which the young ſwarm has been put, and ſet upon it the other hive. The bees in the lower hive, finding themſelves in an inverted ſituation, will ſoon aſcend into the upper.

Though all writers acknowledge, that one of the queens is conſtantly ſlain on theſe occaſions, and generally a conſiderable number of the working bees; yet none of them, Columella excepted, has propoſed the eaſy remedy of killing the queen of the latter caſt or ſwarm before the union is made; a means by which the lives of the working bees may be preſerved. This may be done, either by intoxicating them, and then picking her out, or by ſearching her out when the bees are beaten down upon the cloth; for this being done in the night, to prevent the battle which might otherwiſe enſue, there will be no great difficulty in finding her.

A large ſwarm may weigh eight pounds, and ſo gradually leſs, to one pound: conſequently a very good one may weigh five or ſix pounds. All ſuch as weigh leſs than four pounds ſhould be ſtrengthened, by uniting to each of them a leſs numerous ſwarm. The ſize of the hive ſhould be proportioned to the number of the bees; and, as a general rule, it ſhould be rather under than over-ſized, becauſe bees require to be kept warmer than a large hive will admit of.

Columella directs, that the apiary, or bee-garden, face the ſouth, in a place neither too hot, nor too much expoſed to the cold; that it be in a valley, in order that the loaded bees may with the greater eaſe deſcend to their homes; that it be near the manſion-houſe, on account of the conveniency of watching them, but ſo ſituated as not to be expoſed to noiſome ſmells, or to the din of men or cattle; that it may be ſurrounded with a wall, which however ſhould not riſe above three feet high; that, if poſſible, a running ſtream be near them, or, if that cannot be, that water be brought near them in troughs, with pebbles or ſmall ſtones in the water, for the bees to reſt on whilſt they drink; or that the water be confined within gently declining banks, in order that the bees may have ſafe acceſs to it; they not being able to produce either combs, honey, or food for their maggots, without water. That the neighbourhood of rivers or baſons of water with high banks be avoided, becauſe winds may whirl the bees into them, and they cannot eaſily get on ſhore from thence to dry themſelves; and that the garden in which the apiary ſtands be well furniſhed with ſuch plants as afford the bees plenty of good paſture. The trees in this garden ſhould be of the dwarf kind, and their heads buſhy, in order that the ſwarms which ſettle on them may be the more eaſily hived.

The proprietor ſhould be particularly attentive that the bees have alſo in their neighbourhood ſuch plants as yield them plenty of food. Columella enumerates many of theſe fitted to a warm climate: among them he mentions thyme, the oak, the pine, the ſweet ſmelling cedar, and all fruit trees. Experience has taught us, that furze, broom, muſtard, clover, heath, buck-wheat, &c. are excellent for this purpoſe. Pliny recommends broom, in particular, as a plant exceedingly grateful, and very profitable to bees; and Mr. Bradley ſpeaks highly of the advantages which ariſe from the planting of it for the food of theſe uſeful inſects. *See the article* BROOM.

Plantations of muſtard, of the flowers of which bees are extremely fond, may be kept in bloom for ſeveral weeks running.

Great improvements may alſo certainly be made in the eſſential article of providing plenty of paſture for bees, whenever this ſubject ſhall be more carefully attended to than it, unfortunately, has hitherto been. A rich corn country is well known to be a barren deſart to them during the moſt conſiderable part of the year; and therefore the practice of other nations, in ſhifting the places of abode of their bees, well deſerves our imitation.

Columella informs us, that, as few places are ſo happily ſituated as to afford the bees proper paſture both in the beginning of the ſeaſon and alſo in the autumn, it was the advice of Celcus, that after the vernal paſtures are conſumed, the bees ſhould be tranſported to places abounding with autumnal flowers; as was practiſed by conveying the bees from Achaia to Attica, from Eubœa and the Cyclad iſlands to Scyrus, and alſo in Sicily, where they were brought to Hybla from other parts of the iſland. He likewiſe directs, that the hives be carefully examined before they are removed from one place to another, and to take out ſuch combs as appear old, looſe, or have moths in them, reſerving only thoſe that are ſound, in order that the hive may be ſtored with combs collected from the beſt flowers.

M. Maillet, in his curious deſcription of Egypt, relates, that "ſpite of the ignorance and ruſticity which have got poſſeſſion of that country, there yet remain in it ſeveral footſteps of the induſtry and ſkill of the antient Egyptians. One of their moſt admirable contrivances is, their ſending their bees annually into diſtant countries, in order to procure them ſuſtenance there, at a time when they could not find any at home; and their afterwards bringing them back, like ſhepherds who ſhould travel with their flocks, and make them feed as they go. It was obſerved by the antient inhabitants of Lower Egypt, that all plants bloſſomed, and the fruits of the earth ripened, above ſix weeks earlier in Upper Egypt, than with them. They applied this remark to their bees; and the means then made uſe of by them, to enable theſe uſeful induſtrious inſects to reap advantage from the more forward ſtate of nature there, were exactly the ſame as are now practiſed, for the like purpoſe, in that country. About the end of October, all ſuch inhabitants of the Lower Egypt as have hives of bees, embark them on the Nile, and convey them upon that river quite into Upper Egypt; obſerving to time it ſo that they arrive there juſt when the inundation is withdrawn, the lands have been ſown, and the flowers begin to bud. The hives thus ſent are marked and numbered by their reſpective owners, and placed pyramidically in boats prepared for the purpoſe. After they have remained ſome days at their fartheſt ſtation, and are ſuppoſed to have gathered all the wax and honey they could find in the fields within two or three leagues around; their conductors convey them, in the ſame boats, two or three leagues lower down, and there leave the laborious inſects ſo long time as is neceſſary for them to collect all the riches of this ſpot. Thus, the nearer they come to the place of their more permanent abode, they find the productions of the earth, and the plants which afford them food, forward in proportion. In fine, about the beginning of February, after having travelled through the whole length of Egypt, gathering all the rich produce of the delightful banks of the Nile, they arrive at the mouth of that river, towards the ocean; from whence they ſet out, and from whence they are now returned to their ſeveral homes: for care is taken to keep an exact regiſter of every diſtrict from whence the hives were ſent in the beginning of the ſeaſon, of their numbers, of the names of the perſons who ſent them, and likewiſe of the mark or number of the boat in which they were placed."

The author of the Natural Hiſtory of Bees gives the following account of what is practiſed in this way in France; an example well worth our imitation in many parts of this kingdom. "M. Proutaut, ſays he, keeps a great number of hives. His ſituation is one of thoſe in which flowers become rare or ſcarce very ſoon, and where few or none are ſeen after the corn is ripened. He then ſends his bees into Beauce, or the Gatinois, in caſe it has rained in thoſe parts. This is a journey of about twenty miles, which he makes them take. But if he concludes that the bees could not meet, in either of thoſe counties, wherewith to employ themſelves advantageouſly, he then has them carried into Sologne, about the beginning of Auguſt; as knowing that they will there meet with a great many fields of buck-wheat in flower, which will continue ſo till about the end of September. His method of tranſporting them is thus. His firſt care is, to examine thoſe hives, ſome of whoſe honey-combs might be broken or ſeparated by the jolting of the vehicle: they are made faſt one to the other, and againſt the ſides of the hive, by means of ſmall ſticks, which may be diſpoſed differently as occaſion will point out. This being done, every hive is ſet upon a packing-cloth, or ſomething like it, the threads of which are very wide: the ſides of this cloth are then turned up, and laid on the outſide of each hive, in which ſtate they are tied together with a piece of ſmall pack-thread wound ſeveral times round the hive. As many hives as a cart built for that purpoſe will hold, are afterwards placed in this vehicle. The hives are ſet two and two, the whole length of the cart. Over theſe are placed others; which make, as it were, a ſecond ſtory or bed of hives. Thoſe which are ſtored with combs ſhould always be turned topſy-turvy. It is for the ſake of their combs, and to fix them the better, that they are diſpoſed in this manner; for ſuch as have but a ſmall quantity of combs in them, are placed in their natural ſituation. Care is taken in this ſtowage, not to let one hive ſtop up another; it being eſſentially neceſſary for the bees to have air; and it is for this reaſon they are wrapped up in a coarſe cloth, the threads of which were wove very wide, in order that the air may have a free paſſage, and leſſen the heat which theſe inſects raiſe in their hives; eſpecially when they move about very tumultuouſly, as often happens in theſe carts. Thoſe uſed for this purpoſe in Yévre, hold from thirty to forty-eight hives. As ſoon as all are thus ſtowed, the caravans ſet out. If the ſeaſon is ſultry, they travel only in the night; but a proper advantage is made of cool days. You will imagine that they do not ride poſt. The horſes muſt not be permitted even to trot; they are led ſlowly, and through the ſmootheſt roads. When there are not combs in the hives ſufficient to ſupport the bees during their journey, the owner takes the earlieſt opportunity of reſting them wherever they can collect wax. The hives are taken out of the cart, then ſet upon the ground, and after removing the cloth from over them, the bees go forth in ſearch of food. The firſt field they come to ſerves them as an inn. In the evening, as ſoon as they are all returned, the hives are ſhut up; and being placed again in the cart, they proceed in their journey. When the caravan is arrived at the journey's end, the hives are diſtributed in the gardens; or in fields adjacent to the houſes of different peaſants, who, for a very ſmall reward, undertake to look after them. Thus it is that, in ſuch ſpots as do not abound in flowers at all ſeaſons, means are found to ſupply the bees with food during the whole year."

Theſe inſtances of the great advantages which attend ſhifting of bees in ſearch of paſture, afford an excellent leſſon to many places in this kingdom: they direct particularly the inhabitants of the rich vales, where the harveſt for bees ends early, to remove their ſtocks to places which abound in heath, this plant continuing in bloom during a conſiderable part of the autumn, and yielding great plenty of food to bees. Thoſe in the neighbourhood of hills and mountains will ſave the bees a great deal of labour, by taking alſo the advantage of ſhifting their places of abode.

We come now to explain the moſt inhuman method commonly practiſed of taking bees, which conſiſts in wantonly deſtroying the whole ſwarm, in order to enjoy the fruits of their labours.

Were we to kill the hen for her egg, the cow for her milk, or the ſheep for the fleece it bears, every one would inſtantly ſee how much we ſhould act contrary to our own intereſt: and yet this is practiſed every year in regard to bees. Would it not argue more wiſdom in us to be contented with taking away only a portion of their wax and honey, as is the practice of many countries?

The common method here is, that when thoſe which are doomed for ſlaughter have been marked out (which is generally done in September) a hole is dug near the hive, and a ſtick, at the end of which is a rag that has been dipped in melted brimſtone, being ſtuck in that hole, the rag is ſet on fire, the hive is immediately ſet over it, and the earth is inſtantly thrown up all around, ſo that none of the ſmoak can eſcape. In a quarter of an hour, all the bees are ſeemingly dead; and they will ſoon after be irrecoverably ſo, by being buried in the earth that is returned back into the hole: I ſay, they will ſoon be abſolutely killed by this laſt means; becauſe it has been found, by experiment, that all the bees which have been affected only by the fume of the brimſtone, recover again, excepting ſuch as have been ſinged or hurt by the flame. Hence it is evident, that the fume of brimſtone might be uſed for intoxicating the bees, with ſome few precautions. The heavieſt and the lighteſt hives are alike treated in this manner; the former, becauſe they yield the moſt profit, with an immediate return; and the latter, becauſe they would not be able to ſurvive the winter. Thoſe hives which weigh from fifteen to twenty pounds, are thought to be the fitteſt for keeping.

The practice of the ancients was, however, very different from this: they were content to ſhare with theſe induſtrious inſects, the produce of their labours; and ſome very laudable attempts have been made in our own country, to attain the deſirable end of getting the honey and wax without deſtroying the bees. John Geddy, Eſq; publiſhed in the year 1665, his invention of boxes for preſerving the lives of bees. Theſe were improved by Joſeph Warder, phyſician, at Croydon, who at the ſame time embelliſhed his account of the ſtructure and uſe of theſe boxes, with ſeveral other curious circumſtances concerning bees, in his work intituled, The true Amazons, or the Monarchy of Bees. Two very worthy clergymen, the reverend Mr. John Thorley of Oxford, and the reverend Mr. Stephen White, M. A. rector of Holton in Suffolk, have brought the method of preſerving the lives of bees to ſtill greater perfection. We ſhall relate the opinions and practice of each, beginning with Mr. Thorley, who lived many years before Mr. White, and add to their accounts the beſt improvements that have been lately made in foreign countries.

Mr. Thorley, in his Enquiry into the Nature, Order, and Government of Bees, thinks colonies preferable to hives, for the following reaſons. Firſt, the more certain preſervation of very many thouſands of theſe noble and uſeful creatures: Secondly, their greater ſtrength (which conſiſts in numbers) and conſequently their greater ſafety from robbers: Thirdly, their greater wealth, ariſing from the united labours of the greater number. He tells us, that he has in ſome ſummers taken two boxes filled with honey from one colony; and yet ſufficient ſtore has been left for their maintenance during the winter, each box weighing forty pounds. Add to theſe advantages, the pleaſures of viewing them; with the greateſt ſafety, at all ſeaſons, even in their buſieſt time of gathering, and their requiring a much leſs attendance in ſwarming time. The bees thus managed are alſo more effectually ſecured from wet and cold, from mice and other vermin.

His boxes are made of deal, which, being ſpungy, ſucks up the breath of the bees ſooner than a more ſolid wood would do. Yellow dram-deal, thoroughly ſeaſoned, is the beſt.

An octagon, being nearer to a ſphere, is better than a ſquare form; for as the bees, in winter, lie in a round body near the center of the hive, a due heat is then conveyed to all the out-parts, and the honey is kept from candying.

The dimenſions which Mr. Thorley, after many years experience, recommends for the boxes, are ten inches deep, and twelve or fourteen inches broad, in the inſide. He has tried boxes containing a buſhel or more, but found them not to anſwer the deſign like thoſe of a leſſer ſize.

The top of the box ſhould be made of an entire board, a full inch thick after it has been planed, and it ſhould project on all ſides at leaſt an inch beyond the dimenſions of the box. In the middle of this top there muſt be a hole five inches ſquare, for a communication between the boxes; and this hole ſhould be covered with a ſliding ſhutter, of deal or elm, running eaſily in a groove over the back window. The eight pannels, nine inches deep, and three quarters of an inch thick when planed, are to be let into the top ſo far as to keep them in their proper places; to be ſecured at the corners with plates of braſs, and to be cramped with wires at the bottom, to keep them firm: for the heat in ſummer will try their ſtrength. There ſhould be a glaſs window behind, fixed in a frame, with a thin deal cover, two ſmall braſs hinges, and a button to faſten it. This window will be ſufficient for inſpecting the progreſs of the bees. Two braſs handles, one on each ſide, are neceſſary, to lift up the box: theſe ſhould be fixed in with two thin plates of iron, near three inches long, ſo as to turn up and down, and put three inches below the top-board, which is nailed cloſe down with ſprigs to the other parts of the box.

Thoſe who chuſe a frame within, to which the bees may faſten their combs, need only uſe a couple of deal ſticks of an inch ſquare, placed acroſs the box, and ſupported by two pins of braſs; one an inch and a half below the top, and the other two inches below it; by which means the combs will quickly find a reſt. One thing more, which perfects the work, is a paſſage four or five inches long, and leſs than half an inch deep, for the bees to go in and out at the bottom of the box.

Mr. Thorley, ſon to the above-mentioned clergyman, has improved his father's method of managing bees; and having been convinced from near ſixty years experience, that his bee-hives would be productive of much greater profit to the owners of bees, and alſo render that cruel and ungenerous practice of deſtroying theſe animals not only unneceſſary, but pernicious, preſented a bee-hive of this conſtruction to the Society of Arts, &c. in the Strand, who readily purchaſed another of his hives filled with honey, &c. that they might be inſpected by the curious, and brought into univerſal uſe; and from this bee-hive the view on Plate III. Fig. 8, was drawn. The ſociety, perſuaded that the invention would prove of the greateſt advantage to this country, publiſhed a premium of two hundred pounds, in order to introduce Mr. Thorley's, or ſome other method of a ſimilar kind, whereby much larger quantities of honey and wax might be procured, and, at the ſame time, the lives of theſe laborious and uſeful inſects preſerved.

The bottom part, marked *a*, is an octangular bee-box, made of deal boards, about an inch in thickneſs, the cover of which is about 17 inches in diameter, but the internal part only 15½, and its height 10 inches. In the middle of the cover of this octangular box is a hole, which may be opened or ſhut at pleaſure, by means of a ſlider *d*. In one of the pannels is a pane of glaſs, covered with a wooden door, *e*. The entrance, *f*, at the bottom of the box is about three inches and a half broad, and half an inch high. Two ſlips of deal, about half an inch ſquare, croſs each other in the center of the box, and are faſtened to the pannels by means of ſmalls ſcrews. To theſe ſlips the bees faſten their combs.

In this octangular box the bees are hived, after ſwarming in the uſual manner, and there ſuffered to continue till they have built their combs, and filled them with honey, which may be known from opening the door, and viewing their works through the glaſs pane, or by the weight of the hive. When the bee-maſter finds his laborious inſects have filled their habitation, he is to place a common bee-hive of ſtraw, repreſented at *b*, made either flat at the top, or in the common form, on the octangular box, and draw out the ſlider, by which a communication will be opened between the box and the ſtraw hive; the conſequence of which will be, that thoſe laborious inſects will fill this hive alſo with the product of their labours. When the bee-maſter finds the ſtraw hive is well filled, he may puſh in the ſlider, and take it away, placing another immediately in its room, and then drawing out the ſlider. Theſe indefatigable creatures will then fill the new hive in the ſame manner. By proceeding in this method, Mr. Thorley aſſured the ſociety that he had taken three ſucceſſive hives, filled with honey and wax, from one ſingle hive, during the ſame ſummer; and that after he had laid his inſects under ſo large a contribution, the food ſtill remaining in the octangular box was abundantly ſufficient for their ſupport during the winter. He added, that if this method was purſued in every part of the kingdom, inſtead of that cruel method of putting the creatures to death, he was perſuaded, from long experience, that wax would be collected in ſuch plenty that candles might be made with it, and ſold as cheap as thoſe of tallow are at preſent.

Mr. Thorley has alſo added another part to his bee-hive, which cannot fail of affording the higheſt entertainment to a curious and inquiſitive mind. It conſiſts of a glaſs receiver, repreſented at D, eighteen inches in height, eight inches in diameter at the bottom, and in the greateſt part thirteen. This receiver has a hole at the top, about an inch in diameter, through which a ſquare piece of deal E is extended to nearly the bottom of the veſſel, having two croſs bars to which the bees faſten their combs. When the bees have filled their ſtraw hive, (which muſt have a hole in the center, covered with a piece of tin) Mr. Thorley places the glaſs *c* upon the top of the ſtraw hive, and draws out the piece of tin: the bees, now finding their habitation enlarged, purſue their labours with ſuch alacrity, that they fill this glaſs hive likewiſe with their ſtores. And as this receptacle is wholly tranſparent, the curious obſerver may entertain himſelf with viewing the whole progreſs of their works. One of the hives, now depoſited at the ſociety's rooms in the Strand, is filled with the produce of the labours of thoſe inſects; and the glaſs-hive is ſuppoſed to contain about thirty-eight pounds of honey.

It will, however, be neceſſary to cover the glaſs with an empty hive of ſtraw, or at leaſt with a cloth, which may be eaſily removed when you inſpect your bees, leſt too much light prevent your inſects from working.

When the glaſs is completely filled, ſlide a tin-plate between it and the hive or box, ſo as to cover the paſſage, and in half an hour the glaſs may be taken off with ſafety. What few bees remain in it, will readily go to their companions. He then very obligingly offers his ſervice and farther information to any gentleman or lady whoſe curioſity may incline them to inſpect his apiary. He has added a glaſs window to his ſtraw hives, in order to ſee what progreſs the bees make; which is of ſome importance, eſpecially if one hive is to be taken away whilſt the ſeaſon ſtill continues favourable for their collecting of honey: for when the combs are filled with honey, the cells are ſealed up, and the bees forſake them, and reſide moſtly in the hive in which their works are chiefly carried on. Obſerving alſo, that the bees were apt to extend their combs through the paſſage of communication into the upper hive, whether glaſs or other, which rendered it neceſſary to divide the comb when the upper hive was taken away, he now puts in that paſſage a wire ſcreen, or netting, the meſhes of which are large enough for a loaded bee to go eaſily thro' them. This prevents the joining of the combs from one box to the other, and conſequently obviates the neceſſity of cutting them, and of ſpilling ſome honey, which, running down amongſt a crowd of bees, uſed before to incommode them much; it being difficult for them to clear their wings of it.

The reverend Mr. Stephen White, rector of Holton in Suffolk, informs us, that his fondneſs for theſe little animals ſoon put him upon endeavouring, if poſſible, to ſave them from *fire* and *brimſtone*; that he thought he had reaſon to be content to ſhare their labours for the preſent, and great reaſon to rejoice if he could at any time preſerve their lives, to work for him another year; and that the main drift of his obſervations and experiments has therefore been, to diſcover an eaſy and cheap method, ſuited to the abilities of the common people, of taking away ſo much honey as can be ſpared, without deſtroying or ſtarving the bees; and by the ſame means to encourage ſeaſonable ſwarms.

In his directions how to make the bee-boxes of his inventing, he tells us, ſpeaking of the manner of conſtructing a ſingle one, that it may be made of deal or any other well ſeaſoned boards which are not apt to warp or ſplit. The boards ſhould be near an inch thick: the figure of the box ſquare, and its height and breadth nine inches and five eighths, every way meaſuring within. With theſe dimenſions it will contain near a peck and an half. The front part muſt have a door cut in the middle of the bottom edge, three inches wide, and near half an inch in height, which will give free liberty to the bees to paſs through, yet not be large enough for their enemy the mouſe to enter. In the back part you muſt cut a hole with a rabbit in it, in which you are to fix a pane of the cleareſt and beſt crown-glaſs, about five inches in length, and three in breadth, and faſten it with putty: let the top of the glaſs be placed as high as the roof within-ſide, that you may ſee the upper part of the combs, where the bees with their riches are moſtly placed. You will, by this means, be better able to judge of their ſtate and ſtrength, than if your glaſs was fixed in the middle. The glaſs muſt be covered with a thin piece of board, by way of ſhutter, which may be made to hang by a ſtring, or turn upon a nail, or ſlide ſideways between two mouldings. Such as are deſirous of ſeeing more of the bees works, may make the glaſs as large as the box will admit, without weakening it too much; or they may add a pane of glaſs on the top, which muſt likewiſe be covered with a ſhutter, faſtened down with pegs to prevent accidents.

The ſide of the box which is to be joined to another box of the ſame form and dimenſions, as it will not be expoſed to the external air, may be made of a piece of ſlit deal not half an inch thick. This he calls the ſide of communication, becauſe it is not to be wholly incloſed: a ſpace is to be left at the bottom the whole breadth of the box, and a little more than an inch in height, and a hole or paſſage is to be made at top, three inches long, and more than half an inch wide. Through theſe the bees are to have a communication from one box to the other. The lower communication being on the floor, our labourers, with their burthens, may readily and eaſily aſcend into either of the boxes. The upper communication is only intended as a paſſage between the boxes, reſembling the little holes, or narrow paſſes, which may be obſerved in the combs formed by our ſagacious architects, to ſave time and ſhorten the way when they have occaſion to paſs from one comb to another; juſt as, in populous cities, there are narrow lanes and alleys, paſſing tranſverſly from one large ſtreet to another.

In the next place you are to provide a looſe board, half an inch thick, and large enough to cover the ſide where you have made the communication. You are likewiſe to have in readineſs ſeveral little iron ſtaples, an inch and half long, with the two points or ends bended down more than half an inch. The uſe of theſe will be ſeen preſently.

You have now only to fix two ſticks croſſing the box from ſide to ſide, and croſſing each other, to be a ſtay to the combs; one about three inches from the bottom, the other the ſame diſtance from the top; and when you have painted the whole, to make it more durable, your box is finiſhed.

The judicious bee-maſter will here obſerve, that the form of the box now deſcribed is as plain as is poſſible for it to be. It is little more than five ſquare pieces of board nailed together; ſo that a poor cottager, who has but ingenuity enough to ſaw a board into the given dimenſions, and to drive a nail, may make his own boxes well enough, without the help or expence of a carpenter.

No directions are neceſſary for making the other box, which muſt be of the ſame form and dimenſions. The two boxes differ from each other only in this, that the ſide of communication of the one muſt be on your right-hand; of the other on your left. Plate III. Fig. 9. repreſents two of theſe boxes, with their openings of communication, ready to join to each other.

Mr. White's manner of hiving a ſwarm into one or both of theſe boxes, is thus.

You are to take the looſe board, and faſten it to one of the boxes, ſo as to ſtop the communications. This may be done by three of the ſtaples before mentioned; one on the top of the box near the front, the two others on the back, near the top and near the bottom. Let one end of the ſtaple be thruſt into a gimlet-hole made in the box, ſo that the other end may go as tight as can be over the looſe board, to keep it from ſlipping when it is handled. The next morning, after the bees have been hived in this box, the other box ſhould be added, and the looſe board ſhould be taken away. This will prevent a great deal of labour to the bees, and ſome to the proprietor.

Be careful to faſten the ſhutter ſo cloſe to the glaſs, that no light may enter through it; for the bees ſeem to look upon ſuch light, as a hole or breach in their houſe, and on that account may not ſo well like their new habitation. But the principal thing to be obſerved at this time, is to cover the box, as ſoon as the bees are hived, with a linnen cloth thrown looſely over it, or with green boughs, to protect it from the piercing heat of the ſun. Boxes will admit the heat much ſooner than ſtraw hives; and if the bees find their houſe too hot for them, they will be wiſe enough to leave it. If the ſwarm be larger than uſual, inſtead of faſtening the looſe board to one box, you may join two boxes together with three ſtaples, leaving the communication open from one to the other, and then hive your bees into both. In all other reſpects, they are to be hived in boxes after the ſame manner as in common hives; which being well known, it were needleſs here to give particular directions concerning it.

The door of the ſecond box ſhould be carefully ſtopped up, and be kept conſtantly cloſed, in order that the bees may not have any entrance but through the firſt box.

When the boxes are ſet in the places where they are to remain, they muſt be ſcreened from the ſummer's ſun, becauſe the wood will otherwiſe be heated to a greater degree than either the bees or their works can bear; and they ſhould likewiſe be ſcreened from the winter's ſun, becauſe the warmth of this will draw the bees from that lethargic ſtate which is natural to them, as well as to many other inſects, in the winter ſeaſon. For this purpoſe, and alſo to ſhelter the boxes from rain, our ingenious clergyman has contrived the following frame.

Plate III. Fig. 10. repreſents the front of a frame for twelve colonies. *a*, *a*, are two cells of oak, lying flat on the ground, more than four feet long. In theſe cells you are to fix four oaken poſts, about the thickneſs of ſuch as are uſed for drying linnen.

The two poſts *b*, *b*, in the front, are about ſix feet two inches above the cells: the other two ſtanding backward, five feet eight inches.

You are next to nail ſome boards of ſlit deal horizontally from one of the fore-poſts to the other, to ſcreen the bees from the ſun. Let theſe boards be ſeven feet ſeven inches in length, and nailed to the inſide of the poſts, and be well ſeaſoned, that they may not ſhrink or gape in the joints.

c, *c*, are two ſplines of deal, to keep the boards even, and ſtrengthen them.

Plate III. Fig. 11. repreſents the back of the frame. *d*, *d*, *d*, *d*, are four ſtrong boards of the ſame length with the frame, on which you are to place the boxes. Let the upper ſide of them be very ſmooth and even, that the boxes may ſtand true upon them: or it may be ſtill more adviſable, to place under every pair of boxes a ſmooth thin board, as long as the boxes, and about a quarter of an inch wider. The bees will ſoon faſten the boxes to this board, in ſuch manner, that you may move or weigh the boxes and board together, without breaking the wax or reſin, which for many reaſons ought to be avoided. Theſe floors muſt be ſupported by pieces of wood, or bearers *e*, *c*, &c. which are nailed from poſt to poſt at each end. They are likewiſe to be well nailed to the frame, to keep them from ſinking with the weight of the boxes.

f repreſents the roof, which projects backward about ſeven or eight inches beyond the boxes, to ſhelter them from rain.

You have now only to cut niches or holes in the frame, over againſt each mouth or entrance into the boxes, at *h*, *h*, *h*, in Fig. 10. Let theſe niches be near four inches long; and under each you muſt nail a ſmall piece of wood for the bees to alight upon.

The morning or evening ſun will ſhine upon one or both ends of the frame, let its aſpect be what it will: but you may prevent its over-heating the boxes, by a looſe board ſet up between the poſts, and kept in by two or three pegs.

The ſame gentleman, with great humanity, obſerves, that no true lover of bees ever lighted the fatal match without concern; and that it is evidently more to our advantage, to ſpare the lives of our bees, and be content with part of their ſtores, than to kill and take poſſeſſion of the whole.

About the latter end of Auguſt, ſays he, by a little inſpection through your glaſſes, you may eaſily diſcover which of your colonies you may lay under contribution. Such as have filled a box and a half with their works, will pretty readily yield you the half box. But you are not to depend upon the quantity of combs, without examining how they are ſtored with honey. The bees ſhould, according to him, have eight or nine pounds left them, by way of wages for their ſummer's work.

The moſt proper time for this buſineſs is the middle of the day: and as you ſtand behind the frame, you will need no armour, except a pair of gloves. The operation itſelf is very ſimple, and eaſily performed, thus: open the mouth of the box you intend to take; then, with a thin knife, cut through the reſin with which the bees have joined the boxes to each other, till you find that you have ſeparated them; and after this thruſt a ſheet of tin gently in between the boxes. The communication being hereby ſtopped, the bees in the fulleſt box, where it moſt likely the queen is, will be a little diſturbed at the operation; but thoſe in the other box, where we ſuppoſe the queen is not, will run to and fro in the utmoſt hurry and confuſion, and ſend forth a mournful cry, eaſily diſtinguiſhed from their other notes. They will iſſue out at the newly opened door; not in a body, as when they ſwarm, nor with ſuch calm and chearful activity as when they go forth to their labours; but by one or two at a time, with a wild flutter, and viſible rage and diſorder. This, however, is ſoon over; for as ſoon as they get abroad, and ſpy their fellows, they fly to them inſtantly, and join them at the mouth of the other box. By this means, in an hour or two, for they go out ſlowly, you will have a box of pure honey, without a living bee in it to moleſt you; and likewiſe without dead bees, which, when you burn them, are often mixed with your honey, and both waſte and damage it.

Mr. White acknowledges, that he has ſometimes found this method fail, when the mouth of the box to be taken away has not been conſtantly and carefully cloſed; the bees will, in this caſe, get acquainted with it as an entrance, and when you open the mouth in order to their leaving this box, many of them will be apt to return, and, the communication being ſtopped, will, in a ſhort time, carry away all the honey from this to the other box; ſo much do they abhor a ſeparation. When this happens, he has recourſe to the following expedient, which he thinks infallible. He takes a piece of deal, a little larger than will cover the mouth of the box, and cuts in it a ſquare nich ſomewhat more than half an inch wide. In this nich he hangs a little trap door, made of a thin piece of tin, turning upon a pin, with another pin croſſing the nich a little lower, ſo as to prevent the hanging door from opening both ways. This being placed cloſe to the mouth, the bees which want to get out will eaſily thruſt open the door outwards, but cannot open it the other way, to get in again; ſo muſt, and will readily, make to the other box, leaving this in about the ſpace of two hours, with all its ſtore, juſtly due to the tender hearted bee-maſter, as a ranſom for their lives.

What lead Mr. White to prefer collateral boxes to thoſe before in uſe, was, to uſe his own words, his "compaſſion for the poor bees, who, after traverſing the fields, return home weary and heavy laden, and muſt perhaps depoſit their burden up two pair of ſtairs, or in the garret. The lower room, it is likely, is not yet furniſhed with ſtairs; for, as is well known, our little architects lay the foundation of their ſtructures at the top, and build downward. In this caſe, the weary little labourer is to drag her load up the ſides of the walls; and when ſhe has done this, ſhe will travel, many times, backward and forward, as I have frequently ſeen, along the roof, before ſhe finds the door, or paſſage into the ſecond ſtory; and here again ſhe is perplexed with a like puzzling labyrinth, before ſhe gets into the third. What a waſte is here of that precious time which our bees value ſo much, and which they employ ſo well? and what an expence of ſtrength and ſpirits, on which their ſupport and ſuſtenance depends? In the collateral boxes, the rooms are all on the ground floor: and becauſe I know my bees are wiſe enough to value convenience more than ſtate, I have made them of ſuch a moderate, though decent, height, that the bees have much leſs way to climb to the top of them, than they have to the crown of a common hive."

Mr. White is confident that the expence of his boxes, and of the frame above deſcribed, will not, if a reaſonable allowance be made for their duration, prove greater, in the end, than the charge of ſtraw hives, and of the frames that are made, in moſt places, for their reception: to which he adds, that a great part of this expence may be ſaved, if the bee-maſter can ſpare a place within any of his buildings, eſpecially if they be boarded, where he may fix his ſtools for the boxes to ſtand on, making holes at proper diſtances for the bees to work out at: nor need he be very ſolicitous concerning the aſpect or height of his buildings; for bees have been known to thrive well, and get a large quantity of honey, though placed almoſt at the top of a high turret in Trinity-college, and on the north ſide of it.

M. Vicat, a very ingenious lady in Swiſſerland, publiſhed, in the memoirs of the Berne ſociety for the year 1764, very judicious obſervations on bees and hives, particularly thoſe which are added one to another in the manner above deſcribed. Her remarks well deſerve our attention; and therefore we ſhall give here her own account of them.

On the ninth of June 1761, this lady bought an hive of bees, in a ſtraw hive. The combs were emptied of their honey, and thereby rendered the more liable to be attacked by the moth. She placed it in a little garden in the heart of the city of Lauſanne. She ſoon diſcovered there were moths in it, and that the bees had lice on them; which determined her to place a glaſs hive over the ſtraw one, and to ſhut up the opening into the lower hive. She frequently looked into the glaſs hive, to ſee what paſſed in it. The bees never ſtopped in it, and it ſerved only as a thoroughfare to the ſtraw hive. The bees, though very laborious and numerous, could not defend themſelves againſt the moths, which multiplied daily: on the eighteenth of July her bees were reduced to little more than three hundred. Finding their number decreaſe every day, ſhe ſuſpected that ſome accident had happened to the queen, which upon examination ſhe found to be true; as ſhe alſo did, that theſe moths may ſoon deſtroy the moſt numerous hive. They had mouldered away the wax, and had united the three middle combs, by their galleries, to ſuch a degree, that they appeared but as one maſs. Upon turning up the hive, to ſee what condition it was in, ſhe found the ſides covered with white and hard cocoons, which would ſoon produce moths. They were in ſuch quantity as to fill the crown of her hat.

It appears to her that the moths are moſt ready to attack hives which have ſwarmed oftener than once; becauſe in them the combs, in which the young bees were reared, being empty, ſerve for both ſhelter and food to their maggots, which feed only on wax. For the ſame reaſon, late ſwarms, and hives in which there is not much honey, are equally expoſed to theſe inſects. Such hives ſhould therefore be cleaned at leaſt once a week. If moths are found on the ſtool of the hive, it ſhould be cleaned every morning. In order to do this the more eaſily, without diſturbing the bees, or running the hazard of being ſtung by them, ſhe cauſed a large ſquare hole to be made in the ſtools on which her bees ſtand, with a ſlider underneath, fitted to it. By this means ſhe preſerved another hive, which ſhe had placed in the ſame garden on the ſame day, June nine, 1761: and though it was a ſwarm put into a new ſtraw hive, ſhe obſerved moths in it by the end of July. She calls this hive Numb. 1.

When ſhe ſecured this hive for the winter, ſhe put it into a dry room; but the air there being too mild, the bees conſumed almoſt their whole ſtore. She drew the ſlider often; for the diſaſter which had happened to her other hive rendered her now more attentive, and ſhe generally found a quantity of moths on it. The combs became mouldy, which ſhe endeavoured to wipe off with ſoft brown paper, and rubbed it off the ſides of the hive with a napkin. So many bees died during the winter, that the hive became very weak in compariſon to what it was in the autumn. About the middle of March, ſhe placed it in a little garden ſurrounded with houſes.

She placed near the former a ſwarm of June 1761, which had been kept in a hive of Mr. Paltau's conſtruction, and had ſtood the preceding ſummer in the country, and the winter in a green-houſe in town, where the air was conſtantly kept temperate. Few of theſe bees died. She calls this hive Numb. 2.

That ſhe might judge of the ſtrength of theſe hives, ſhe counted the bees which entered into each of them in a quarter of an hour, taking the ſame hour of a fine day. She repeated this during ſeveral weeks, and found that about ſix hundred and ſixty entered in Numb. 2, and two hundred, or ſometimes two hundred and twenty, in the ſame time, into Numb. 1.

In May, the numbers of bees were ſo much increaſed, that it was no longer poſſible to count them. Numb. 1. was now as well ſtocked with bees as Numb. 2. She had been particularly careful of the former, and had fed them with honey in rainy weather. She had cleaned the ſlider every morning, and often found on it even four moths at a time. She thinks that the bees can eaſily pull them out of their holes before their galleries have been ſtrengthened with croſs threads, and cemented with the crumbs of wax, or their excrements. The bees do not always carry them out of the hive, but ſometimes leave them on the ſtool, where the little maggots ſoon weave a caſe to conceal themſelves in; as ſhe has known them do in a few hours. She found the greateſt number of them at about four or five o'clock in the morning.

She reſolved to place over Numb. 1. a glaſs hive, to give the bees an opportunity of working in it. With this view, ſhe cut ſome rounds off the top of the ſtraw hive, ſo as to make an opening of four inches, upon which ſhe put a piece of board with a correſponding opening of four inches; and on the twenty-fifth of March 1762, a glaſs hive was placed over it. She ſhut up the mouth of the ſtraw hive, in order to oblige the bees to enter by an opening under the glaſs hive, which ſhe covered, leſt the cold might incommode or even kill her bees, which were few in number. Though they increaſed ſo much by May as to be equal with Numb. 2. yet the bees never ſtopped in the glaſs hive. She judged from this, that they would rather deſcend, if ſhe gave them a convenient habitation below. She therefore placed under the ſtraw hive a box, which had an opening in it of eight inches, for the bees to paſs through. They ſoon extended their works downward, ſo that in a fortnight they almoſt filled the box with combs. On the eighth of July ſhe took away the glaſs hive; and though it had hitherto ſerved them only as a paſſage, they were much diſconcerted when it was removed: for after ſhe had filled up the opeing in the top of the ſtraw hive with flax and rue, the loaded bees continued for ſeveral day to fly round it, though the rue was diſagreeable to them, before they would enter by the opening in the box, which was the only one they now had.

It is very remarkable, that the bees made no combs in the glaſs hive, though they were ſo fond of entering by it; and yet they deſcended into the box as ſoon as it was placed under them. We might have imagined it to be eaſieſt for them to enter below, at the bottom of the box; but inſtead of ſo doing, they entered by the glaſs hive, paſſed through the ſtraw hive full of combs, and carried their load down into the box. This gave her the firſt hint, that it was moſt adviſable to put the additional hive into which we would have the bees to work, under the full one, and ſhe has ſince found it ſucceed accordingly.

On the twentieth of July, ſhe found that the bees of Numb. 1. had caſt out ſo great a quantity of their young brood, that ſhe gathered ſome handfuls of it about the hive. The bees continuing to do the ſame next day, ſhe determined to take away the ſtraw hive the day after. For this purpoſe, ſhe choſe eight o'clock in the morning, which ſhe had obſerved to be the time when the greateſt number of bees were gone into the fields. She began by looſening the ſtraw hive from the board on which it reſted, and to which the bees had faſtened it with propolis. She then took the wadding out of the hole in the top of the ſtraw hive; near to which ſome linnen rags were kept ſmoking, and this ſmoke was blown into the hive by a pair of bellows. As ſoon as ſhe judged that moſt of the bees had been forced down into the box, ſhe cauſed a ſtrong iron wire to be drawn through between the hive and the board it reſted on, thereby to cut tranſverſely, all the combs which were extended from the hive into the box through the hole of communication. The hive was then taken up with all the combs but one, which ſeparated from the middle of the hive. She carried this comb, with two fingers of each hand, to a table at ſome diſtance, on which the hive had been placed bottom up. The comb which ſhe carried was almoſt covered with bees; and as it fell from the middle of the hive, where the queen generally reſides, ſhe ſearched for her, and found her on the firſt round of the hive, ſcarce able to crawl, being daubed with honey which had flowed from the combs cut through. She waſhed her in a glaſs of water; but finding that this did not entirely carry off the honey which ſtill adhered to her wings, ſhe waſhed her a ſecond time, and put her among ſeveral bees which had alſo been waſhed, but had recovered ſtrength enough to aſſiſt their queen. They immediately ſet themſelves to dry and aſſiſt her. She kept her thus for half an hour, in the preſence of ſeveral curious perſons, who had often ſought in vain for her. As ſoon as ſhe thought her able to make uſe of her legs and wings, ſhe carried her to the ſtool on which the box remained, now to become the only habitation of the bees. Here ſhe was again bruſhed and licked during an hour, by bees which were in great numbers on the forepart of the box, and at laſt ſhe entered.

A farmer with whom this lady kept ſome bees in the country had an old ſtraw hive, which he intended to deſtroy in order to come at their honey and wax. She propoſed to him to follow the ſame ſteps as ſhe had taken with her's, which he agreed to, knowing that he could not loſe any thing by it. Having been taught by experience, ſhe adviſed him to put a box under the hive, rather than a hive over it. As ſhe had obſerved that her own bees had ſo obſtinately adhered to their former paſſage, ſhe adviſed him to place the box at a ſmall diſtance from the place where the hive had ſtood, that the whole might be the newer to them. They ſet to work heartily on the third of July; and by the ſixteenth of Auguſt they had lain in ſo much proviſion, that ſhe determined to take off the hive in the ſame manner as ſhe had done her own. The honey did not run ſo much, becauſe the weather was not ſo hot.

Whatever pains are taken to drive the bees out of the hive by means of ſmoke, many ſtill remain in it. In order to preſerve theſe bees, ſhe found that the beſt way was to ſweep them with the wing of a fowl into a tub of water, as faſt as the combs were taken out. This practice was attended with ſeveral advantages. It prevented the people being ſtung, it cleared the bees of any honey that might have dropped on them, and it made many of their lice fall off them.

In order to take them out of the water, ſhe cauſed a thin linnen cloth to be ſpread over the mouth of an empty tub, in ſuch manner that it hung every where over the brim, and was held by one perſon, whilſt another poured the water, in which the bees were, gradually through it. The bees remained on the cloth. It is eſſential that the quantity of water be large in proportion to the number of bees, and that they be quite ſenſeleſs before they are taken out. If the firſt water taſtes of honey, they ſhould be bathed in a ſecond quantity. M. de Réaumur loſt many bees by not attending to this precaution. When the bees have been ſufficiently bathed, madam Vicat ſpreads them on whited-brown paper, which, with the warm air, ſoon dries them.

It was ſome time before this lady could find the queen of the farmer's hive. The country people who ſaw this operation, were ſtruck with great compaſſion on ſeeing ſo many bees laid out, as it were, upon the table; for they thought them quite dead, and could not believe her when ſhe aſſured them that they would all return to life. By the time ſhe had found the queen, many of the bees had ſo far recovered, as to take care of her. Madam Vicat obſerved on her crocelet a louſe, which ſhe ſtruck off with a pin. She ſaw a ſecond on the hind part of her head; but it ſtuck ſo faſt that ſhe could not remove it; nor was ſhe much ſolicitous about it, becauſe the queen ſeemed to to be in good plight. All the bees were placed on the ſtool before the box; and ſhe was informed next day, that they had all ſoon returned to their companions. Having obſerved in the combs ſome cells which had young in them, ſhe put an additional height under the box, in which ſhe placed the combs with the young in them: and remarking on the twentieth of Auguſt, that there were ſeveral moths under the laſt addition, in which the combs with young were placed, ſhe judged it not to be right to preſerve ſuch combs for the future. Experience has ſince confirmed her in this opinion.

It is generally alledged, that the moths get ſo much the upper hand in the hives by the fourth year, that it is neceſſary to deſtroy the bees on the third year, in order to get the then remaining honey and wax; for that all would otherwiſe fall a prey to the moths. Madam Vicat has now ſhewn, that hives may be preſerved from moths without condemning to the fire thoſe precious labourers, the bees; a practice as barbarous as it is ſenſeleſs; a practice which was ſtrictly forbidden by a Grand Duke of Tuſcany, under the penalty of ſevere puniſhment, as we are informed by M. de Réaumur. If care is not taken, even three years will be too long a time to allow; for the moths will frequently deſtroy a hive the very firſt year.

The lice which ſtick to bees are not generally thought to be prejudicial to them; and this may be true when there are but few of thoſe vermin; but when every bee in a hive has two, or perhaps three lice upon it, as is often the caſe, we may believe that the bees are greatly incommoded by them: indeed we may be aſſured of it, by their uſing every means in their power, though ineffectually, to get rid of them. M. de Réaumur declares, that he cannot think well of a hive in which the greateſt number of bees have lice on them.

Madam Vicat had a hive near a chair in her garden, in which ſhe uſed to ſit at work for hours. She one day ſaw many bees endeavouring to rid themſelves of theſe troubleſome enemies, and endeavoured, but to little purpoſe, to aſſiſt them, by killing the lice with her ſciſſars. Recollecting that tobacco is a poiſon to many inſects, ſhe immediately ſtrewed a little Morocco tobacco over ſome bees which had lice on them. The lice fell off inſtantly, as dead. In order to be aſſured that tobacco did not hurt the bees, ſhe confined ſome which were louſy, under a glaſs placed on paper ſtrewed with tobacco. After the bees had paſſed ſeveral times over the tobacco, the lice fell off them dead. She left the bees in the glaſs three hours, and at the end of that time they appeared vigorous and well.

Mr. Thorley tells us, that the beſt time to plant colonies of bees, is either in ſpring with new ſtocks full of bees, or in ſummer with ſwarms. If ſwarms are uſed, procure, if poſſible, two of the ſame day; hive them either in two boxes, or in a hive and a box; at night place them in the bee-houſe, one over the other, and, with a knife and a little lime and hair, ſtop cloſe the mouth of the hive, or upper-box, ſo that not a bee may be able to go in or out, but at the front door. This done, you will, in a week or ten days, with pleaſure ſee the combs appear in the boxes; but if it be an hive, nothing can be ſeen till the bees have wrought down into the box. Never plant a colony with a ſingle ſwarm, as Mr. Thorley ſays he has ſometimes done, but with little ſucceſs.

When the ſecond box, or the box under the hive, appears full of bees and combs, it is time to raiſe your colony. This ſhould be done in the duſk of the evening, and in the following manner.

Place your empty box, with the ſliding ſhutter drawn back, behind the houſe, near the colony that is to be raiſed, and at nearly the height of the floor; then lifting

ing up the colony with what expedition you can, let the empty box be put in the place where it is to ſtand, and the colony upon it, and ſhut up the mouth of the then upper box, with lime and hair as before directed.

When, by the help of the windows in the back of the boxes, you find the middle box full of combs, and a quantity of honey ſealed up in it, the loweſt box half full of combs, and few bees in the uppermoſt box, proceed thus.

About five o'clock in the afternoon, drive cloſe, with a mallet, the ſliding ſhutter under the hive or box that is to be taken from the colony. If the combs are new, the ſhutter may be forced home without a mallet; but be ſure it be cloſe that no bees may aſcend into the hive or box to be removed. After this, ſhut cloſe he doors of your houſe, and leave the bees thus cut off from the reſt of their companions for the ſpace of half an hour or more. In this time, having loſt their queen, they will fill themſelves with honey, and be impatient to be ſet at liberty.

If, in this interval, you examine the box or boxes beneath, and obſerve all to be quiet in them, you may be confident that the queen is there, and in ſafety. Hereupon raiſe the back part of the hive or box ſo far, by a piece of wood ſlipped under it, as to give the priſoners room to come out, and they will return to their fellows: then lifting the box from off the colony, and turning it bottom upmoſt, cover it with a cloth all night; and the next morning, when this cloth is removed, the bees that may have remained in it will return to the colony. Thus you have a hive or box of honey, and all your bees ſafe.

Mr. Thorley adds, that the method he has purſued with great ſucceſs for many years, and which he recommends to the public, as the moſt effectual for preſerving bees in common hives, is incorporation, or uniting two ſtocks into one, by the help of a peculiar fume or opiate, which will put them intirely in your power for a time, to divide and diſpoſe of at pleaſure. But as that dominion over them will be of ſhort duration, you muſt be expeditious in this buſineſs.

The queen is immediately to be ſearched for, and killed. Hives which have ſwarmed twice, and are conſequently reduced in their numbers, are the fitteſt to be joined together, as this will greatly ſtrengthen and improve them. If a hive which you would take is both rich in honey, and full of bees, it is but dividing the bees into two parts, and putting them into two boxes, inſtead of one. Examine whether the ſtock to which you intend to join the bees of another, have honey enough in it to maintain the bees of both: it ſhould weigh full twenty pounds.

The narcotic, or ſtupefying fume, is made with the *fungus maximus* or *pulverulentus*, the large muſhroom, commonly known by the name bunt, puckfiſt, or frogcheeſe. It is as big as a man's head, or bigger: when ripe, it is of a brown colour, turns to powder, and is exceeding light. Put one of theſe pucks into a large paper, preſs it therein to two-thirds, or near half the bulk of its former ſize, and tie it up very cloſe; then put it into an oven ſome time after the houſhold bread has been drawn, and let it remain there all night: when it is dry enough to hold fire, it is fit for uſe. The manner of uſing it is thus:

Cut off a piece of the puck, as large as a hen's egg, and fix it in the end of a ſmall ſtick ſlit for that purpoſe, and ſharpened at the other end, which place ſo that the puck may hang near the middle of an empty hive. This hive muſt be ſet with the mouth upward, in a pail or bucket, which ſhall hold it ſteady, near the ſtock you intend to take. This done, ſet fire to the puck, and immediately place the ſtock of bees over it, tying a cloth round the hives, that no ſmoke may come forth. In a minute's time, or little more, you will hear the bees fall like drops of hail into the empty hive. You may then beat the top of the full hive gently with your hand, to get as many of them as you can: after this, looſing the cloth, lift the hive off to a table, knock it ſeveral times againſt the table, ſeveral more bees will tumble out, and perhaps the queen among them. She often is one of the laſt that falls. If ſhe is not there, ſearch for her among the main body in the empty hive, ſpreading them for this purpoſe on a table.

You muſt proceed in the ſame manner with the other hive, with the bees of which theſe are to be united. One of the queens being ſecured, you muſt put the bees of both hives together, mingle them thoroughly, and drop them among the combs of the hive which they are intended to inhabit. When they are all in, cover it with a packing or coarſe cloth, which will admit air, and let them remain ſhut up all that night, and the next day. You will ſoon be ſenſible that they are awaked from this ſleep.

The ſecond night after their union, in the duſk of the evening, gently remove the cloth from off the mouth of the hive, (take care of yourſelf) and the bees will immediately ſally forth with a great noiſe; but being too late, they will ſoon return; then inſerting two pieces of tobacco-pipes to let in air, keep them confined for three or four days, after which the door may be left open.

Providence has ordained that inſects which feed on leaves, flowers, and green ſucculent plants, are in an inſenſible or torpid ſtate from the time that the winter's cold has deprived them of the means of ſubſiſtence. Thus the bees, during winter, are in ſo lethargic a ſtate, that little food ſupports them: but as the weather is very changeable, and every warm or ſunny day revives them, and prompts them to return to exerciſe, food becomes neceſſary on theſe occaſions. Mr. White very judiciouſly obſerves, that a greater degree of cold than is commonly imagined to be proper for bees, is favourable to them in winter. If a ſharp froſt, ſays that experienced gentleman, continues for two or three months, without intermiſſion, you may obſerve, through your glaſs, that the bees are all this time cloſely linked together in cluſters between the combs. If they are not altogether without motion, yet it is certain they ſtir not from their places, while the cold continues, and therefore eat not at all.

A colony of bees therefore placed on the north-ſide of a building will waſte much leſs of their proviſions, than others which ſtand in the ſun; for coming ſeldom forth, they eat little; and yet in the ſpring are as forward to work and ſwarm, as thoſe which had twice as much honey in the preceding autumn. The owner ſhould however examine their ſtate in the winter, and if he finds that inſtead of being cluſtered between the combs, they fall down in numbers on the ſtool or bottom of the hive, the hive ſhould be immediately carried to a warmer place, where they ſoon recover.

Moſt writers on bees have obſerved, that theſe inſects are ſubject to a kind of purging in the ſpring, which is often fatal to the whole hive. Madam Vicat aſcribes this diſtemper to the honey being candied in the hive by the cold. But Columella deſcribes it as an annual diſtemper which ſeizes them in the ſpring, when the ſpurge bloſſoms, and the elm diſcloſes its ſeeds; for that the bees, being allured by the firſt flowers, feed ſo greedily upon them, that they ſurfeit themſelves therewith, and die of a looſeneſs, if they are not ſpeedily relieved. He relates Hyginus's adviſing, in this caſe, to cover the bees with aſhes of the fig-tree; and affirms, that, being enlivened by the warmth of theſe aſhes, the bees will revive in two hours, and go into a hive brought to them. Columella adviſes giving them roſemary and honey diluted with water. Ariſtomachus ſeems to have preſcribed the moſt effectual cure, namely, to take away all the vitiated combs, that is, all the combs in which there are open cells appearing to contain candied honey.

The authors of the *Maiſon Ruſtique*, impute this purging to the bees feeding on pure honey, which does not form a food ſufficiently ſubſtantial for them, unleſs they have bee-bread to eat at the ſame time; and adviſe giving them a honey-comb taken from another hive, the cells of which are filled with crude wax or bee-bread.

The common practice is to feed them in the autumn, giving them as much honey as will bring the whole weight of the hive to near twenty pounds. To this end, the honey is diluted with water, and then put into an empty comb, ſplit reeds, or, as Columella directs, upon clean wool, which the bees will ſuck perfectly dry.

The following directions given for this purpoſe in the *Maiſon Ruſtique*, ſeem to be very judicious. Repleniſh the weak hives in September, with ſuch a portion of combs full of honey, taken from other hives, as ſhall be judged to be a ſufficient ſupply for them. In order to do this, turn up the weak hive, after taking the precaution of defending yourſelf with the ſmoke of rags, cut out the empty combs, and put the full ones in their place, where ſecure them with pieces of wood run acroſs, in ſuch manner that they may not fall down when the hive is returned to its place. The bees will ſoon fix them more effectually. If this method be thought too troubleſome, ſet under the hive a plate of liquid honey, unmixed with water, with ſtraws laid acroſs it, and over theſe a paper pierced full of holes, through which the bees will ſuck the honey, without daubing themſelves. This ſhould be done in cloudy or rainy weather, when the bees ſtir leaſt abroad; and the hive ſhould be covered, to protect the bees from robbers, who might be allured to it by the ſmell of honey.

Another circumſtance which may render it very neceſſary to feed the bees, is, when ſeveral days of bad weather enſue immediately after they have ſwarmed; for then, being deſtitute of every ſupply beyond what they carried with them, they may be in great danger of being ſtarved. In this caſe honey ſhould be given them in proportion to the duration of the bad weather.

But it is not enough to know how to manage bees in all ſeaſons; it will be alſo requiſite to know how to defend them from their enemies; among which hornets and waſps, and eſpecially the ſpecies of waſps which are ſcarcely larger than bees, are very formidable; for they ſeize a bee loaded with honey. If this robbery is committed near the mouth of the hive, they carry off the bee to a place of greater ſafety. Their neſts ſhould therefore be carefully deſtroyed, by pouring plenty of boiling water into them; for this is by much the ſafeſt method.

The field-mouſe is an enemy to be carefully guarded againſt as ſoon as the cold begins to approach: for if it enters at that ſeaſon, it makes dreadful havock. At firſt it deſtroys the loweſt parts of the combs; but as the weather grows colder, and the bees more torpid, it aſcends up the hive, and ſeizes on the richeſt treaſure: nor does the evil end here: for other bees, ſmelling the honey ſpilt by the mouſe, fall upon the hive, and rob it of what remained; or as ſoon as the warm weather returns, and the bees ſtir about, they are ſometimes ſo diſguſted at the havock made by the mouſe, that they deſert the hive. The only way to guard againſt this, is to prevent its entering into a hive. Whilſt the bees continue in their vigorous ſtate, it dares not attack them: therefore, as ſoon as the cold approaches, the entrance to the hives ſhould be leſſened.

Bees may themſelves be reckoned enemies to bees: for they ſometimes wage cruel wars againſt each other. Their fighting and plundering one another ought chiefly to be imputed, as Mr. Thorley obſerves, either to their perfect abhorrence of ſloth and idleneſs, or to their inſatiable thirſt for honey: for when, in ſpring or autumn, the weather is fair, but no honey can be collected from plants, and is to be found only in the hives of other bees, they will venture their lives to get it there.

Dr. Warder aſſigns another cauſe of their fighting, which is, the neceſſity that the bees are reduced to when their own hive has been plundered, at a ſeaſon when it is too late for them to repair the loſs by any induſtry in the fields.

Sometimes one of the queens is killed in battle. In this caſe, the bees of both hives unite as ſoon as her death is generally known among them. All then become one people: the vanquiſhed go off with the robbers, richly laden with their own ſpoils, and return every day, with their new aſſociates, to pillage their old habitation. This cauſes a throng unuſual for the ſeaſon, at the door of the hive they are plundering; and if the owner lifts it up at night, when all are gone home, he will find it empty of inhabitants; though there perhaps will remain in it ſome honey, which he takes as his property.

When two ſwarms take flight at the ſame time, they ſometimes quarrel, and great numbers are deſtroyed on both ſides, till one of the queens is ſlain. This ends the conteſt, and the bees of both ſides unite under the ſurviving ſovereign.

Robbers make their attacks chiefly in the latter end of July, and the month of Auguſt. They appear to act with caution at firſt, and to procure themſelves an entrance by ſtealth; not pitching boldly like the native bees, and then entering at once in at the door. If they are encouraged by ſucceſs, they return in greater parties, ſometimes all the bees of a hive, and endeavour to force that entrance which they ſought before with ſo much caution. They come in ſuch numbers, as frequently to make thoſe who are not acquainted with theſe ſcenes, miſtake them for new ſwarms: but the number of dead bees ſtrewed on the ground, ſoon convince them of this error. Columella adviſes to kill the queen, if poſſible; but the moſt effectual way to prevent the loſs of bees, as well as of honey, occaſioned by theſe robberies, is, early in the autumn, to leſſen the entrance into the hive, as before directed, ſo as to leave room for only two or three bees to paſs a-breaſt.

In the third claſs of enemies to bees is a ſmall caterpillar, termed the wax-worm, or wax-moth, becauſe of the havock it makes on wax. It is tender in its frame, unarmed and defenceleſs; and yet can ſubſiſt itſelf in the midſt, and at the coſt, of the moſt numerous hive. A few of theſe little caterpillars will deſtroy and break to pieces the combs of a hive, build up new edifices for lodging themſelves in it, and finally force the bees to quit the place.

This inſect is of the ſpecies of the falſe-moth, and is extremely nimble. It is enough for it to get into a hive unawares. It runs ſo very ſwiftly, that it paſſes unperceived, and ſlides into ſome narrow place between the combs, perhaps inacceſſible to bees, there to lay its eggs in ſecurity. This done, it makes its eſcape as well as it can. From each of theſe eggs proceeds a caterpillar, which eſcapes certain death merely by its extreme ſmallneſs, and the quickneſs with which it ſpins and enwraps itſelf in a covering ſufficient to ſecure it from all harm. This covering, or tube, is glued to the wax which the caterpillar feeds on, and this inſect lengthens the tube as it eats the wax, till at laſt it ſhuts itſelf up, in order to be transformed into a chryſalis. Several caterpillars, and conſequently ſeveral moths, muſt proceed from the eggs which the males and females engender. Probably the bees deſtroy great numbers of the moths: however, if a ſingle female has an opportunity to lay her eggs, ſhe is ſo exceedingly prolific, that this ſecond brood may quite overſpread the hive. If one of the impregnated females eſcapes out of the hive by means of her great nimbleneſs, ſhe ſeeks out another hive, in which ſhe ſpreads the ſame ſource of miſchief.

The only method of deſtroying theſe pernicious inſects is to take away the infected hive; and after clearing it from the moths, reſtore it to the proper owners, who will now work with greater diligence and reſolution.

The next particular neceſſary to be known, is how to ſeparate the honey from the wax. In order to this, the combs ſhould be laid in a place perfectly ſecure from the acceſs of bees; for otherwiſe the bees would not only carry off much honey, but alſo be extremely troubleſome, by ſtinging the people at work. It is proper to burn cow-dung, or rotten hay, at the doors and windows of this place; becauſe the ſmell of the ſmoke ariſing from thence is ſo diſagreeable to the bees, that it will drive them away. If any bees remain in the comb, they ſhould be bruſhed off with the wing of a fowl into a tub of water, and being afterwards dried in another place, they will fly back to their hive. If the combs are taken out of the hive before the end of autumn, there are generally young bees in them. The parts of the combs in which theſe are ſhould be laid aſide, for they would give a bad taſte to the honey. The bee-bread muſt alſo be ſeparated, and both ſhould be melted with the wax.

Before the combs are laid to drain out their honey, they ſhould be carefully cleaned of every ſort of filth, or inſects. The cruſt with which the bees cover the honey in them ſhould then be pared off with a ſharp, thin, broad knife, and the combs themſelves ſhould be divided through the middle, in ſuch manner as to render the cells open at both ends, that the honey may flow the more freely out of them. The combs ſhould be laid in this ſtate on ſieves, or ſome other contrivance, which will afford the honey a free paſſage. It will run quite clear; and the honey thus obtained ſhould be kept by itſelf, as being the pureſt and beſt.

The combs which are but partly filled, and alſo thoſe that were full and have done running, are broken by hand, and the honey in them is ſqueezed out. Some put the broken combs into a ſtrong bag, and then uſe a preſs to ſqueeze the honey out of them; and even warm the broken combs with the help of fire: but neither of theſe laſt conſider that, in both theſe ways, much of the wax paſſes through the bag with the honey, and that the wax being of greater value than the honey, the owner ſuſtains a loſs in that reſpect, beſides that his honey becomes the leſs valuable, in proportion to its being leſs pure. It is true, that great part of the wax thus mixed with the honey ſoon riſes to the ſurface, and may be taken off, eſpecially after the honey is grown hard.

The makers of mead need not be extremely ſolicitous about ſeparating the honey ſo very perfectly from the wax, becauſe, by waſhing the wax in cold water, the honey will diſſolve in the water, and the wax being ſtrained from it by running the water through a coarſe cloth, neither bad taſte nor impurity will be communicated by it to the water, which may afterwards be uſed for making mead. The wax that has been ſkimmed off the honey ſeparated by preſſure, ſhould be waſhed in the ſame manner; becauſe, by this means, no part of the wax will be loſt.

The goodneſs and flavour of honey depend on the fragrance of the plants from which the bees collect it: and hence it is that the honey of different places is held in different degrees of eſtimation. That which is made early in the year is alſo preferred to what is collected in the latter end of the ſeaſon.

In order to obtain the wax in a pure ſtate, what remains of the combs after ſeparating the honey, together with the combs which contain bee-bread and young bees or maggots, is put into a copper with a ſufficient quantity of clean water, which is made to boil over a ſlow fire, and ſtirred frequently with a ſtick. When the wax is melted, it is run through bags, which are put into a preſs, to ſeparate the wax perfectly. The wax runs from the preſs into a veſſel placed underneath, with ſome water in it, to prevent the wax from ſticking to it. What remains after the preſſure may be again boiled in water, in order to obtain more wax from it: and this ſhould be repeated by ſlow boilings, rather than by boiling it ſtrongly at once.

When all the wax is thus ſeparated from the dregs, it is again melted in water, over a very gentle fire, and ſkimmed clean whilſt any ſcum ariſes. It is then poured into veſſels ſuited to give it the deſired form, after previouſly putting into them a little water, to keep the wax from ſticking to them. Theſe veſſels are then carried into a place where the wax may cool gradually. It is found that, the larger the cakes of wax are, the better the wax keeps, and the higher price it brings; alſo, that the more gentle it has been boiled, the better it likewiſe is: for too haſty boiling renders it hard, and this increaſes the difficulty of bleaching it. Whatever filth ſticks to the bottom of the cake is ſcraped off with a knife.

We ſhall conclude this article with a few directions for purchaſing bees; which ſhould always be done in the ſpring, as the dangers of the winter are then over. The ſummer is an improper time for buying them, becauſe the heat of the weather then ſoftens the wax, and thereby renders the combs liable to break, if they are not very well ſecured. The honey too, being then thinner than at other times, is more apt to run out of the cells, which is attended with a double diſadvantage, namely, the loſs of the honey, and the daubing of the bees, whereby many of them may be deſtroyed. A firſt and ſtrong ſwarm may indeed be be carried away in the night after it has been hived.

The hive ſhould be full of combs, and well ſtored with bees. The purchaſer ſhould examine the wax, in order to know the age of the hive. The combs of a year old are white; thoſe of two years are dark coloured, or yellow; and where the combs are black, the hive ſhould be rejected; becauſe old hives are moſt apt to be infected with the moth, and moſt liable to other accidents. For this reaſon, the ſtate of the combs ſhould be examined as high up as poſſible; becauſe the lower parts of the combs may have been cut off, and renewed in the preceding ſummer. It ſometimes, though rarely, happens, that two queens continue to govern ſeparately in the ſame hive; and in this caſe a large comb forms the barrier. Such hives ſhould be rejected, becauſe there is not in them that harmony which is neceſſary for the ſucceſs of the bees.

In order to judge of the ſtate of the hive, it may be raiſed a little in the evening, ſo as to admit a more than uſual degree of cold; for this will drive the bees to the top of the hive, and ſo benumb them, that the next morning there will be no danger of their ſtinging. If any ſuch danger does appear, a pot of lighted charcoal, with ſome linnen rags upon it, may be got ready, and held under the hive whilſt it is pulled back in order to be examined.

We may alſo judge of the thriving ſtate of the hive by the following appearances. Bees which are in good condition will get into the fields early in the morning, return loaded, enter boldly, and not come out of the hive in bad weather; for when they do, this indicates that they are in great want of proviſions. They are alert on the leaſt diſturbance; they preſerve their hive free from all filth, or dead nymphs or bees; they are ready to aſſiſt the bees which return loaded from the fields, and to defend the hive againſt every enemy that dares to approach: they make a continual humming noiſe, which increaſes on the leaſt touch. Indeed, by the loudneſs of the humming, we may judge of the ſtrength and progreſs of the hive, and therefore this ſhould be frequently noticed, to enable us to form the better judgment of the preſent ſtate the bees are in. *Columella, lib.* IX. *Maiſon Ruſtique, tom.* I. *Memoires, &c. de la Societé de Berne: Anné* 1764. *Réamur's Memoires pour ſervir à l'Hiſtoire Naturelle des Inſects, tom.* V. *Thorley's Enquiry into the Nature, &c. of Bees. Warder's Monarchy of Bees. White's collateral Bee-Boxes. Mills's Eſſay on the Management of Bees.*

BEECH, the name of a well known tree, and of which ſome planters ſuppoſe there are two diſtinct ſpecies; calling the one the mountain or wild beech, and the other the common beech. They alſo ſay, that the wood of the former is whiter than that of the latter; but Mr. Miller aſſures us that there is only one ſpecies of this tree, and that the difference in the colour of the wood ariſes from the difference in the ſoils.

This tree is propagated by ſowing the maſt, which may be done at any time from October to February, only obſerving to ſecure the ſeeds from vermin when early ſown; and, if this be carefully done, the ſooner they are ſown after they are fully ripe, the better: a ſmall ſpot of ground will be ſufficient for raiſing a great number of theſe trees from ſeed; for if the plants are come up very thick, the ſtrongeſt of them ſhould be drawn out the autumn following, that thoſe left may have room to grow; ſo that a ſeed-bed, carefully managed, will afford a three year's draught of young plants, which ſhould be planted in a nurſery, and, if deſigned for timber trees, at three feet diſtant row from row, and eighteen inches aſunder in the rows.

But if they are deſigned for hedges, to which the tree is very well adapted, the diſtance need not be ſo great; two feet row from row, and one foot in the rows, will be ſufficient. In this nurſery they may remain two or three years, obſerving to dig up the ground between the roots, at leaſt once a year, that their tender roots may the better extend themſelves every way: but be careful not to cut or bruiſe their roots, which is injurious to all young trees; nor ſhould you ever dig the ground in ſummer, when the earth is hot and dry; for by letting in the rays of the ſun to the roots, the young trees are often deſtroyed.

This tree will grow to a conſiderable ſtature, though the ſoil be ſtoney and barren, as alſo upon the declivities of hills and chalky mountains, where they will reſiſt the wind better than moſt other trees; but then the nurſeries for the young trees ought to be made upon the ſame ſoil; for if they are raiſed on good ground, and in a warm expoſure, and afterwards tranſplanted into a bleak, barren ſituation, they ſeldom thrive. The nurſery ſhould therefore be made upon the ſame ſoil, where the plantation is intended, and the plants drawn annually to extend the plantation.

The tree is very proper to form large hedges to ſurround plantations, or wilderneſs quarters; and may be kept in a regular figure, if ſheared twice a year; eſpecially if they ſhoot ſtrong; in which caſe if they are neglected but a ſeaſon or two, it will be very difficult to reduce them again.

The ſhade of this tree is very injurious to moſt ſorts of plants which grow near it, but is generally believed to be very ſalubrious to human bodies.

It delights in a chalky or ſtony ground, where it generally grows very faſt; the bark of the trees in ſuch land is clear and ſmooth, and although the timber is not ſo valuable as that of many other trees, yet as it will thrive on ſuch ſoils, and in ſuch ſituations where few better trees will grow, the planting of them ſhould be encouraged, eſpecially as the trees afford an agreeable ſhade, and the leaves make a fine appearance in ſummer, and continue green as long in autumn as any of the deciduous trees; therefore in parks, and other plantations for pleaſure, this tree deſerves to be cultivated among thoſe of the firſt claſs, eſpecially where the ſoil is adapted to it. *Miller's Gard. Dict.*

The timber is of great uſe to turners for making trenchers, diſhes, trays, &c. and alſo to carpenters for making ſtools, bedſteads, &c. Shipwrights likewiſe often uſe it for the keels of ſhips; and it is eſteemed the beſt wood for firing. The thin lamina, or ſcale of the wood, commonly called paſte-board, is uſed in making band-boxes, hat-caſes, &c.

Beech wood is well known to be ſubject to worms, which ſoon deſtroy it. This worm is ſuppoſed to feed upon the ſap remaining in the wood after it is cut into ſcantlings, and worked up for uſe. If therefore the ſap can, by any means, be extracted, the wood will be much leſs ſubject to decay. Upon this principle, a correſpondent of the authors of the *Muſeum Ruſticum* greatly improved the wood, by laying it a reaſonable time in a pond, and afterwards drying it in the ſhade; by which means the timber when applied to uſe, was at leaſt as good, and as durable as elm. He adds, that by boiling the wood intended for ſmaller works, ſuch as bowls, trenchers, chairs, &c. two or three hours in a copper filled with water, all the ſap will be extracted, the wood will work pleaſanter, be more beautiful when finiſhed, and laſt, without compariſon, longer. *Muſeum Ruſticum, vol.* II. *pag.* 135.

BEECH *maſt*, the ſeed of the beech-tree.

This maſt is very good for feeding ſwine; ſo that in ſome counties of England, where there are large woods of beech-trees, the hogs are fed for months together on the maſt only. They thrive prodigiouſly on this food only, ſo that many porkers are killed in a year fatted with beech-maſt, without the aſſiſtance of any other food. It is, however, the better way to take them up, and give them either pollard, barley-meal, or peaſe, for a month or five weeks, when they will be fit for the tub.

But beech-maſt, like acorns, are apt to give the hogs a diſtemper called the garget; which may be effectually prevented, if a few peaſe or beans moiſtened with water, and ſprinkled over with antimony finely powdered, be given them every other day for a fortnight or three weeks. *Muſeum Ruſticum, vol.* I. *pag.* 474.

BEES-NEST, or *birds-neſt*, the ſame with wild carrot. *See the article Wild* CARROT.

BEER, a common and well known liquor, made of malt and hops, and uſed in various parts of Europe, particularly in thoſe where the vine will not flouriſh, and where cider is ſcarce. *See the article* BREWING.

The grounds, or ſettlings of beer, &c. form a very rich manure.

BEESTINGS, the firſt milk taken from a cow after calving.

If this milk be not taken away clean from the cow upon her firſt calving, it will often make the cow's milk to dry away. Nor ſhould the beeſtings be given to the calf, as it is very apt to ſurfeit. *Liſle's Huſbanary, vol.* II. *pag.* 143.

BEET, the name of a plant commonly cultivated in gardens, and of which there are two ſpecies, commonly diſtinguiſhed by the names of white and red beet: the former is cultivated for its leaves, and the latter for its roots.

The roots of the white beet ſeldom grow larger than a man's thumb; the ſpikes of the flowers come out from the wings of the leaves, which are long, and have many narrow leaves placed between the flowers. The lower leaves are thick and ſucculent, and their footſtalks are broad. The varieties of this ſort are, the white beet, the green beet, and the Swiſs, or chard beet; but theſe will all vary from one to the other by culture.

It is commonly ſown by itſelf, and not mixed with other crops, the beginning of March, upon an open ſpot of ground, not too moiſt. When the plants have put out four leaves, the ground ſhould be hoed, as is practiſed for carrots, carefully cutting up all the weeds, and alſo the plants where they are too near each other, leaving them at leaſt ſix inches aſunder. In three weeks or a month's time, the ground ſhould be a ſecond time hoed over, to cut up the weeds, and then ſet the plants at a greater diſtance; for by this time they will be paſt danger, ſo ſhould not be left nearer than eight or ten inches, if regard is had to the goodneſs of the leaves; and if it is of the Swiſs kind, with broad leaves, the plants muſt not be nearer than a foot: in ſix weeks after, the ground ſhould be hoed over a third time; which, if properly done, will deſtroy all the weeds; ſo that after this, the plants will ſpread and prevent the weeds from growing, therefore will want but little cleaning for a conſiderable time, and the leaves will ſoon be fit for uſe, when the outer larger leaves ſhould be firſt gathered; leaving the ſmall inner leaves to grow larger; ſo that a ſmall ſpot of ground will ſupply a moderate family, and furniſh a new ſupply of leaves the whole year, provided the plants are not permitted to run up to ſeed, for after that their leaves will not be good. *Miller's Gard. Dict.*

M. de Chateauvieux tells us, that of this plant, cultivated according to the principles of the new huſbandry, produced leaves three or four inches broader than thoſe of the ſame kind of plants in his kitchen garden. By this method of culture it will yield an amazing quantity of leaves, which being very pleaſant to the taſte, will prove good food for cattle; and Mr. Roque has found by experience, that cows fed with them give a large quantity of milk. This plant, according to Mr. Roque's obſervations, grows above an inch a day, and is beſt ſown in March. A buſhel is enough for an acre, and will not coſt above ten ſhillings. It thrives beſt in a deep, rich, light ſoil: the ſtalks are very rich and ſucculent, and therefore the cows ſhould eat it green

The red beet hath large thick ſucculent leaves, which are for the moſt part of a dark green, or purple colour. The roots of this are large, and of a deep red colour, on which their goodneſs depends; for the larger theſe roots grow, the tenderer they will be; and the deeper their colour, the more they are eſteemed. The varieties of this are, the common red beet, the turnip-rooted red beet, and the green leaved red beet.

It is frequently ſown with carrots, parſnips, or onions, by the kitchen gardeners near London, who draw up their carrots or onions when they are young, whereby the beets will have room to grow, when the other crops are gathered; but where the crops are not timely removed from them, it will be a better method to ſow them ſeparately. This ſort requires a deep light ſoil, for as their roots run deep in the ground, ſo in ſhallow ground, they will be ſhort and ſtringy. The ſeeds ſhould be ſown in March, and muſt be treated in the ſame manner as the white beet; but the plants ſhould not be left nearer than a foot diſtance, or in good land a foot and an half, for the leaves will cover the ground at that diſtance. The roots will be fit for uſe in the autumn, and continue good all the winter; but in the ſpring, when they begin to ſhoot, they will be hard and ſtringy. *Miller's Gard. Dict.*

That attentive cultivator M. de Chateauvieux raiſed the red beet according to the principles of the new huſbandry; and on digging up the roots on the twenty-fifth of October, he found them all nearly of the ſame ſize, which was from five to ſix inches in diameter towards the top, or thickeſt part. Theſe roots ſeem to promiſe fair for being an excellent food for cattle, and would be well worth the trial, as they will produce a very large increaſe, and are eaſily cultivated.

BEETLE, a wooden inſtrument in the form of a mallet, but much larger, uſed in driving piles, wedges, hedge-ſtakes, &c.

Beetle, is alſo the name of a flying inſect, of which there are a great variety of ſpecies; but they have all of them caſes over their wings to defend them from hard bodies, which they often meet with when they dig holes in the ground, or gnaw rotten wood with their teeth, to make themſelves houſes or neſts. When they fly they fill the air with a humming noiſe, and, perhaps, greater than that of any other inſect. There are different ſorts of beetles, ſome being large with horns, and others ſmall, and without horns.

BEEVES, a general name for oxen, or black cattle in general.

BEHEN, a ſpecies of chickweed, frequently called ſpattling-poppy. *See* Chickweed.

BENT-*graſs*, a ſpecies of graſs common in paſture grounds; there are ſeveral ſorts of this graſs, particularly that called fine bent, for the gathering the ſeeds of which the ſociety offered a premium. We have given a figure of one of the ſpecies of bent-graſs, on Plate III. Fig. 11.

BERE, or *bear*, a ſpecies of barley. *See the article* Barley.

BERNE-MACHINE, the name of an engine for rooting up trees, invented by Peter Sommer, a native of Berne in Switzerland.

A model of this machine was ſent by the Berne Society to the Society for the Encouragement of Arts in London, and from this model the drawing on Plate IV. Fig. 1. was made. The engine conſiſts of three principal parts, the beam, the ram, and the lever. The beam A B C, of which only one ſide is ſeen in the figure, is compoſed of two ſtout planks of oak of three inches thick at leaſt, and ſeparated by two tranſverſe pieces of the ſame wood at A and C, about three inches thick. Theſe planks are bored through with correſponding holes, as repreſented in the figure, to receive iron pins, upon which the lever acts between the two ſides of the beam, and which are ſhifted higher and higher, as the tree is raiſed, or rather puſhed out of its place. The ſides are well ſecured at top and bottom, by ſtrong iron hoops.

The iron pins on which the lever reſts, ſhould be an inch and a quarter, and the holes through which they paſs, an inch and a half in diameter. The poſition of theſe holes is ſufficiently indicated by the figure.

The foot of the beam, when the machine is in action, is ſecured by ſtakes repreſented at G, driven into the earth.

The ram D, which is made of oak, elm, or ſome other ſtrong wood, is capped with three ſtrong iron ſpikes, repreſented at *f*, which take faſt hold of the tree. This ram is ſix or eight inches ſquare, and a ſlit is cut lengthwiſe through the middle of it, from its lower end at K, to the firſt ferule *a*, in order to allow room for the chain *g h*, to play round the pulley K, which ſhould be four inches thick, and nine inches in diameter. This ram is raiſed by means of the chain *g h*, which ſhould be about ten feet long, with links four inches and three quarters in length, and an inch thick. One end of this chain is faſtened to the top of the beam at C, while the other, after paſſing through the lower part of the ram, and over the pulley K, terminates in a ring or link repreſented Fig. 3. the two ears *m*, *n*, of which ſerve to keep it in a true poſition between the two planks of the beam. In this ring the hook P is inſerted.

The hook is repreſented in profile, Fig. 2. where F is the part that takes hold of the ring. But it muſt be obſerved, that the parts of this machine, repreſented in Fig. 2, 3. are drawn on a ſcale twice as large as the whole engine, Fig. 1.

The hook F, Fig. 2. ſhould be made of very tough iron, as well as the handle D, and the arch E *c*. This handle ſhould be two inches thick at *z*, where it joins to the hook, and the thickneſs gradually leſſen by degrees up to the arch, which need not be more than half an inch thick.

On each ſide of the pin *z*, is a ſemi-circular notch, *x*, *y*, which reſts alternately on the pins, when the machine is worked. The hole D, and the arch *E c*, ſerve to fix a long lever of wood E F, Fig. 1. by means of two iron pins; and by this contrivance the lever is either raiſed or depreſſed at pleaſure, in order to render the working of the machine eaſy in whatever part of the beam the lever may be placed: for without this contrivance the extremity of the lever E F, would, when the handle *d*F was near the top of the beam C, be much higher than men ſtanding upon the ground could reach. It muſt, however, be remembered that the lever is often ſhortened by this contrivance, and conſequently its power leſſened.

The machine is worked in the following method: it is placed againſt a tree, in the manner repreſented in the figure, ſo that the iron ſpikes at *f* may have hold of the tree, and the end of the beam A be ſupported by ſtakes repreſented at G. The iron handle, Fig. 2. is placed in the opening between the two planks of the beam, and the wooden lever fixed to it by means of the iron pins already mentioned. The hook F takes hold of the chain, and one of the iron pins is thruſt into the outer row of holes, by which means the outer notch *x* will reſt on the pin, which will be now the center of motion; and the end of the lever E, Fig. 1. being preſſed downwards, the other notch *y*, Fig. 2. will be raiſed, and at the ſame time the chain, and conſequently the ram. The other iron pin is now to be thruſt into the hole in the inner row, next above that which was before the center of motion, and the end of the lever E, Fig. 1. elevated, or puſhed upwards, the latter pin on which the notch *y* reſts, now becoming the center of motion. By this alternate motion of the lever, and ſhifting the pins, the chain is drawn upwards over the pulley K, and conſequently the whole force of the engine exerted againſt the tree. There is a ſmall wheel at L, in order to leſſen the friction of that part of the machine.

From this account the reader will very eaſily perceive that the machine is nothing more than a ſingle pulley, compounded with a lever of the firſt and ſecond order; and therefore its power may be eaſily computed from the nature of the pulley and lever.

It muſt, however, be remembered, that as the puſh of the engine is given in an oblique direction, it will exert a greater or leſſer force againſt the horizontal roots of the tree in proportion to the angle formed by the machine with the plane of the horizon; and that the angle of 45° is the maximum, or that when the machine will exert its greateſt force againſt the horizontal roots of the tree.

M. N. E. Tſcharner, ſecretary to the Berne Society, obſerves, in a letter ſent to the Society for the Encouragement of Arts, &c. in London, and dated Berne, Jan. 10th 1763, that by repeating experiments with this machine he has found that the chain *g h*, is ſo far from giving an additional power, that it hinders the play and effect of the engine by its friction; and that when the ram preſſes ſtrongly againſt the beams, the chain is ſqueezed between the beams ſo as to render the upper holes uſeleſs, and prevents the machine from being worked out to its full length; in conſequence of which it is obliged to be removed from its firſt place, and fixed again anew; which neceſſarily occaſions a loſs of time. He alſo found that the ram was too ſhort. He has therefore taken away the chain, and lengthened the ram four feet.

The inconvenience of the chain was immediately ſeen by the Society for the Encouragement of Arts, and therefore the machine at large made by their directions, was conſtructed without it. The ram moved between the two cheeks of the beam, and was puſhed up by the alternate motion of the lever. And that the force of the machine might not be leſſened by the removal of the chain, the lever was made of twice the length of that in the Berne model.

It will be very readily granted, that an engine conſtructed in this manner will be very uſeful in ſaving the labour of men; though very inadequate to the taſk intended, that of throwing down trees. For it ſufficiently appeared from experiments made by the committee of mechanics, that trees above ſixteeen inches diameter, eſpecially if oaks or elms, cannot be thrown down with this engine, without the aſſiſtance of cutting their roots.

BEVERAGE, drink, liquor to be drank.

BIENNIAL *plants*, ſuch as continue two years.

BIG, the ſame with bear, or ſquare barley. *See the article* BARLEY.

BIGGE, a pap, or teat.

BILL, an edged tool uſed by huſbandmen in cutting buſhes, &c. It is a kind of hatchet with a hooked point, and a handle either ſhorter or longer, according to the various uſes for which it is intended.

BIN, or BINN, a place where corn, &c. is depoſited.

BIND-WEED, called by ſome *with-wind*, a troubleſome weed, of which there are two ſpecies, the ſmaller and the greater.

The firſt, or ſmaller bind-weed, commonly called gravel bind-weed, is very common upon dry banks, and in gravelly ground in moſt parts of England, and is generally a ſign of gravel lying near the ſurface. Its roots penetrate very deep into the ground, whence it is in ſome countries called devil's guts. It is a very troubleſome weed both in gardens and fields.

The ſecond or greater bind-weed, is alſo a troubleſome weed; but in an open clear ſpot of ground, where the plants are conſtantly hoed down for three or four months, they may be effectually deſtroyed; for when the ſtalks are broken or cut, a milky juice flows out, by which the roots are ſoon exhauſted, and decay; but as every part of the root will grow, this circumſtance renders it a troubleſome weed to deſtroy, where its roots are intermixed with thoſe of other plants. *Miller's Gard. Dict.*

Mr. Liſle, after obſerving that he believes bind-weed propagates itſelf in paſture grounds chiefly by its ſeeds, and by its roots in arable land, becauſe it ſeems to flower too late in corn to ſeed before the corn is cut, thinks the reaſon why it is moſt apt to multiply in clayey ſoils, is becauſe ſuch ground being, in the common practice, ploughed only in winter months, after wheat, for other crops as barley, peaſe, or oats, and not till about September for winter vetches; this tillage cannot deſtroy the roots or ſeeds of weeds like the ſummer fallows for wheat; but, on the contrary, promotes their increaſe, particularly from the off-ſets, or joints of the roots. " I have known, ſays he, in this caſe, clay land folded for barley, and particularly that part of it which, waiting for the folds going over it laſt, was lateſt fallowed, bring up ſuch an increaſe of with-wind, that, though the ſpring and ſummer had been very dry, every ſtem of barley had a with-wind round it. As the fold brought up a crop of this corn, it brought up with each plant its enemy, which would eat it out, pull it down before it could ripen, and threby prevent the filling of the grain. The crop is alſo greatly hazarded here, after it is cut, from the danger it muſt run by laying in ſwarth, till this weed is withered before it can be carted. Again, near the end of the firſt ſummer, after the firſt year of a crop of hop-clover, which I fed, that is about the beginning of Auguſt, I fallowed the ground for wheat, then dunged the fallows, and ſowed the wheat before Michaelmas. I had a very good crop of wheat; but a with-weed came up to every plant; ſo that had it been a wet and cold ſummer, inſtead of a hot and dry one, as it chanced to be, my corn would have been pulled down and lodged while green in the ear, and in the milk, and could not then have filled in body and flour, but muſt have been of the nature of blighted corn. The increaſe of the with-wind here was, without doubt, occaſioned by laying down this ground only to one ſummer ſeed after the hop-clover was ſown, when it had borne three or four crops of ſummer corn after its wheat crop; for by the winter ploughings, as I intimated before, the off-ſets of the roots of weeds, and their ſeeds, were propagated. I could not conveniently deſtroy theſe roots or ſeeds by giving the ground a ſeaſonable ſummer fallow in the beginning of June; becauſe I ſhould then have loſt the fruits of my hop-clover crop, by ploughing it in at the beginning of the firſt ſummer: though this would have contributed much to the killing of the with-wind: whereas, by delaying the fallowing three months longer, viz. to the beginning of Auguſt, when the ſun had loſt its ſtrength to burn up the roots and malt the ſeeds, and it was too late for the ground to lie long to a fallow, the dung laid on the fallows gave new life to the roots and ſeeds. *Liſle's Huſbandry, vol.* II. *pag.* 303.

BINN. *See* BIN.

BIRCH, the name of a tree ſo well known as to need no deſcription. This tree is not much eſteemed for its wood, but however it may be cultivated to advantage upon barren land, where better trees will not thrive; for there is no ground ſo bad, but this tree will thrive in it; for it will grow in moiſt ſpringy land, or in dry gravel or ſand, where there is little ſurface: ſo that upon ground which produced nothing but moſs, theſe trees have ſucceeded ſo well, as to be fit to cut in ten years after planting, when they have been ſold for near ten pounds per acre ſtanding, and the after-produce have been conſiderably increaſed. And as many of the woods near London, which were chiefly ſtocked with theſe trees, have been of late years grubbed up, ſo the value of theſe plantations have advanced in proportion. Therefore thoſe perſons who are poſſeſſed of ſuch poor land, cannot employ it better, than by planting it with theſe trees, eſpecially as the expence of doing it is not great.

The beſt method to cultivate this tree, is to furniſh yourſelf with young plants from the woods, where they naturally grow, and are generally found there in great plenty; but in places where there are no young plants to be procured near, they may be raiſed from ſeeds, which ſhould be carefully gathered in the autumn, as ſoon as the ſcales under which they are lodged begin to open, otherwiſe they will ſoon fall out and be loſt: the ſeeds are ſmall, ſo ſhould not be buried deep in the ground. The autumn is the beſt ſeaſon to ſow them; and in a ſhady ſituation, the plants will thrive better than when they are expoſed to the full ſun; for in all places where there are any large trees, their ſeeds fall, and the plants come up well without care; ſo that if the young plants are not deſtroyed by cattle, there is generally plenty of them, in all the woods where there are any of theſe trees. Theſe wild plants ſhould be carefully taken up, not to injure the roots. The ground where they are to be planted, will require no preparation; all that is neceſſary to be done, is to looſen the ground with a ſpade or mattock, in the places where the plants are to ſtand, making holes to receive their roots, covering them again when the plants are placed, cloſing the earth hard to their roots. If the plants are young, and have not much top, they will require no pruning; but where they have buſhy heads, they ſhould be ſhortened, to prevent their being ſhaken and diſplaced by the wind. When the plants have taken root, they will require no other care, but to cut down the great weeds which would over-hang the plants, being careful not to cut or injure the young trees. This need not to be repeated oftener than twice in a ſummer the two firſt years, after which time the plants will be ſtrong enough to keep down the weeds, or at leaſt be out of danger from them.

Theſe may be planted any time from the middle of October, till the middle of March, when the ground is not frozen; but in dry land the autumn is the beſt ſeaſon, and the ſpring for moiſt. The diſtance which they ſhould be planted, is four feet ſquare, that they may ſoon cover the ground, and by ſtanding cloſe they will draw each other up; for in ſituations where they are much expoſed, if they are not pretty cloſe, they will not thrive ſo well.

If the plants take kindly to the ground, they will be fit to cut in about ten years; and afterwards they may be cut every ſeventh or eighth year, if they are deſigned for the broom-makers only; but where they are intended for hoops, they ſhould not be cut oftener than every twelfth year.

The broom-makers are conſtant cuſtomers for birch, in all places within twenty miles of London, or where it is near water-carriage: in other parts the hoop-benders are the purchaſers; but the larger trees are often bought by the turners, and the wood is uſed for making ox-yokes, and other inſtruments of huſbandry.

In ſome of the northern parts of Europe, the wood of this tree is greatly uſed for making of carriages and wheels, being hard and of long duration. In France it is generally uſed for making wooden ſhoes. It likewiſe makes very good fuel.

In ſome places theſe trees are tapped in the ſpring, and the ſap drawn out to make birch wine, which has been recommended for the ſtone and gravel, as is alſo the ſap unfermented. The bark of the birch-tree is almoſt incorruptible. In Sweden the houſes are covered with it, where it laſts many years. It frequently happens, that the wood is entirely rotten, and the bark perfectly ſound and good. *Miller's Gard. Dict.*

The beſt method of obtaining the ſap of the birch-tree for making wine, &c. is to bore a hole ſlanting upwards with a middle-ſized augre to a moderate depth in the tree, and to faſten a bottle to the orifice, by which means a large quantity of the ſap may be ſpeedily procured. Or many gallons in a day may be gathered from the boughs of the trees by cutting them off, leaving their ends fit to go into the mouths of bottles, and ſo by hanging many bottles on ſeveral boughs, the liquor will diſtill into them very plentifully.

The ſeaſon for this work is from the end of February to the end of March, whilſt the ſap riſes, and before the leaves ſhoot out from the tree; for when the ſap is forward, and the leaves begin to appear, the juice, by a long digeſtion in the branch, grows thick and coloured, which before was thin and limpid. Nor will the ſap diſtil either in the night, or in cold weather while the north and eaſt winds blow; but very well and freely, when the ſouth-weſt winds blow, or the ſun ſhines warm.

The liquor is beſt that proceeds from the branches, having had a longer time in the tree, and thereby better digeſted, and acquiring more of its flavour than if it had been extracted from the trunk. *Mortimer's Huſbandry, vol.* ii. *p.* 406.

In order to have enough of this liquor to ſet about making wine with it, many trees ſhould be tapped at the ſame time, ſo that a ſufficient quantity of ſap may be obtained in a few days; for it will not keep long, without a tendency to putrefaction. To prevent this, ſome authors adviſe ſetting that which is firſt drawn in bottles, or other proper veſſels, in the ſun, till the reſt be ready, and to put into it a hard toaſt of rye-bread cut thin, to make it ferment. But as it is neceſſary to mix with this juice either ſugar or raiſins, in order to give it a body, to enable it to undergo a regular fermentation, which alone can render it fit for keeping, and for want of which it is that this wine is ſo apt to burſt the bottles into which it is put, that firſt fermentation will certainly be found hurtful. When therefore the huſbandman has not a ſufficient number of trees to obtain ſap enough for his purpoſe in two or three days, the moſt adviſable way will be to put the ſap into very ſweet veſſels, and place them in a cool cellar; for it will keep there perfectly ſound, for a much longer time, eſpecially if it be covered with oil, or bunged up cloſe.

The proportion of ſugar may be varied according to the taſte and intention of the brewer: but, in general, a pound of ſugar is thought to be the proper allowance for a gallon of this liquor. The ſap and ſugar muſt be thoroughly united by a heat juſt ſufficient to make them boil; but the long boiling, which is generally adviſed, can anſwer no good purpoſe: on the contrary, it will render the liquor leſs diſpoſed to ferment kindly, and likewiſe deprive it of a conſiderable part of the peculiar fragrance and flavour of the tree from whence it was taken. It ſhould therefore be carefully remembered, that the ſole purpoſe of boiling this liquor is, to make a thorough diſſolution of the ſurgar in it. Some people ſubſtitute honey inſtead of ſugar; in this caſe a quart of honey is eſteemed equal to a pound of ſugar. With regard to various ſpices ordered by different writers, they muſt be left to the taſte and option of the maker.

It is generally found neceſſary in order to ferment this liquor, to put into it a little yeaſt, a bit of dough, or a thin toaſt of leavened bread; after which it is treated in all reſpects like other vinous liquors. See the articles FERMENTATION, and WINE.

It is ſaid, that in the North, where large birch and plane trees are frequent, their ſap is obtained in ſuch plenty as to be uſed for brewing, inſtead of water, and that it makes equally ſtrong beer with much leſs malt. Dr. Tong, in the Philoſophical Tranſactions, N° 46. ſays, that one buſhel of malt brewed with this liquor will make as good ale, as four buſhels with common water. He thinks the ſap of the ſycamore the beſt for brewing; becauſe it is very ſweet, and, at the ſame time, very wholeſome.

BIRD-GRASS, *or* FOWL-MEADOW-GRASS, a very excellent graſs imported from Virginia, by the late Peter Wych, Eſq; and has been cultivated with ſucceſs by Mr. Roque. The Rev. Dr. Elliot of New-England, in his Eſſays on Field-Huſbandry, tells us, that it acquired this odd name from its being brought into a piece of poor meadow at Dedham, by ducks and other wild water-fowl. We have given a figure of this valuable graſs on Plate IV. Fig. 4.

As Mr. Roque is the only perſon that has ſucceſsfully cultivated this ſpecies of graſs, we ſhall give our readers his own account of it, which he ſent in a letter to the Society for the Encouragement of Arts, &c.

“ In the month of March, 1764, I received from the late Peter Wych, Eſq; the chairman of the committee of agriculture in the Society for the Encouragement of Arts, &c. an ounce and a half of the ſeed of a ſpecies of graſs called bird-graſs. He obtained it from Virginia, where it grows, though it is not a native graſs. The intention of putting it into my hands was, in order that I ſhould cultivate it, and be thence able to form a judgment whether it might have any peculiar properties not found in our graſſes, that would render it an advantageous article of culture here. He had, himſelf, conceived a very high opinion of it, by the information he had gained concerning it, from the country whence it came; and intended, as ſoon as he ſhould have due proof from experiment, of what he hoped, to bring it before the Society for the Encouragement of Arts, &c. who had, with public-ſpirited zeal, entered very minutely into the conſideration of the means of improving paſtures. Being very ſolicitous to acquit myſelf of the truſt, I carefully preſerved this little treaſure till the month of April, which I thought might be a fit time to ſow it. Not being acquainted with the particular nature of this graſs, I prepared the ground for it, in the ſame manner I ſhould have done for a flower-bed: raking it with a wooden rake. I did this as I was willing by every means to ſecure its coming up: but ſuch care would not have appeared in the leaſt neceſſary, had I known its great hardineſs, and force of vegetating power, as I have done ſince.

“ At the time I expected the bird-graſs to riſe from my ſeed, I found the weeds and common graſs coming up very thick: ſo that I could not diſtinguiſh the deſired kind from theſe intruders; particularly the poa-graſs. Being a ſtranger, as I before ſaid, to the appearance of the bird-graſs, I thought it the beſt way to weed out the other graſs and herbs which I knew, and to let what I could not diſtinguiſh to be ſo, remain in the ground: and my eagerneſs was ſo great to perceive whether the bird-graſs was come up, that I went almoſt every hour to look after it. I diſcovered it at laſt, in about a month from the time of its being ſown, by its having a deeper green hue than is commonly ſeen in our graſſes: and I tranſplanted it as ſoon as I imagined it would bear moving, into ſome of the ſame kind of ground, as that on which it had been raiſed: having firſt turned it up and cleared it from weeds. The ſize of this piece of ground was about twenty rods: part of it a little gravelly, and the other part of it moory land. I ſoon perceived the bird-graſs grew better on the gravelly than on the moory part of the ground. That on the gravelly being of a better colour and ſweeter than that on the moory; which was pale and yellow. And with reſpect to the moory ground itſelf, one part was moiſter than the other, and the bird-graſs grew better on the drier ſide than on the wet. The graſs, however, looked well all the ſummer, and in the month of September following, I began to gather the ſeed, and proceeded in it till October. The quantity of the ſeed was above twelve pounds.

"The firſt year the graſs did not grow to above two feet and an half high: but the ſecond it roſe to be four feet high. On the 14th of June of that year, being 1765, I meaſured out ten rods of this graſs, and cut it. Three days after I weighed the product of this ten rod, herb and ſeed together; and they amounted to twelve hundred pounds. The tenth of Auguſt following, the ſame graſs was again grown to the height of two feet eight inches, and was a ſecond time fit to cut for hay: but I did not cut it; becauſe I wanted a ſecond crop of ſeed: which I obtained in the beginning of October; and it proved a much greater crop than the former. About this time a good deal of rain fell, which occaſioned me no ſmall ſhare of trouble in drying the graſs, and turning the little cocks. I then firſt remarked that ſhoots were made from almoſt every joint, in conſequence of the moiſture; but from ſome more than others: and of theſe many were of a finger's length. Had I not ſuffered this graſs to ſtand, that I might have the ſeed, I am ſatisfied I could have mowed it thrice in the year; but wanting to collect as great a quantity as I could of the ſeed, I have not yet actually tried that experiment. I am very confident, however, that this kind of graſs may be brought to afford eight tons of hay per acre in the year: and any perſon who may entertain doubts of the reaſonableneſs of this ſuppoſition, may have them cleared up by ocular proof, if they will take the trouble to call on me; as great numbers of gentlemen have already done, to their entire ſatisfaction in this point. The latter end of May, and the beginning of June, will be a proper time for ſuch inſpection; as this graſs, being a forward kind, will be fit to cut at that ſeaſon.

"This graſs has a peculiar quality, different from what is found in any other kind I ever knew before; which is, that it hath very ſhort joints, and that every joint ſends out ſhoots, which ſtrike root whenever they touch the ground. On taking a full-grown plant of the graſs out of the ground, it will be found, moreover, capable of being divided into twenty ſmaller roots or off-ſets, proper to be again planted: and theſe off-ſets, though taken thus from the root, even in the beginning of July, will bear ſeed the ſame year. If, likewiſe, when this graſs is ready to be mowed, there ſhould happen to be much rain, no damage will enſue on waiting a month for fair weather. Becauſe, as this graſs is conſtantly ſending out ſhoots at every joint, it always keeps freſh; and does not wither, nor root at the bottom, as other graſſes do: but, on the contrary, it continues green, even till the ſeed is ripe: which is certainly a very ſingular property, and of great conſequence.

"The goodneſs of this kind of graſs may alſo be very obviouſly inferred from the following particular. When I firſt ſowed it, which was in the month of April, 1764, I had, as I have above declared, only one ounce and a half of ſeed: but betwixt that time and the preſent, I have found ſuch a ſurprizing increaſe, that I have collected from the ſucceſſive crops of this ounce and a half, as much ſeed as has ſown two hundred and fifty acres of land; and have beſides, as much by me at preſent, as will ſow one hundred acres more.

"I ſhall not dwell any longer on the commendation of this graſs, than only to ſay, that it has every quality requiſite to make good hay. That it is eaſily propagated, and from a very ſmall portion of ſeed. That it is not ſubject to rot, or fail in patches, as moſt other kinds of graſs do. That it is a beautiful green at all times, and conſequently affords a moſt pleaſing verdure, when ſown in ſight of any houſe, or made part of any proſpect. And, laſtly, that the produce of hay from it is extremely great, being much more than any other kind of true graſs will yield. Of the truth of all this many perſons can witneſs, who have, on ſeeing the real trials reſpecting it, given the greateſt encomiums on it: I ſhall therefore proceed now to offer ſome directions for its culture.

"The ground on which the ſeed of this kind of graſs is intended to be ſown, is to be prepared in the manner that is proper for lucern: that is, it ſhould be well ploughed and harrowed; and cleared, as much as poſſible, from all weeds, in the ſame way as is done for barley. When the ground is well mellowed and ſweetened, the ſeed may be ſown: the quantity of which may be about one pound and a half per acre; and the time of doing it, from March to April.

"Before the bird-graſs ſeed be ſown, it will be proper to ſow as much barley or oats, as will afford half a crop: and ſuch barley or oats being harrowed in, the pound and half of bird-graſs ſeed ſhould be ſown over it: after which, in general caſes, the ground is only to be rolled the firſt opportunity when it is dry. But if the ſoil be ſandy or dry, it may be proper to give it a very light harrowing.

"This kind of graſs cannot be well ſown without ſome corn. Becauſe it is of ſo fine and delicate a nature, at its firſt coming up, that the weeds would overpower and choak it at that time: or a great expence would be neceſſary for clearing them away by hand. But when this graſs is ſo mature, as to be in the ſtate of a paſture, or fit to cut, it grows ſo cloſe and thick, that if a handful of money was thrown up over it, none would, when fallen, I am certain, reach the ground.

"As to the nature of the ſoil proper for the culture of bird-graſs, almoſt every kind will do very well for it; except, as has been obſerved before, ſuch as is too wet or moory; and this is one of the good properties of this graſs, becauſe few kinds flouriſh much on dry gravelly ground.

"This is a juſt account of the obſervations and experiments I have hitherto made on this valuable graſs; and they ſeem ſufficient to juſtify me, in endeavouring to render it known to the public, as an object worthy their attention."

BIRD'S-NEST, the name of a weed otherwiſe called wild carrot. *See Wild* CARROT.

BISHOP, a little ſpotted beetle, commonly called the lady-cow, or lady-bird.

BISHOPING, a cant term made uſe of by horſe-jockies, implying the unfair practices they make uſe of to conceal the age of an old horſe, or the ill properties of a bad one.

BIT, *or* BITT, the iron part of a bridle, put into a horſe's mouth.

BLACK, a colour in horſes, eſteemed very beautiful, eſpecially when they are of a jet ſhining black, and well marked, without having too much white: for as a great deal of white, eſpecially when it ſpreads round their eyes, and a great way up their legs, adds nothing to their beauty, ſo neither does it add any thing to their goodneſs. The Engliſh black horſes have more white about them than the black horſes of any other country. The Spaniſh, Arabian, Dutch, and Daniſh horſes, ſeldom have much; though a ſtar or blaze, and ſometimes a white muzzle, and one or more of the feet tipped with white, always looks beautiful and lively, and is ſo far from being a diminution of the goodneſs of a horſe, that moſt think it an addition, from an opinion that horſes without marks are generally ſtubborn and ill-conditioned. Some black horſes have brown muzzles, are browniſh on their flanks, and between their hips. Theſe are often called black browns, as they are not a perfect black, but approach near to the colour of a tawny black hound; ſome are of a lighter colour about their muzzles, and are called mealy-mouthed horſes; and of theſe ſort are the pigeon-eyed horſes, which have a white circle round their eye-lids, and their fundaments often white. Thoſe that partake moſt of the brown, are generally the ſtrongeſt in conſtitution. *Gibſon on Horſes, vol.* i. *p.* 46.

BLACK-GRASS, a ſpecies of graſs in America, of which the following account is given by the late Dr. Elliot of New-England.

"We have, ſays that worthy writer, in a letter to Mr. Mills, an excellent ſort of graſs in our ſalt marſhes. It thrives beſt, and grows largeſt, in thoſe meadows which border on tide-rivers, and have the greateſt mixture of freſh-water. Where the water is very ſalt it is not apt to fix and ſpread; but will remain ſhort and poor. It is very tender, and cuts as eaſily as garden cives, grows thicker and taller than the common ſalt-marſh graſs, and affords from two to three tons of hay to the acre: but it is a ſlow grower, after it has been cut. Its ſeeds are ſmall, like thoſe of tobacco. The colour of this graſs is a very deep green, which renders it ſo conſpicuouſly different from every other kind, that it is univerſally known by the name of black graſs.

“ This ſpecies introduced itſelf long ſince the ſettlement of New England. Our firſt planters knew nothing of it; nor has it yet travelled very far ſouth-weſt. Its firſt appearance in this colony was on a marſh at Saybrook, to which an old boat was brought down Connecticut river, by a great flood, and there caſt up. This inclined me to think, that it was originally an inland graſs, which happened to ſuit with ſuch ſalt marſhes as are well ſupplied with freſh water; and what confirms me in this opinion is, that a perſon in the town of Killingworth, where I reſide, having cleared a ſwamp far diſtant from ſalt water, and afterwards ſent into this freſh meadow, cattle, which had been foddered with hay of the black graſs, had there in a ſhort time (undoubtedly by means of its ſeeds carried thither in the dung of theſe cattle) a fine growth of this very graſs, which has ſince not only eſtabliſhed itſelf, ſpread, extended, and, like a conqueror, beaten out the natural graſs; but looks as flouriſhing in that freſh meadow, as any growing on a ſalt marſh.

“ I have a large tract of peat meadow, in which no graſs ſeeds will grow. I deſign to try the ſeeds of this black graſs in that dead freſh meadow, ſince the other ſorts which I have tried do not ſucceed. What encourages me to do this, is my having introduced it into a once uſeleſs, worthleſs moraſs, worſe indeed than nothing, though of conſiderable extent, for I was obliged to be at the expence of fencing it, for the ſake of other land. It was quite over-run with reeds, buſhes, and brakes.

“ Between this land of mine and a creek of ſalt water, intervened three meadow lots belonging to other perſons. I obtained leave of the owners to cut a ditch ſix feet wide through their ground, and carried this ditch to the upper end of my land, where ſeveral croſs ditches were then dug, to invite in, and retain the ſalt water. The gaping mouths of theſe numerous ditches ſoon occaſioned a ſtrong indraught of ſalt water, and, in time, converted the main ditch into a proper tide creek. The ſalt water thus introduced has done wonders. It has not only killed the trees, buſhes, brakes, and levelled great inequalities, but has alſo introduced the black graſs, and thereby rendered an acre of that land, which was not worth any thing before, now worth thirty-five pounds of our currency.

“ The ſalt water in its paſſage through my neighbours grounds has alſo done them great ſervice, by introducing this black graſs; and all this with ſmall expence.” *Mills's Huſbandry, vol.* III. *pag.* 416.

To this account of the black graſs given by doctor Elliot, we ſhall add the following, tranſmitted in a letter from that gentleman's ſon-in-law, the reverend doctor Gale.

“ Its (the black graſs) early ſpring and growth, its lively green, its great produce, the preference given to it by cattle, when diſtributed promiſcuouſly with ſalt graſs for their food; its rendering the turf of mirey, looſe, dirty meadows, firm and ſolid, and its extraordinary quality when improved for paſture in the ſpring and ſummer, raiſed its reputation, and endeavours were uſed to propagate it: but it proved very ſullen and uncertain in its growth; growing only where it liſted, from the ſeed promiſcuouſly ſhed, and wafted about by the tide which overflowed the meadows.

“ It is obſerved to grow and flouriſh well near the banks of rivers, which admit the ſalt water, and even in flat or low meadows, which are in ſome meaſure overflowed every tide by the ſalt water: but theſe low meadows muſt alſo be of that kind only, where there is a courſe of freſh water when the tide is out: ſo that a mixture of both freſh and ſalt water ſeems to be neceſſary for its prolific vegetation.

“ It grows largeſt and beſt in reedy and ruſhy coves, or arms of the ſalt meadows, which are a little higher than the general level of the ſalt marſh, which are not commonly overflowed by the flux and reflux of the tides, which lie at ſome diſtance from ſalt creeks or courſes of ſalt water, and which are watered by freſh ſprings riſing from the banks, or adjoining uplands.

“ I have ſeen ſeveral ſuch meadows which flouriſh remarkably with this ſort of graſs, though but lately brought under culture: I am credibly informed, that eight acres of ſuch a cove produced this year thirty-two tons of black graſs in an adjoining townſhip.

“ The black graſs is not near ſo much impregnated with ſalt as the common graſs is, when both of them grow together; and the dew which adheres to the black graſs is freſh, when that on ſalt graſs is highly impregnated with ſalt.

“ It thrives beſt on a clay or ſtrong loam. The natural turf ſhould be broken, and the ſeed, after being mixed with freſh cow-dung, ſhould be ſpread, and faſtened in by treading, that it may not be carried off by the water: or it may be propagated by tranſplanting the turf taken from a black graſs meadow, by which means it will be made to ſpread a pace.

“ It will alſo grow where ſalt water never reaches. I have ſeen it growing on moiſt upland, and the turf has been ſo firm, that it was hard work for ſix oxen to plough through it.”

We ſhall only add, that the above gentleman has juſt ſent the Society for the Encouragements of Arts, &c. a conſiderable quantity of the ſeed of this black graſs; and that they have diſtributed it to a number of gentlemen, in order to their ſowing it on proper ſoils; ſo that there is great reaſon to hope that this valuable graſs will ſoon be as well known in England, as it is now in America.

BLACK-LAND, a name given to a particular ſort of clayey ſoil, which is rather a grey than a true black. But however pale it may be when dry, it always blackens by means of rain; and when ploughed up at thoſe ſeaſons, it ſticks to the plough ſhare; and the more it is wrought, the muddier and duſkier coloured it appears.

Theſe ſorts of lands when ſomewhat fat, yet porous, light, and ſufficiently tenacious, are good both for corn and graſs; but as they are moſtly in bottoms, ſo the wetneſs of them often ſpoil them for corn; but where they are dry, they are extraordinary fruitful, eſpecially for barley; they will bear alſo good wheat upon an erch crop: but if they are ſo very rich, that you fear lodging of the corn, you may, if a deep mould, plant them with liquorice, or ſow them with hemp, woad, cole, rape-ſeed, madder, or ſome other rich commodity, that beſt agrees with ſuch land; and afterwards with corn, when ſome of the fertility is abated. The natural produce of theſe lands is commonly thiſtles, docks, and all ſorts of rank weeds and graſs. It will bear excellent clover. The beſt manure is chalk, lime, dung, &c. *Mortimer's Huſbandry, vol.* I. *pag.* 75.

BLACK-LEGS, a name given in Leiceſterſhire to a diſeaſe frequent among the calves and ſheep. In Staffordſhire they call it the wood-evil.

It is a white jelly, and ſometimes a bloody jelly, ſettling in their legs, from whence it has its name of black-legs, and often in the neck between the ſkin and fleſh, which will make them carry their necks awry. If it falls on the joints they overcome it; but of in their bowels they die, nor is there any cure. *Liſle's Huſbandry, vol.* II. *pag.* 134.

BLACK OATS, a ſpecies of oats greatly cultivated in the northern parts of England, being eſteemed a very hearty food for horſes. *See the article* OATS.

BLACK THORN, a ſpecies of buſhes well known, and much uſed in making fences, &c.

It is not reckoned quite ſo good for fences as the white thorn, becauſe it is apt to run more into the ground, and is not ſo certain of growing; but then the buſhes are much the beſt, and moſt laſting of any for dead hedges, or to mend gaps: nor are cattle ſo apt to crop them as the other. They will grow on the ſame ſort of ſoil with the white thorn; but the richer the mould is, the more they will proſper. *Mortimer's Huſbandry, vol.* I. *pag.* 5.

BLADE, the ſpire of graſs, or green ſhoots of corn.

BLADE, alſo ſignifies the ſharp or ſtriking part of a weapon or inſtrument.

BLAIN, a diſeaſe to which cattle are ſubject in the ſpring of the year. Some think it is occaſioned by a little red worm which the cattle lick up. It often occaſions a bladder as large as a hen's egg under the tongue, and when this happens, the beaſt may be cured by breaking the bladder, and rubbing it with ſalt.

Others impute the diſeaſe to a ſudden riſing of the blood, and may be known by the beaſt's eyes running with water; and as the diſtemper advances, its eyes will ſwell, and, if bled under the rump, the blood will feel hot. In this caſe the following drench is recommended. Take a pennyworth of Engliſh liquorice, and an equal quantity of Engliſh anniſeeds, turmeric, long pepper, horſe-ſpice or diapente, all ground fine, and juſt boiled up in a quart of ſtrong beer; but if the heat of the blood indicates that the diſtemper proceeds from a hot cauſe, the horſe-ſpice ſhould be omitted. It is added, that if the bladder cannot be found under the tongue, the bum-gut ſhould be raked, where it will be found in the back. If a knife be run through the ear of a beaſt near the root, it will, according to the report of experienced graziers, prove a certain cure in this diſtemper, provided it be done before the beaſt falls. *Liſle's Huſbandry*, *vol.* II. *pag.* 127.

BLANCHING, an operation performed on certain ſallets, roots, &c. ſuch as cellery and endives, to render them fairer and fitter for the table.

One method of blanching conſiſts in tying the leaves up cloſe; this is practiſed on cabbages, lettuces, &c. in the ſummer, which makes them fit for uſe conſiderably ſooner, and particularly thoſe which are not inclinable to turn in, or cabbage, as the gardeners call it. Another method practiſed in winter on celery, endive, dandelion, &c. is by earthing them up to their tops, which not only blanches, but alſo protects them from the froſts.

BLAST, the ſame with blight. *See* Blight.

BLAZE, a white mark in a horſe's face.

BLEA, that part of a tree which lies immediately under the bark, or between that and the hard wood, and is the firſt progreſs of the alteration of the bark into wood, by the natural growth, and ſtrengthening of the fibres.

While the blea remains any thing ſoft, and retains ſomewhat of the nature of bark, it may maintain a feeble vegetation; but when it is grown abſolutely hard and woody, it can no longer contribute to carry on that operation.

BLEEDING, an operation frequently neceſſary among all kinds of cattle, particularly horſes; and conſiſts in opening a vein by means of an inſtrument called a fleam.

Thoſe horſes that ſtand much in the ſtable, and are full fed, require bleeding more than thoſe that are in conſtant exerciſe; but eſpecially when their eyes look heavy and dull, red and inflamed; or when they look yellow or inflamed in their lips, and inſides of their mouths; when they ſeem hotter than uſual, and mangle their hay. Theſe are all indications that require bleeding, and likewiſe to lower their diet till they have more exerciſe.

Young horſes ſhould be bled when they are ſhedding their teeth, which is a relief to them, and removes thoſe feveriſh heats, to which they are ſubject at that time.

The ſpring is always a proper ſeaſon for bleeding, becauſe their blood is then more luxuriant than at other times; and in ſummer it is often neceſſary to prevent fevers, always chooſing the cool of the morning, and keeping them cool the remaining part of the day.

Some bleed their horſes three or four times a year, or even oftener, by way of prevention. Theſe take a very ſmall quantity at a time, not exceeding a pint, or a pint and a half, only to give a kind of briſker motion to the blood, and by that means to preſerve or render it more thin and fluid, and to prevent its ſtagnating in the ſmaller veſſels, which indeed is the firſt beginning of almoſt all diſeaſes; but how far this ſucceeds, can only be known to thoſe who have practiſed it a ſufficient time. There is, however, this inconvenience from frequent bleeding, that it grows into a habit, which, in ſome caſes, cannot be eaſily broken off without hazard; and ſome horſes have been known to become weak from frequent bleeding, while others have had their necks ſo full of ſcars, that they are apt to inflame and feſter every time they are bled, which is always troubleſome, and often ends with the loſs of the vein. And therefore to prevent ſuch accidents, thoſe who bleed horſes ſhould not confine their operation to one place of the vein, as they generally do, but uſe themſelves to open it higher or lower as they ſee occaſion; and if they meet with any difficulty in bleeding in the neck veins, the plate veins, or any other large veins, that can be made to run a full ſtream, will equally anſwer the ſame end.

But the caſes that require bleeding moſt, are colds, fevers of almoſt all kinds, falls, and bruiſes, which are ſometimes dangerous to horſes, becauſe of their great weight. Hurts and wounds of the eyes, ſtrains in hard riding, or drawing, and all other accidents where a ſtagnation of the blood may be ſuddenly expected, or where the ſmall veſſels may be broke, and the blood extravaſated. Thoſe horſes that refuſe their food after riding, or any ſort of work, require to be bled more frequently than others, to prevent fevers, and inward inflammations of the lungs, the liver, or any of the principal viſcera. Nor is it leſs neceſſary to bleed horſes at graſs, when the purgation is over, and they begin to gather fleſh, or at any other time, when they look heavy about their eyes, for that is a proper indication for bleeding; and ſome rank paſtures require more bleeding than others.

There are alſo other indications that require bleeding by way of prevention, viz. when any epidemic diſtemper prevails among the horſes; at ſuch times the ſound ones may be bled, to keep them, if poſſible, from being infected; and if the contagion continues, it may not be amiſs to repeat the bleeding once in two or three months, or oftener; but in ſmall quantities, for the loſs of too much blood may be hurtful in ſome times of contagion. It is likewiſe neceſſary to keep ſound horſes from the unſound, or to remove them into places where the infection has never ſpread itſelf. *Gibſon on the Diſeaſes of Horſes*, *vol.* I. *pag.* 218.

BLEYME, an inflammation in an horſe's foot, occaſioned by blood putrified in the inner part of the coffin towards the heel, between the ſole and the coffin-bone.

There are three ſorts of bleymes; the firſt, bred in ſpoiled, wrinkled feet with narrow heels, are uſually ſeated in the inward or weakeſt quarter: the ſecond, beſides the uſual ſymptoms of the firſt, infects the griſtle, and muſt be extirpated, as in the cure of a quitter-bone. *See* Quitter-Bone. The third is occaſioned by ſmall ſtones, or gravel, between the ſhoe and the ſole. For the cure they pare the foot, let out the matter, if any, and dreſs the ſore like the prick of a nail.

BLIGHT, a general name for various diſtempers incident both to corn and fruit-trees.

M. du Hamel treats that part of this ſubject which relates to corn in a very maſterly and inſtructive manner; dividing what we generally call blights into the following ſpecies, viz. empty ears, parched and ſhrivelled corn, glazed corn, abortive or rickety corn, barren corn, and fallen or lodged corn. The reader will find each under its proper articles, as Empty Ears, &c.

" There is nothing, ſays Mr. Miller, ſo deſtructive to a fruit-garden as blights; nor is there any thing in the buſineſs of gardening which requires more of our ſerious attention, than the endeavouring to prevent or guard againſt this great enemy of gardens.

" In order, therefore, to remedy this evil, it will be neceſſary firſt to underſtand the true cauſes of blights: and, although many curious perſons have attempted to explain the cauſes of them, yet very few of them have yet come near the truth, except the reverend and learned doctor Hales, who hath, in his curious book, intitled, Vegetable Statics, given us ſome accurate experiments upon the growth and perſpiration of plants; together with the various effects the air has upon vegetables; ſo that, by carefully attending thereto, together with diligent obſervations, we need ſeldom be at a loſs how to account for the cauſes of blights, whenever they may happen.

" Blights are often cauſed by a continued eaſterly wind, for ſeveral days together, without the intervention of ſhowers, or any morning dew, by which the perſpiration of the tender bloſſoms is ſtopped; ſo that, in a ſhort time, their colour is changed, and they wither and decay: and if it ſo happens, that there is a long continuance of the ſame weather, it equally affects the tender leaves; for their perſpiring matter is hereby thickened, and rendered glutinous, cloſely adhering to the ſurfaces of the leaves, and becomes a proper nutriment to thoſe ſmall inſects, which are always found preying upon the leaves and tender branches of fruit-trees, whenever this blight happens.

“ The beſt remedy for this diſtemper, that I have yet known to ſucceed is gently to waſh and ſprinkle over the trees, from time to time, with common water (that is, ſuch as hath not had any thing ſteeped in it) and the ſooner this is performed (whenever we apprehend danger) the better; and, if the young and tender ſhoots ſeem to be much infected, waſh them with a woollen cloth, ſo as to clear them, if poſſible, from all this glutinous matter, that their reſpiration and perſpiration may not be obſtructed; and if we place ſome broad flat pans or tubs of water near the trees, that the vapours exhaled from it may be received by the trees, it will keep their tender parts in a ductile ſtate, and greatly help them; but, whenever this operation of waſhing the trees is performed, it ſhould be early in the day, that the moiſture may be exhaled before the cold of the night comes on; eſpecially if the nights are froſty: nor ſhould it be done when the ſun ſhines very hot upon the wall, which would be ſubject to ſcorch up the tender bloſſoms.

“ Another cauſe of blights in the ſpring is, ſharp hoary froſts, which are often ſucceeded by hot ſunſhine in the day-time; which is the moſt ſudden and certain deſtroyer of fruits that is known: for the cold of the night ſtarves the tender parts of the bloſſoms, and the ſun riſing ſun hot upon the walls before the moiſture is dried from the bloſſoms (which, being in ſmall globules, collects the rays of the ſun) a ſcalding heat is thereby acquired, which ſcorches the tender flowers, and other parts of plants.

“ But there is another ſort of blight, againſt which it is very difficult to guard our fruit-trees; this is ſharp pinching froſty mornings, which often happen at the time when the trees are in flower, or while the fruit is very young, and occaſion the bloſſoms or fruit to drop off; and, ſometimes, the tender parts of the ſhoots and leaves are greatly injured thereby.

“ The only method yet found out to prevent this miſchief is by carefully covering the walls, either with mats, canvas, reeds, &c. which being faſtened ſo as not to be diſturbed with the wind, and ſuffered to remain on during the night, by taking them off every day, if the weather permits, is the beſt and ſureſt method that hath yet been uſed in this caſe; which, although it has been ſlighted, and thought of little ſervice by ſome, yet the reaſon of their being not ſo ſerviceable, as has been expected, was, becauſe they have not been rightly uſed, by ſuffering the trees to remain too long covered; by which means, the younger branches and leaves have been rendered too weak to endure the open air, when they are expoſed to it; which has often proved of worſe conſequence to trees, than if they had remained entirely uncovered.

“ Whereas, when the covering before-mentioned has been performed, as it ought to be, it has proved very ſerviceable to fruits; and many times, when there has been almoſt a general deſtruction of fruits, in the neighbouring gardens, there has been a plenty of them in ſuch places where they have been covered; and, though it may to ſome ſeem very great trouble, yet, if theſe coverings are fixed near the upper part of the wall, and are faſtened to pullies, ſo as to be drawn up, or let down, it will be ſoon and eaſily done; and the ſucceſs will ſufficiently pay the trouble.

But there is another ſort of blight, that ſometimes comes later in the ſpring, viz. in April or May, which is often very deſtructive to orchards, and open plantations, and againſt which we know no remedy. This is what is called a fire-blaſt, which, in a few hours, hath not only deſtroyed the fruit and leaves, but many times parts of trees, and, ſometimes, whole ones have been killed by it.

“ This is ſuppoſed to effected by volumes of tranſparent flying vapours, which, among many forms they revolve into, may ſometimes approach ſo near to a hemiſphere, or hemi-cylinder, either in their upper or lower ſurfaces, as thereby to make the beams of the ſun converge enough to ſcorch the plants or trees they fall upon, in proportion to the greater or leſs convergency of the ſun's rays.

“ The learned Boerhaave, in his Theory of Chemiſtry, obſerves, that thoſe white clouds, which appear in ſummer time, are, as it were, ſo many mirrors, and occaſion exceſſive heat; theſe mirrors are ſometimes round, ſometimes concave, polygonous, &c. and therefore when the face of the heavens is covered with ſuch white clouds, the ſun, ſhining among them, muſt of neceſſity produce a vehemen heat; ſince many of his rays, which would otherwiſe, perhaps, never touch our earth, are by that means reflected to us: thus, if the ſun be on one ſide, and the clouds on the oppoſite, they will be perfectly burning glaſſes.

“ I have ſometimes, continues he, obſerved a kind of hollow clouds, full of hail and ſnow in this poſition; during the continuance of which, the heat was extreme; ſince by ſuch condenſation they were enabled to reflect more ſtrongly: after this came a ſharp cold, and then the clouds diſcharged their hail in great quantities; to which ſucceeded a moderate warmth. Frozen concave clouds therefore, by this great reflection, produce a vigorous heat; and the ſame, when reſolved, exceſſive cold. Whence, as doctor Hales obſerves, we ſee, that blaſts may be occaſioned by the reflections of the clouds, as well as by the above-mentioned refraction of denſe tranſparent vapours.

“ Againſt this enemy to fruits, &c. as has been already obſerved, there is no guard to our plantations, nor any remedy to cure it: but as this more frequently happens in cloſe plantations (where the ſtagnating vapours from the earth, and the plentiful perſpiration from the trees, are pent in for want of a free air to diſſipate and diſpel them; which are often obſerved, in ſtill weather, to aſcend in ſo plentiful a manner, as to be ſeen by the naked eye; but eſpecially with a reflecting teleſcope, ſo as to make a clear and diſtinct object become dim and tremulous) than in thoſe which are planted at a greater diſtance, or are not ſurrounded with hills or woods; this directs us in the firſt planting of orchards, &c. that we ſhould allow a greater diſtance between the trees; and make choice of clear healthy ſituations, that the air may freely paſs between the trees, to diſſipate thoſe vapours before they are formed into ſuch volumes, whereby the circumambient air will be clear, and leſs ſubject to injuries: as alſo the fruits, which are produced in this clearer air, will be much better taſted than thoſe that are ſurrounded with a thick rancid air; for, as fruits are often in a reſpiring ſtate, ſo they, conſequently, by imbibing a part of theſe vapours, are rendered crude, and ill taſted; which is often the caſe with a great part of our fruits in England. *Miller's Gard. Dict.*

BLIND, deprived of the ſenſe of ſight.

Moon-BLIND, or *lunatic*, a diſeaſe to which horſes are ſubject, the ſymptoms of which are no other than the forerunners of cataracts, and generally end in blindneſs.

Signior Ruini, ſays that experienced writer Mr. Gibſon, and moſt other foreign writers, both French and Italia, in treating the diſeaſes of horſes, have all of them reckoned the moon-blind ſymptoms as a peculiar diſeaſe of the eyes, without having any relation to a cataract, which they have conſidered a-part, as another diſeaſe of the eyes, which ſhews they built more on books than experience. But from many years obſervation, I do not remember I have ever ſeen a cataract bred in the eyes of any other horſes than thoſe which were called lunatic, or moon-blind. The Arabians were the firſt that aſcribed ſo much to the moon in the diſeaſes of the human body; and after the decay of learning all over Europe, their ſuperſtitious notions were ſo firmly riveted, and ſo univerſally prevailed, that they could not be eaſily exploded, even by the ableſt phyſicians, till the modern diſcoveries in natural knowledge

ledge made way for more ſolid improvements in the medicinal art; and therefore it is no wonder, that the firſt writers on the ſubject of farriery, notwithſtanding ſome of them were men of learning, ſhould fall in with all the common ſuperſtitions that had ſo long prevailed, and had ſo great an influence on the practice of phyſic.

Theſe writers have deſcribed this diſtemper as appearing at certain times of the moon, coming ſometimes at the new-moon; ſometimes at the full; and ſometimes in the wane of the moon; that it ſometimes returns once in three months; ſometimes once in two months, and in ſome not above once in ſix months: that the eyes look ſo clear when the diſtemper abates, that it is impoſſible to ſee any imperfection in them. But theſe obſervations are very liable to exception; for any one who has the leaſt knowledge of the eyes, muſt needs ſee, that when the diſtemper is the moſt abated, and the eye the moſt clear, it ſtill ſhews a remarkable weakneſs, and upon full trial, the ſight will be found defective. Neither could I perceive that the eyes were affected by any of the moon's periods, ſo as not to vary, unleſs by mere accident. And therefore theſe obſervations are neither of any great uſe to the knowledge of the diſtemper, nor to lead us into a right method of curing it when it happens.

I have already taken notice, that the ſymptoms which appear in the moon-blind horſes, are, for the moſt part, no other than the prognoſtics of breeding cataracts. Theſe ſymptoms generally make their firſt appearance, when a horſe is turned five, coming ſix, at which time one eye becomes clouded, the eye-lids ſwoln, and very often ſhut up; and, for the moſt part, a thin viſcid water runs, from the diſeaſed eye, down the cheek, which is generally more or leſs in proportion, as the eye and eye-lids happen to be more or leſs ſwelled and inflamed; and in ſome conſtitutions, the inflammation is ſo great, and the humour ſo ſharp and corroſive, that it ſcalds and fetches off the hair wherever it comes. The veins of the temples and under the eye, along the ſide of the noſe, are alſo turgid and full: others run but little; nor is the humour very ſharp.

This diſorder is apt to come and go, till the cataracts are perfect and ripe, and then all pain and anguiſh, and the ſoreneſs and running of the eyes, go off with blindneſs, when the horſe is between ſeven and eight years old, this being about the time when moſt horſes are ſpread and come to their full growth; ſo that from its firſt appearance to its completion, is generally about two years, or two years and a half, during which time, ſome horſes have the returns of the diſorder, not only more frequently than others, but the ſymptoms alſo are more ſtrong and violent. In ſome the eye is not much diſturbed above a week, when it clears up again, and returns to its former ſtate. In ſome horſes the eye continues bad a fortnight or three weeks. In others a month or longer, before the diſorder goes off; and the time of the return, ſo far as I could obſerve in many horſes, was always uncertain, and could not be fixed to any period of the moon, as many have imagined, being ſometimes ſooner, ſometimes later, according to its predominancy, or according to the treatment a horſe meets with from his farrier and keeper. Some have their returns once within the ſpace of two or three months; ſome within the ſpace of four; and, with the greateſt care and pains, the diſorder ſeldom keeps off above five months, without a relapſe.

This is uſually the caſe of thoſe moon-blind horſes, which have their eyes ſtrongly infected with a hot ſharp humour, that ſhuts them up with ſwelling and inflammation. But there is another kind of moon-blindneſs, which is alſo the fore-runners of cataracts, where no humour or weeping attends the eye. It is never ſhut up or cloſed, as in the caſe above deſcribed, but will now and then look thick and troubled, at which time the horſe ſees little, and, perhaps, nothing diſtinctly: Here the eyes always appear ſunk and periſhing, though the cataracts do not become ſo ſoon complete, as in thoſe that are full, and where a humour is predominant; nor is it unuſual in this caſe for one eye to eſcape, whereby a horſe will retain ſight to guide him, ſo as to render him fit for common drudgery.

The cauſes of this diſtemper are various, and when it proceeds from a natural defect in the eyes, it may no doubt be hereditary; but in a horſe that has naturally good eyes, and yet turns moon-blind, it is uſually owing to ſickneſs, or ſome other malady that has terminated in the eyes; though we ſeldom ſee horſes turn moon-blind and breed cataracts, but where the eyes are naturally in fault. Theſe eyes are, for the moſt part, faulty, that are very large and prominent, or very flat, ſmall, and ſunk; both which defects in the eyes of horſes are liable to blindneſs, though they differ in their manner; and therefore colts, that have large eyes, that run abroad, always feed with their heads downwards, and are continually expoſed to the ſun in hot weather, may eaſily contract an habitual weakneſs in their eyes, eſpecially as the blood and juices of all young animals are naturally of a viſcid and balſamic texture, and thence may be the more eaſily retarded in the veſſels of the eye, which are exquiſitely fine. Theſe cauſes produce weakneſs and relaxation in the eyes, and this ſtill increaſes till the blood is in that ſtate, which we may reaſonably ſuppoſe to continue till a horſe has done ſpreading, and turned ſeven, for then the cataracts generally grow complete. On the other hand, when the eyes are flat, and lie deep within their orbits, the ſurface of the eye being alſo flattiſh, the rays of light falling directly upon the pupil, and theſe not being ſufficiently refracted, as they are in thoſe eyes that are more convex, or of a rounder make, muſt needs weaken the eye, affect the optic-nerve, and conſequently weaken the tone of the muſcles. And, perhaps, this may be the reaſon why the eyes periſh and decay, while the cataracts are growing.

The ſigns of this diſtemper may, in ſome meaſure, be deduced from what has been already obſerved; viz. ſwelling and inflammation of the eyes alternately, ſometimes one eye, and ſometimes the other, with a running of a thin watery ſerum, which is often ſo hot and ſcalding, as to fret off the hair. In others the eyes run but little, and ſome not at all; but look deadiſh, ſunk, and periſhing. In all moon-blind horſes, the eyes are ſometimes tolerably clear, at other times thick and muddy, of a wheyiſh colour, or a duſky yellow; and when this happens, a moon-blind horſe ſees but little, and when he is brought out into the light, he takes little notice of any perſon or object that is near him, but always looks upwards, with his head raiſed, lifts his feet high, and ſets them down with fear. Though in this diſtemper the humour ſhifts from one eye to the other by turns, and at ſome intervals ſeems to go off, yet when the eyes of ſuch horſes are at their beſt, they look weak, and with a deadneſs, and when any ſuch horſe has his head held up, the weakneſs of the muſcles, and of the whole eye, is eaſily perceived.

When this diſtemper happen to horſes that have large full eyes, reſembling thoſe of a calf, and when the humour continues by long periods, and the returns are frequent, there is great danger of blindneſs. If the eyes be of a moderate ſize, well formed, and the periods or returns of the diſtemper ſhort; if the horſe ſees perfectly when the humour goes off, and the eyes in thoſe intervals look clear, the horſe may recover. When the humour attacks one eye without changing to the other, there is alſo hopes of a cure, at leaſt, of ſaving one eye. But when the eyes look flat and depreſſed, and decay gradually, it is generally the fore-runner of blindneſs; for in this caſe the nerves and muſcles of the eyes are affected, and the cataracts always grow in the progreſs of the diſtemper. Here, however, as in the preceding caſe, when the diſtemper ſeizes only one eye, the other may be ſometimes ſaved, and when this happens, the remaining eye generally grows ſtronger when its fellow is gone. But when the diſtemper proceeds from a violent cold, as ſometimes happens, whereby we often ſee the eyes ſwoln, and quite ſhut up, though the horſe may be threatened with blindneſs by ſeveral returns, yet by good management it may ſometimes be prevented, and the eyes recover. Nor does the diſtemper always prove incurable, when the eyes are darkened with a yellow cloud, provided the eye be not naturally bad, and the above ſymptom of long continuance. In all caſes of moon-blindneſs, the moſt promiſing ſigns of a recovery are when the attacks come more ſeldom, and their continuance grows ſhorter: or when the inflammation and ſwelling in thoſe eyes that are naturally full and large abates. Alſo, when the eyes, that looked ſunk and periſhing, grow more plump and full;

and when in either the cornea looks clear and tranſparent, without muddineſs, and the horſe looks more attentive to his way, and goes on without much fear or ſtartling; all theſe are promiſing ſigns, and with good and careful management he may recover.

The moſt difficult part ſtill remains to be treated of, namely, the method of curing this diſorder, for few moon-blind horſes eſcape; and when it is hereditary, or the eyes naturally defective, it is not adviſable for any one to be at much expence and trouble to ſave them, as there is great reaſon to fear he will meet with a diſappointment. We, however, ſometimes ſee moon-blind horſes, at leaſt ſuch as have many of the ſame ſymptoms, recover and do well, even beyond expectation.

If the eyes are large, full, ſwoln, and inflamed, the horſe ſhould be bled at proper intervals; ſometimes in the neck, and ſometimes backward, to make a revulſion. But where the eyes appear ſunk or periſhing, bleeding is often pernicious. After bleeding, for thoſe that are full and run a thin ſharp water, make a ſtrong tincture of roſes in the following manner:

> Take two drams of red roſe-buds, either freſh or dried, infuſe them in half a pint of boiling water in the manner of making tea; when it has ſtood to be cold, pour off the infuſion, which will be of a reddiſh colour.

In four ounces of this tincture diſſolve half a dram of ſugar of lead, and waſh the horſe's eyes, and all over his eye-lids, with a piece of ſponge, or a clean bit of rag, twice a day. If the matter digeſt and thicken, which uſually happens before it abates, add to the whole quantity of this tincture about two drams of honey (which will diſſolve in the fluid, by holding the phial near the fire, and ſhaking it) and uſe it as before. At the ſame time, if the parts near the eye be hot, and the veins over the face, and along the ſide of the noſe be turged and full, bathe thoſe parts frequently with the beſt vinegar, verjuice, or vinegar of roſes, till the heat and running of the eye abates, the veins ſink, and become leſs apparent, and the eye begins to look clear. In the mean time ſome lenient mild purges may be adminiſtered, ſuch as the following:

> Take lenitive electuary and cream of tartar, of each four ounces; ſyrup of the juice of buckthorn berries, two ounces; mix theſe with white wine and water, warmed, about a pint, and give it faſting. Or,
>
> Take lenitive electuary and cream of tartar, of each four ounces; Glauber's purging ſalts, three ounces; the ſolutive ſyrup of roſes, two ounces; to be mixed with white wine and water, or warm water-gruel.

Either of theſe may be given to moon-blind horſes. The latter is rather the more mild and cooling, and exceeding proper if the horſe be fat and full of blood, and will work ſo gently, that it may be repeated twice a week, till the eye becomes clear, and attains its uſual brightneſs.

The horſe ſhould have feeds of ſcalded bran while theſe lenitives are given him, and he may have moderate exercife, or may be made uſe of in any kind of eaſy buſineſs; for theſe draughts, for the moſt part, work off in about two hours. But as the blood in all theſe caſes is generally ſizy, and as this diſpoſes young horſes to frequent returns of the diſtemper, it is, therefore, neceſſary to adminiſter ſuch things as may attenuate the juices and preſerve them in a more fluid ſtate. Theſe are called alteratives, becauſe their property is gradually to alter the ſtate of the blood. The following has been often uſed, in this and many other caſes, with great ſucceſs:

> Take the fineſt ſuccotrine aloes, half an ounce, or ſix drams; cream of tartar, half an ounce; freſh jallap, in fine powder, and ſalt of tartar, of each one dram; make the whole into a ball, with a ſufficient quantity of oil of amber, and roll it in liquorice powder.

One of theſe balls may be given every week, in the manner of a common purge, with ſcalded bran, and his water milk warm. The firſt day it will work plentifully by urine, and the day following both ways; but no more than juſt to empty his guts, unleſs when there is a foulneſs, by reaſon of a redundant ſlime and greaſe; when it will often work very powerfully two or three days, without the leaſt diminution of the horſe's ſtrength, or loſs of fleſh. Theſe alterative purges ſhould be continued for a month or ſix weeks, and after omitting another month to begin again; in all which time the horſe may be kept in any common buſineſs, except hunting, going journies, or any other laborious exerciſe.

In the intervals between the purges it will be proper to give him an ounce of crude antimony every day, made into a fine impalpable powder, in one of his feeds, which may be continued for three months or longer. But if the horſe be of value, inſtead of crude antimony, he may have powders compounded of native cinnabar, or cinnabar of antimony, and gum guiacum, equal parts, giving him an ounce every day, till he has taken two or three pounds; and after an interval of about three months, to proceed in the ſame method till the eyes look ſtrong and clear, and the horſe ſhews no ſigns of blindneſs, or any defect in his ſight or weakneſs in his eyes. Several gentlemen have followed this method with good ſucceſs, where the eyes have been full, and no way periſhed. A pound of guiacum wood boiled in three gallons of water till it is reduced to two, is a cheap remedy, and may be profitably adminiſtered to horſes of ſmall value. It promotes perſpiration, dries up ſuperfluous humidity, ſtrengthens the ſolids when relaxed, and ſweetens the blood. It may be given a quart or two every day, in a horſe's water, and will have a good effect to prevent moon-blindneſs, where it is not hereditary, nor proceeds from a natural defect in the eye.

But when the eyes are ſunk and periſhing, and the eye-brows are pinched at their inner corners next the noſe; when there is little or no inflammation or running, except a more than ordinary moiſture in the caruncle, or haw of the eye, or where there is no moiſture at all, as we often find in many moon-blind horſes: wherever theſe ſymptoms are, a method of cure is required quite different from the preceding. For as we ſuppoſe here the nerves of the eye to be affected, and the ſupplies of the arterial blood by that means denied; therefore, wherever the fault may be, whether originally in the blood or in the nerves, it is neceſſary, in either caſe, to adminiſter ſuch things as not only attenuate the blood, but may cauſe a greater derivation thereof to the eye: ſo that the moſt likely way to ſucceed is by the proper uſe of mercurials; and theſe ſuch as are the moſt efficacious, and at the ſame time the moſt ſafe. But firſt of all let the horſe have the laſt mentioned purge given him by way of preparation, and when the operation is over, which will be mild and gentle, the following ball may ſucceed:

> Take mercurius dulcis that has been often ſublimed and dulcified, two drams; make it into a ſmall ball, with a ſufficient quantity of conſerve of red roſes, and wheat flour.

Let this ball be given early in the morning faſting, and tie up the horſe from eating two or three hours after it; then let him have a feed of ſcalded bran, with warm water, or warm gruel to drink; which regimen ought to be continued the whole time he is under this courſe of mercurial and purging phyſic; cold water and other cold drinkables, being ſomewhat unſafe at ſuch a time. The mercurial ball may be repeated every other day, in the morning, till the horſe has taken three or four. If his mouth grows tender, which may poſſibly happen, if he be not of a pretty ſtrong conſtitution, he muſt be fed with water gruel for two or three days, till that ſymptom wears off. At the ſame time the purge may be repeated once or twice, and the following eye-water applied outwardly to both his eyes, if both be weak and diſordered:

> Take crude ſal ammoniac, cleaned from the black ſcurf that is uſual on the outſides of the cakes, two drams; diſſolve it in a pint of warm water, or the above tincture of roſes; and add to it a

> gill of ſpirit of wine, or the beſt brandy, ſhaking them together in a quart bottle.

The eyes may be bathed all over with this mixture, twice a day, or it may be uſed in the manner of a fomentation, by wringing cloths out of it, and applying them warm over the eyes. This will act as a ſtimulus, and may alſo help to thin and rarify the gummy juices, and bring new ſupplies of nouriſhment to the periſhing eyes. At firſt it may cauſe a little ſmarting; but after uſing it a day or two that ſymptom goes off, and if the eyes grow more plump and full, there will be hopes of a recovery, at leaſt of ſaving one eye; and therefore the beſt way upon this proſpect is to proceed in the ſame method, after a month's interval, and ſo on, as you find encouragement. And in all the intervals, the powders mentioned above, ſhould be given in all his feeds, or the decoction of guiacum in his water.

Some take up the eye-veins to prevent blindneſs, but without diſtinction, whether the eyes are full with redundant humours, or ſunk and periſhing. In the latter caſe the taking up the veins may poſſibly be of ſervice, becauſe by that means the eyes may be better ſupplied with its proper nutritive juices; but this too is uncertain, becauſe the fault may be in the nerves, or the diſtemper may proceed from ſome original configuration of the eye, which may be defective, and then ſuch operations are like to prove fruitleſs. But the taking up the veins where the eyes are full, muſt, for the moſt part, prove hurtful, by cutting the channels which ſhould convey the blood juices from thence in the courſe of circulation, and conſequently increaſe the diſtemper, inſtead of abating it. In this caſe the taking up the arteries might be of ſome ſervice; but this is an operation that only perſons well ſkilled in the anatomy of a horſe, ſhould preſume to undertake, and in the end might perhaps be uncertain.

The cutting out the haw is another operation uſually performed on moon-blind horſes. The haw is a ſwelling and ſpungineſs of the caruncle or fleſhy ſubſtance in the inner corner of the eye next the noſe, and when it is ſoaked with too much moiſture and humidity it ſwells and turns ſpongy. The membrane to which it adheres alſo grows thick, and ſpreads itſelf ſo as to cover a conſiderable part of the eye, but ſeldom reaches ſo far as to cover any part of the pupil. The ligament which runs along the verge of this membrane becomes horny; and when it riſes to this ſtate, it compreſſes the eye-ball like a hoop, and by its continual preſſure cauſes conſtant pain, and increaſes all thoſe bad ſymptoms that are the fore-runners of blindneſs. Haws grow ſometimes in eyes that are not naturally bad, after colds and ſurfeits; but moon-blind horſes are ſeldom without them; and wherever this ſymptom appears, that the haws grow large and ſpongy, and derive a drain of humours upon the eye, the operation becomes neceſſary, and is performed by taking hold of the membrane with a ſmall hook, and cutting off ſo much of the caruncle as looks moiſt and ſpongy, with part of the membrane and griſtle that cauſe a preſſure on the eye. When this operation is well performed, it does great ſervice, and often recovers horſes that are not ſubject to cataracts; and even in this caſe it makes the eyes look ſomething better, and helps to protract the blindneſs, but will not prevent it when it is hereditary. This is an eaſy operation, and what almoſt every farrier pretends to; but they are apt to cut off too much of this ſubſtance, and by that means weaken the eye, and forward the blindneſs, inſtead of preventing it. The proper application after cutting out the haw, is honey of roſes, or rather tincture of roſes, with a little honey diſſolved in it. But if the eye continue ſtill to abound with moiſture, after the haw is extirpated, and threatens a freſh fungus, the caſe may be deemed bad; and then it will be neceſſary to blow into it a ſmall quantity of burnt alum and fine loaf ſugar, equal parts, once or twice a day; or one part of white vitriol, and two parts of ſugar; and in ſome caſes it may be touched with the blue vitriol-ſtone, or the lunar cauſtic; but theſe violent ſymptoms ſeldom happen, and when they do, we may ſuppoſe the blood to have a very bad diſpoſition; ſo that it will be hardly worth while to attempt a cure, conſidering both the length of time, and the uncertainty of ſucceſs. *Gibſon on the Diſeaſes of Horſes, vol.* I. *pag.* 326.

BLINDNESS, a want of ſight. The ſheep in ſome parts of Wiltſhire are troubled with a blindneſs, and are cured by anointing their eyes with gooſe dung. *Liſle's Huſbandry, vol.* II. *pag.* 212.

BLISTERING *ointment*, a name given by farriers for a ſort of charge or plaſter for raiſing a bliſter in horſes. There are various preſcriptions for making this ointment, but the following is equal to any yet known:

> Take nerve and marſhmallow ointment, of each two ounces; quickſilver one ounce, thoroughly broke with an ounce of Venice turpentine; Spaniſh flies powdered, a dram and a half; ſublimate one dram; oil of origanum, two drams.

BLITHE, gay, airy, frolickſome, chearful.

BLOOD, a red liquor circulating through the veins, arteries, and other veſſels of animal bodies; and ſerving for the ſupport of life, and nouriſhment of all their parts.

Blood is an excellent manure for almoſt any ſort of ſoil. Mr. Evelyn tells us, "that after the battle of Bagnam fields, in Devonſhire (where lord Hopton obtained a ſignal victory) the blood of the ſlain fertilized the land, which had been ſown with corn a little while before, to ſuch a degree, that moſt of the wheat ſtalks of the enſuing crop bore two, three, four, nay ſeven, and ſome even fourteen ears; a thing almoſt incredible. The owner of the land ſeeing how miſerably it had been trodden down, thought of reſowing it; but was diſſuaded from that deſign (perhaps to make the experiment) and had the above-mentioned ſurprizing crop." The huſbandman ſhould, therefore, be careful to procure the offals of the ſhambles, where they are to be had, as they will prove an excellent manure.

BLOOD-*letting. See the article* BLEEDING.

BLOOD-*ſpavin*, a ſwelling and dilatation of the vein that runs along the inſide of the hock, forming a little ſoft ſwelling in the hollow part, and is often attended with a weakneſs and lameneſs of the hock.

The cure ſhould be firſt attempted by bathing the part twice a day with vinegar or verjuice; or let it be fomented with a decoction of oak bark, pomegranate, and alum, boiled in verjuice, binding over it, with a roller, a woollen cloth ſoaked in the ſame, which will contribute greatly to ſtrengthen all weakneſſes of the joints, and, if early applied, will frequently remove the diſorder: but if by theſe means the vein is not reduced to its uſual dimenſions, the ſkin ſhould be opened, and the vein tied with a crooked needle and waxed thread paſſed underneath it, both above and below the ſwelling, and the turgid part ſuffered to digeſt away with the ligatures: for this purpoſe the wound may be daily dreſſed with turpentine, honey, and ſpirit of wine, incorporated together. *Bartlet's Farriery, pag.* 279.

BLOSSOM, a general name for the flower of plants, but more eſpecially of fruit-trees.

BLOSSOM, or *peach coloured horſe*, is one that has white hairs intermixed all over with ſorrel and bay hairs.

BLOWING *of a flower*, an artificial proceſs, in order to bring a flower to diſplay itſelf with greater perfection and beauty than it would arrive at in the natural way of blowing.

The uſual method for carnations is this: about April, when the flower ſtems begin to put forth, or ſpindle, as the gardeners call it, they place by each flower a ſtrait ſtick, about four feet long, and tie the ſpindles to it as they ſhoot. As ſoon as the flower-buds appear, they diſplace all, except the largeſt, leaving only one on each flower-ſtem to bloſſom. About ten days before the flowers open themſelves, the round-podded kinds will begin to crack their huſks on one ſide; when the careful gardener, with a fine needle, ſplits or opens the huſk on the ſide oppoſite to the natural fraction; and about three or four days before the complete opening of the flower, cuts off, with a pair of ſciſſars, the points on the top of the flower-pod, and ſupplies the vacancies or openings on each ſide the huſk, with two ſmall pieces of vellum, or oil-cloth, ſlipped in between the flower-leaves on the inſide of the huſk; by this means the bloſſom will diſplay its parts eqally on all ſides, and be of a regular figure. Beſides this caution, when the bloſſom begins to ſhew its colours, they take care to ſhade it from the extreme heat of the ſun with a ſmall board, or other device, faſtened to the ſtick which ſupports it; for flowers as well as fruits, grow larger in the ſhade, and ripen and decay ſooneſt in the ſun. *Bradley's new Improvement in Gardening*, &c.

BLOW-MILK, ſkimmed, or floten milk; that from whence the cream is blown off.

BLOWN, ſwelled or hoved. *See the article* HOVED.

BLUE-BALL, a name given to the cone-wheat in Somerſetſhire, from the dark colour on the edge of the huſks of the chaff, which cover each grain, and the falling off of the awms when ripe; ſome of the ears having awms, and others none. *See the article* CONE-WHEAT.

BLUE-BOTTLE, *knapweed*, *matfellon*, or *centaury*, the name of a weed abounding in many corn lands, flowering in July, and ripening its ſeeds in autumn.

Mr. Miller ſays the corn blue-bottle is an annual plant; but Mr. Ray and Mr. Liſle think its root is perennial; becauſe, as the latter obſerves, it not only puts forth new buds every ſummer at the root for the growth of the next year, but ſeems alſo not to ſeed early enough, before the corn is cut to propagate itſelf by its ſeed in corn lands, in which it moſt abounds, eſpecially in a gravelly ſoil.

BLYME, the ſame with bleyme. *See* BLEYME.

BOAR, the male ſwine. *See the article* HOG.

BODY *of a horſe*, the material part or ſubſtance of a horſe, uſually called his carcaſe. *See the article* CARCASE.

BOG, properly ſignifies a quagmire, covered indeed with graſs, but not ſolid enough to ſupport the body; in which ſenſe it differs from moors or fens only as a part from the whole. *See the articles* MOOR and FEN.

Mr. King, in his account of the bogs in Ireland, publiſhed in the Philoſophical Tranſactions, Numb. 170, imputes the true cauſe of them to want of induſtry.

" The ſprings, ſays he, with which Ireland abounds, are generally dry, or near dry in the ſummer time, and graſs and weeds grow thick about the places where they burſt out. In the winter, they ſwell, run, and ſoften, and looſen all the earth about them. The ſward or ſcurf of the earth, which conſiſts of the roots of graſs, being lifted up and made fuzzy by the water in the winter, as I have ſeen it lifted up a foot or two at the head of ſome ſprings, is dried in the ſpring, and does not fall together, but withers in a tuft, through which ariſes new graſs; which is alſo lifted up the next winter. By this means the ſpring is more and more ſtopt, and the ſcurf grows thicker and thicker, till at firſt it make that which we call a quaking bog; and as it grows higher and drier, and the roots of the graſs, and other vegetables become more putrid, together with the mud and ſlime of the water, it acquires a blackneſs, and grows into that which we call a turf bog. I believe that when the vegetables rot, the ſaline particles are generally waſhed away with the water, as being apt to be diluted in it. The oily, or ſulphureal, are thoſe which chiefly remain, and ſwim on the water; and this is that which gives turf its inflammability.

" I muſt confeſs, that there are quaking bogs cauſed otherwiſe. When a ſtream or ſpring runs through a a flat, the paſſage, if not tended, fills with weeds in ſummer, trees fall acroſs it, and dam it up: then, in winter, the water ſtagnates farther every year, till the whole flat is covered. Afterwards, a coarſer kind of graſs ſhoots up, peculiar to theſe bogs. This graſs grows in tufts, its roots conſolidate together, and its height increaſes every year; inſomuch, that I have ſeen it as tall as a man.

" This graſs rots in winter, and falls on the tufts, and with it the ſeed, which ſprings up the next year, and ſo ſtill makes an addition. Sometimes the tops of flags and graſs are interwoven on the ſurface of the water, and this becomes by degrees thicker, till it lies like a cover on the water: then herbs take root in it, and by the matting of their roots it becomes very ſtrong, ſo as to bear a man. I have gone on bogs which would riſe before and behind, and ſink where I ſtood, to a conſiderable depth; under which was clear water.

As a farther proof that want of induſtry is the principal cauſe of bogs, Mr. King obſerves, that the higheſt mountains in Ireland being full of ſprings, and uninhabited, are over-run with bogs, as well as the plains, becauſe no care is taken to clear the ſprings.

" Ireland, continues he, abounds in moſs more than, I believe, any other kingdom. This moſs is of divers kinds, and that which grows in bogs is remarkable. The light ſpongy turf is nothing but a congeries of the threads of this moſs, as I have frequently obſerved, before it be ſufficiently rotten. The turf then looks white, and is light. I have ſeen it in ſuch quantities, and ſo tough, that the turf-ſpades could not cut it. In the north of Ireland, they call it old-wives tow, being not much unlike flax. The turf-holes, in time, grow up with it again; and all the little gutters in bogs are generally filled with it. To this I chiefly impute the red or turf bog; and from the ſame cauſe even the hardened turf, when broken, is ſtringy; though there plainly appear in it parts of other vegetables: and I am almoſt, from ſome obſervations, tempted to believe, that the ſeed of this bog-moſs begets heath, when it falls on dry and parched ground. However, the moſs is ſo fuzzy and quick growing a vegetable, that it greatly ſtops the ſprings, and contributes to thicken the ſcurf, eſpecially in red bogs, where I remember to have obſerved this moſt particularly."

A flat ſpot of ground, lower than the level of an adjoining river or lake, may alſo give riſe to a bog; for when that part is filled up by the ſlime and earth brought from the ſurrounding grounds, and the rotten plants and animals, which are buried in it, have choaked it up, it will become a bog; and then the water will continue to flow into it from the river or lake, eſpecially when either of theſe is ſwelled by a fall of rain, or the melting of ſnow. Theſe waters may alſo ſometimes have this effect, without a communication above ground, by ſoaking through a ſandy or gravelly ſoil.

Another cauſe of bogs have frequently ariſen from the fall of a number of trees, which, being neglected, have neceſſarily occaſioned a ſtagnation of the water brought down from higher grounds; ſo that the earth and other ſoil conveyed with it, have of courſe remained among the fallen wood, and given birth to a moſſy ground, which, it is plain from hence, is not an original ſoil. Coarſe graſs, and weeds which cattle will not eat, ſpring up in theſe places, and die there, after ſhedding their ſeeds, which, being prevented from rotting by the bituminous acid in the moſſy water, produce new plants; ſo that, this being repeated every year, an annual addition is made to the depth of the moſs.

Draining of BOGS. Among the many and great inconveniences which neceſſarily ariſe from bogs, Mr. King mentions the following, as cogent reaſons why every endeavour ſhould be uſed to bring them, firſt to a leſs hurtful ſtate, and afterwards to a condition in which they may be of ſervice to mankind.

" The fineſt and ſmootheſt plains, which generally ſhould be meadows, are often covered with uſeleſs, too often with really pernicious bogs. Theſe bogs are a great deſtruction to cattle, the chief commodity of Ireland. In the ſpring time, when the cattle are weak and hungry, the edges of the bogs are commonly cloathed with graſs, and the beaſts, in venturing to get it, fall into pits or ſloughs, where they are either drowned, or, if they are found, hurt, and often maimed, in the pulling out. The fogs and vapours which ariſe from theſe places are commonly putrid, ſtinking, and very unwholſome: for the rain which falls on them, ſtagnating upon their ſurface, and in their hollows, than which there is hardly any ſubſtance, equally ſoft, more impenetrable by water, corrupts there, and is exhaled by the ſun; ſo that, very little of it running off, it muſt of neceſſity affect the air. They corrupt other water, both in its colour and taſte: for the water which ſtands in the pits, or lies on the ſurface of the bog, is tinctured by the reddiſh-black colour of the turf; and when a ſhower comes, ſo as to make theſe pits overflow, the water which runs from them tinges all it meets, and gives its colour and ſtench even to many rivers. The only advantage derived from any bog, is turf for fuel. It makes a tolerable ſweet fire, in the common way of uſing it; and is, when charred, perhaps, the ſweeteſt and wholeſomeſt thing that can be burnt, fitter for a chamber, and for conſumptive people, than either wood or coal.

"All the inconveniencies of our bogs, continues Mr. King, may be remedied, and they may be made uſeful to us, by draining: for I never obſerved one bog without a fall ſufficient to drain it, nor do I believe there is any. The great objection againſt this improvement is the expence; in which I cannot but think the people are often terrified without ſufficient cauſe. One trench will drain many acres in quaking bogs, which, when dry, are generally meadow, or the beſt grazing ground. Every red bog has about it a deep, marſhy, ſloughy ground, which is called the bounds of the bog. A deep trench round ſuch a bog keeps out cattle, and turns the bounds into good meadow. I remember a red bog of ſixty acres, which a gentleman reduced to good grazing ground, worth three ſhillings an acre, for twenty-five pounds, which is leſs than three year's purchaſe. In all improvements of this kind, gentlemen ſhould conſider, that what they lay out goes by degrees, ſo that they ſcarcely feel it; that it goes among their tenants, whom it helps to enable to pay their rent; that they do a work of charity in employing the poor; and that they at the ſame time contribute to both the ornament and general profit of the kingdom.

"The deep trench before mentioned, round a red bog, not only drains and improves the bounds of the bog, as I ſaid before, but goes a great way towards drying the bog itſelf. It ſerves likewiſe as a common ſink, into which all the drains vent themſelves. Theſe drains ſhould be cut ſo as to croſs the little ſloughs that run in the bog. The firſt drains ſhould not be above two or three feet deep, or wide: for the bog is ſo ſoft, that deep trenches will not ſtand, but fill up again. When the ſurface of the bog is cut in little trenches, ſuppoſe at twenty, thirty, or forty perches diſtance, it will ſoon be ſo dried that cattle may graze on it all the ſummer. A year or two after this, by which time the bog will be ſomewhat dry towards the ſurface, the drains may be made ſix feet wide, and as deep as the ſoftneſs of the bog will permit. This will certainly make the bog uſeful for grazing: and at the end of another year or two, an attempt may be made to cut one or two of the trenches down to the bottom of the bog; for till that be done, I do not reckon the bog ſecured. A gentleman may oblige all his tenants to cut their turf in theſe trenches, and likewiſe have his own cut there." *Philoſophical Tranſactions, Numb.* 170.

Small bogs may be turned to very good account by planting them with oſiers, willows, and alders: but where the extent is conſiderable, this object becomes of too little conſequence. Draining will be however neceſſary before they can be improved any other way; as a previous ſtep towards which, it will be neceſſary to examine from whence their too great quantity of water ariſes, and what retains it. When the cauſes are known, their effects will be the more eaſily removed.

The ſources from whence the too great quantity of water proceeds, may either be without or within the bog. This is eaſily diſcovered by the greater quantity of water in one place than in another, and obſerving that the water ſpreads from thence, even under the ſurface, as through a ſponge.

If the water from without comes from neighbouring grounds, it is uſually kept off by a ſurrounding ditch, made large enough to contain the quantity that may at any time flow down, and by extending that ditch to the moſt convenient outlet, according to the declivity of the ground. If the bed of gravel or ſand through which the ſprings within the bay run, be cut quite through, the ſource of thoſe ſprings will certainly be deſtroyed; and if that bed be only opened in digging this ſurrounding ditch, the water will ſo readily diſcharge itſelf thereby, that the ſprings will probably be dried up.

Before any drain be made in the bog itſelf, an exact level of the ground ſhould be taken; and when the two great moiſture proceeds from a ſpring or ſprings within the bog, a large ditch ſhould be made, beginning at the loweſt part of the bog, where an outlet can be had, and continued from thence to the ſpring. If the bog be firm enough to bear it, this ditch ſhould be dug down to the very bottom of the bed on which the peat or moſs is formed, which, in caſe of ſprings, is always gravel or ſand: for otherwiſe the water would force itſelf a paſſage in another part, and ſo make it neceſſary to extend the ditch thither. If there be more ſprings than one, the main ditch muſt be extended to each of them. In all caſes, the ſureſt way is to dig the ditch, where it can be done, at leaſt a foot deeper than the ſpring lies. Between the principal ditches cut in the bog, there ſhould be ſmaller, emptying themſelves into thoſe larger, to carry off the remnant of ſtagnating water, and to preſerve the ſurface dry. Care ſhould be taken not to lay the earth dug out of any of theſe ditches too near their ſides, leſt its weight ſhould make them fall in.

Bogs are generally higher than the land about them, and higheſt in the middle; the chief ſprings that cauſe them being generally about the middle, from whence they extend by degrees, and puff up the earth in ſuch a manner, that perſons are often apt to think the ſprings lie deeper than they really do. A ſure way to know whether the ditch be deeper than the ſpring, is, to obſerve whether the water comes in at its bottom, or through the ſides. The width of the main ditch ſhould be proportioned to its depth; and both will, in a great meaſure, depend upon the quantity of water neceſſary to be drained. In general, it ſhould widen progreſſively from its head to its outlet, becauſe the quantity of water in it will be conſtantly encreaſed. The ſides of the ditch ſhould always be dug either more or leſs ſloping, according to the ſoil. If the ground be very looſe and light, and conſequently very liable to fall in, it will ſometimes be neceſſary to make a ſlope ſo great, that the top of the ditch will be four times as wide as its bottom. If the ſoil be ſtiffer, the ſlope may be leſs; but no ditch ſhould ever be dug quite perpendicular.

If a deep trench be cut through a bog, the original ſpring will be found, vaſt quantities of water will iſſue from it, and the bog will ſubſide. Mr. King ſays that he was informed that the bog at Caſtle Forbes, where this was done, ſubſided thirty feet, a fall which ſeemed indeed incredible: but he found by computation that it could not be leſs than fifteen.

Mr. Elliot's contrivance for draining a bog, or what he calls a ſhaking meadow, containing about forty acres, deſerves to be mentioned, for the ſingularity as well as the uſefulneſs of the invention. The ſurface of this ground, over-run with cran-berry vines and wild graſs, ſeemed to be only a ſward of their roots laid over a pappy mud, and was deemed ſo poor that nobody would rent it. At the ordinary outlet of this meadow, there was a ſufficient fall, but very rocky, ſo that it was neceſſary to dig four or five feet to take advantage of it. In March, when this gentleman went to make the outlet drain, the torrent of water was ſo great, that nothing could be done in the uſual way. He therefore ordered a tree to be felled a croſs the brook, and pieces of plank, the upper ends of which reſted againſt the tree, to be driven down aſlant into the mud. The chinks and crevices of theſe planks were then cloſely ſtopped with tow, by which means the water was ſhut into the meadow. The trench or main ditch was then worked at in the day, and the water let out at night, till the drain was completed. When the weather grew ſufficiently warm, and the meadow was a little ſettled, croſs ditches were cut, one on each ſide, and another in the middle, and, ſo far as they extended, the meadow ſoon became firm and dry. "Some, adds Mr. Elliot, are deterred from ſuch an undertaking as that of draining their land, by reaſon of the great charge. They terrify themſelves without reaſon. When I was about to cut my main drain, ſome thought it impoſſible; others, that it would coſt, at leaſt, an hundred pounds. The place was full of rocks, ſome of which we dug up, others were broken with ſteel wedges, and others were blown up with powder. The whole expence did not exceed twenty pounds." *Eſſay* I. *on Field Huſbandry*, p. 7.

When the ditches and trenches are finiſhed, great care muſt be taken to keep them in good and laſting condition, leſt all the labour beſtowed upon them ſhould be loſt. There are different ways of doing this. If the ditches are left open, they muſt be well cleanſed from weeds and mud, twice every year, once in the ſpring, and once in the autumn. It will alſo be right to drive in from ſpace to ſpace, along the inſide of their banks, ſtrong ſtakes of oak or alder, to ſtrengthen them, and keep them from falling in. Willows, which delight in a watery ſoil, may be advantageouſly planted upon theſe banks, which their roots will help to keep up and bind.

If a bog be ſo entirely ſurrounded with high grounds, as not to have any declivity whatever, by the help of which its waters may be drained off, ditches muſt then be dug round it, to receive the water from the neighbouring hills, and a very large pond muſt be made in the middle or loweſt part of the bog itſelf, for its waters to run into; to facilitate which, large trenches ſhould be cut from the ſurrounding ditches to this pond, and channels communicating with theſe trenches a-croſs different parts of the bog. The number and ſize of which will depend on the greater or leſs wetneſs of the ground. When the water is thus collected, engines muſt be uſed to raiſe it to a proper height for a channel to carry it off. The reader will find a deſcription of ſeveral new and uſeful engines of this kind under the article, DRAINING MACHINES.

Improvement of drained BOGS. The moſt laſting and moſt perfect improvement of bogs, is effected by paring off their ſurface and burning it. *See the articles* MOOR and BURN-BAKING. In order to this the bogs ſhould be levelled; and whatever earth remains unemployed in filling up hollows, ſhould be burnt together with that taken out of the ditches, unleſs the latter has been already carried off for fuel. The greater quantity of aſhes there is, the greater will be the improvement of the ſoil itſelf, and the more will the earth brought upon it be benefited. The fire on the ſurface of the moſs, exhales a very conſiderable part of the bituminous acid of this ſoil, and the fixed alkaline ſalt, always found in ſome proportion in the aſhes, corrects or neutralizes it, ſo that no inconvenience ariſes from it afterwards, if the ground be kept dry as it ought to be. The fire ſhould not be fierce but rather ſmothered.

When the bog is pared, and the clods are collected to dry, the farmer muſt prepare earth to cover the ſurface. Marle, which is often found under bogs, preſents the beſt covering that can be deſired. If a clay lies under the bog, it muſt be prepared before it is ſpread in the manner directed under the article COMPOST, excepting only that the quantity of other ſubſtances mixed with it, ſuch as dung, &c. need not be ſo great in this caſe, becauſe the aſhes, and the bog itſelf, will greatly aſſiſt in opening the body of the clay. If a loamy earth be near at hand, it will perhaps be leſs expenſive to the farmer to bring ſuch earth to cover the bog, than it will be to dig and prepare the clay. But of whatever kind the earth be, which is laid upon the bog, the quantity ſhould always be ſufficient to cover its whole ſurface four, five, or ſix inches deep, according to the ſtiffneſs of the ſoil ſo brought. Thus four inches of clay, when mixed with the aſhes, and a due quantity of the earth of the bog itſelf, will give a depth of covering mould equal to what ſix inches of loam will do, when likewiſe mixed in proportion to its quality. If the bog be intended for arable land, the depth of the covering earth ſhould be greater; becauſe all kinds of grain, eſpecially wheat, require at leaſt a foot depth of good mould to extend their roots in, before they come to any cold or tenacious ſubſtance like peat or clay. The covering, therefore, of clay or marle ſhould be in this caſe, ſix or ſeven inches thick, and that of loam eight or nine inches.

As ſoon as the ſurface is burnt, its aſhes ſhould be ſpread and mixed with the additional covering, which will then be fit for the farmer's purpoſe, whether for corn or graſs. If the extent of the bog intended to be improved be conſiderable, it ſhould be adviſable, by means of a ſluice, to fill the ditches contiguous to the ſpot which is to be covered, and to bring the earth in barges, or flat-bottomed boats, kept on purpoſe to tranſport the neceſſary manures, and the produce of the ground. By this means a ſaving will be made of the ſurface otherwiſe neceſſary for cart-ways. Beſides, this ſoil, eſpecially, when newly trained, does not well bear heavy carriages: a circumſtance which renders it needleſs to obſerve, that broad wheels are always the moſt proper, when any muſt be uſed upon ſuch land.

The bog being covered with a proportion of earth, the huſbandman muſt next determine to what laſting purpoſe he can beſt apply it. The too great moiſture of theſe ſoils, which always lie flat, renders them unfit for continued tillage; and their mould becomes ſo looſe, by frequent ploughing, that it does not afford ſufficient ſtability to the roots of corn. For this reaſon, barley, oats, and rye, do better here than wheat, which requires a firmer footing: but neither of them ſhould ever be ſowed thick; becauſe the fruitfulneſs of the ſoil will always make up in the ſize of the plants, what ſome might think wanting in their number. The moſt beneficial method of employing this ſort of land is, undoubtedly, by converting it into meadow; becauſe, when thus prepared, and not injudiciouſly exhauſted by crops of corn, it will yield great quantities of excellent graſs. It is, however, uſual to begin with ſowing ſome kind of grain on this prepared ſurface, to indemnify the farmer by the plentiful crop which it generally yields; ſuch, indeed, as ſometimes defrays at once the whole expence of the improvement. Perhaps the moſt profitable method may be, to ſow it in the autumn with rape, the leaves of which, ſhading the ſurface in hot weather, and rotting in the winter, contribute greatly to mellow the earth: the ſtrong roots of this plant open the ſoil; its aſhes enrich it, when burnt, and its ſeed brings a great return when ſold for making oil. One or two ploughings will then prepare it for a crop of wheat. After this is taken off, and the ſtubble turned down or burnt, white clover and graſs ſeed from upland paſtures ſhould be ſowed, and the ground ſhould then be laid down for a laſting meadow; or, if turnips are ſowed, or cabbages planted, in the autumn, theſe, in the ſpring, may be ſucceeded by barley, with which the graſs ſeeds may be ſowed.

When, either through neceſſity, for want of other arable land, or out of choice, the farmer intends to continue ploughing his improved bog, the ſurface muſt be raiſed in ridges, and the farther management of it may be like that of moſt other ploughed grounds.

If a ſoil of this kind happens to be ſituated near a town, a greater profit will accrue from planting it with garden ſtuff, than from any ſort of grain. Beans, peaſe, cabbages, potatoes, turnips, carrots, &c. thrive exceeding well in ſuch earth as this, as the marquis of Turbilly experienced to his entire ſatisfaction.

"I received, ſays he, from Straſburg, in the year 1755, ſome ſeed of the large hard cabbage, which was immediately ſowed in my garden, from whence it was afterwards tranſplanted into a bog, which I had drained and cleared. This ſpot contains about an acre of ground, and forms a kind of iſland in my river. It had been pared and burnt; but never received any other manure than the aſhes produced by that burning; no ſort of dung having ever been laid upon it. The whole of it was planted with this kind of cabbage, excepting only a corner, where a few carrots, parſnips, and beet-roots, all of which grew to a prodigious ſize, and proved exceeding good, were ſet out of curioſity. Theſe cabbages throve wonderfully, ſeveral of them weighing forty pounds a piece, were well taſted, and very wholeſome, though ſome of the country people ſeemed poſitive that they and the other pot-herbs would be hurtful, unhealthy food, as, ſaid they, all plants are during the firſt year of their growth in new drained bogs.

"Theſe people pretended to have experienced this in other places; but not finding it ſo here, I aſcribed the effect they talked of to ſome pernicious quality in the ſoil; for I was very ſure, that the violent operation of the fire which mine had undergone, had not left any bad property in the earth. During the reſt of the ſummer, and the autumn, ſome of the neighbouring peaſants, whom I hired for the purpoſe, carried this great quantity of cabbages to the markets of three different towns, about ſix miles off: there they ſold them; and the accounts which they gave me of their produce amounted in all to eight hundred and fifty livres, that is thirty-ſeven pounds, three ſhillings, and nine pence. The wages of theſe men and the expence of carriage, amounted to about half this ſum; which being deducted, my acre of bog produced clear four hundred and twenty-five livres, that is, eighteen pounds eleven ſhillings, and ten-pence halfpenny, with which I was the better ſatisfied, as the cultivating of it had coſt me but little. The ſoil, being light, was eaſily turned up, though fat; and I had drained off the water without difficulty, by means of a ſlope which happened to be properly ſituated. I never had been offered above a crown a year for this marſhy land, which was quite a ſhaking bog, and often overflowed. When drained, its ſurface ſunk a foot lower than before. So great a produce, from ſo ſmall a ſpot of ground, of which no one knew the goodneſs, ſhews what vaſt riches are hid beneath the ſeveral bogs in this kingdom. They are not, however, all like this, which chanced to be a very fertile ſoil. I could wiſh to be maſter of ſeveral others like it. It has ſince been ſowed with hemp, peaſe, and ſeveral other plants, which have done very well, though none of its crops have produced ſo much money as this firſt; which ſhews the difficulty of ſetting a juſt value upon land. All the other bogs which I have drained and cleared in different ways, have anſwered, in general; but no one ever yielded, in proportion, any thing like this ſpot." *Memoire ſur les Defrichemens*, *pag.* 167.

BOG-*Spavin*, an encyſted tumour, or according to doctor Bracken, a collection of browniſh gelatinous matter, contained in a bag or cyſt, which he thinks to be the lubricating matter of the joint altered, the common membrane that incloſes it forming the cyſt: this caſe he has taken the pains to illuſtrate by an inſtance of a young colt of his own, where he obſerves, that when the ſpavin was preſſed hard on the inſide of the hough, there was a ſmall tumour on the outſide, which convinced him the tumour was within ſide the joint: he therefore cut into it, diſcharged a large quantity of this gelatinous matter, dreſſed the ſore with doſſils dipped in oil of turpentine, putting into it, once in three or four days, a powder compoſed of calcined vitriol, alum, and bole: by this method of dreſſing, the bag ſloughed off, and came away, and the cure was ſucceſsfully completed without any viſible ſcar.

This diſorder, according to the above account, will ſcarcely ſubmit to any other method, except firing, when the cyſt ſhould be penetrated to make it effectual; and in all obſtinate caſes that have reſiſted the above method, both the cure of this, and the ſwellings called wind-galls, ſhould be attempted in this manner. If, from the pain attending the operation or dreſſings, the joint ſhould ſwell and inflame, foment it twice a day, and apply a poultice over the dreſſings, till it is reduced. *Bartlet's Farriery*, *pag.* 279.

BOIL, a diſeaſe to which cattle, eſpecially ſheep, are very ſubject.

In order to cure theſe boils, it will be neceſſary to bring them to a head, by applying to them a plaſter compoſed of wheat flour, yolks of eggs, and tar: and when they feel ſoft under the finger, to open them with a lancet, and let out the matter. Then anoint the part with ointment of tobacco, and apply over it the following plaſter. Take of turpentine, burnt ſalt, honey, and galbanum, of each one ounce; of roſin an ounce and a quarter. Melt the whole into a ſalve over the fire. *Ellis on Sheep*, *pag.* 101.

BOLE, the body or trunk of a tree.

BOLE alſo ſignifies the ſtalk or ſtem of corn.

BOLE, a meaſure of corn, containing four buſhels.

BOLE *of ſalt*, contains two buſhels.

BOLING *Trees*, pollard trees, or thoſe whoſe heads and branches are cut off, and only the boles or bodies left.

BONE, a hard, brittle, inſenſible part of an animal body, affording form and ſupport to the whole machine.

All marrow-bones, fiſh-bones, hoofs, horns, or ſhavings of horn, are very uſeful in manuring lands. Bones are moſt ſerviceable when raſped or broken into ſmall pieces; becauſe their ſalts, in which their principal virtue conſiſts, are more eaſily extracted by the rains and dews, and communicated to the ſoil.

BONE-*Spavin*, a boney excreſcence, or hard ſwelling growing on the inſide of the hock of a horſe's leg.

A ſpavin that begins on the lower part of the hock, is not ſo dangerous as that which puts out higher, between the two round proceſſes of the leg-bone; and a ſpavin near the edge is not ſo bad as that which is more inward towards the middle, as it does not ſo much affect the bending of the hock. A ſpavin that comes by a kick or blow, is at firſt no ſpavin, but a bruiſe on the bone, or membrane that covers it; therefore not of that conſequence, as when it proceeds from a natural cauſe: and thoſe that put out on colts, and young horſes, are not ſo bad as thoſe which happen to horſes in their full ſtrength and maturity; but in very old horſes they are generally incurable.

The uſual method of treating this diſorder, is by bliſtering and firing, without any regard to the ſituation or cauſe, from whence it proceeds. Thus if a fullneſs on the fore-part of the hock comes after hard riding, or any other violence which threatens a ſpavin, ſuch coolers and repellers are proper as are recommended in ſtrains and bruiſes. Thoſe happening to colts and young horſes are generally ſuperficial, and require only the milder applications; for it is better to wear them down by degrees, than to remove them at once by ſevere means.

There are various forms for making what is called the bliſtering ointment; but of the beſt of that kind, and what will infallibly anſwer the intention, has been already given under the article BLISTERING OINTMENT.

When a bliſter is thought neceſſary, the hair ſhould be cut as cloſe as poſſible, and then the ointment applied pretty thick over the part; this ſhould be done in the morning, and the horſe kept tied up all day without any litter till night; when he may be untied in order to lie down; and a plaſter of pitch, or any other ſticking ſubſtance, may be laid over it, and bound on with broad tape, or a bandage, to keep all cloſe.

After the bliſter has done running, and the ſcabs begin to dry and peel off, it may be applied a ſecond time in the ſame manner as before; the ſecond application generally taking greater effect than the firſt, and in colts and young horſes makes a perfect cure.

When the ſpavin has been of long ſtanding, it will require to be renewed perhaps five or ſix times; but after the ſecond application a greater diſtance of time muſt be allowed, otherwiſe it might leave a ſcar, or cauſe a baldneſs; to prevent which, once a fortnight, or three weeks, is often enough; and it may in this manner be repeated ſix or ſeven times, without the leaſt blemiſh, and will generally be attended with ſucceſs.

But the ſpavins that put out upon older, or full aged horſes, are apt to be more obſtinate, as being ſeated more inward; and when they run among the ſinoſities of the joint, they are for the moſt part incurable, as they then lie out of the reach of applications, and are arrived to a degree of impenetrable hardneſs.

The uſual method in theſe caſes is to fire directly, or to uſe the ſtrongeſt kind of cauſtic bliſters; and ſometimes to fire and lay the bliſters immediately over the part; but this way ſeldom ſucceeds farther than putting a ſtop to the growth of the ſpavin, and is apt to leave both a blemiſh and ſtiffneſs behind; beſides the great riſk run (by applications of theſe fiery and cauſtic medicines, to the nervous and tendinous parts about the joints) of exciting violent pain and anguiſh, and deſtroying the limb.

The beſt and ſafeſt way therefore is to make trial of the bliſtering ointment given under that article, and to continue it according to the directions above laid down, for ſome months, if found neceſſary; the horſe in the intervals working moderately: the hardneſs will thus be diſſolved by degrees, and wear away inſenſibly.

When the ſpavin lies deep, and runs ſo far in the hollow of the joint, that no application can reach it, neither firing nor medicines can avail, for the reaſons abovementioned: though bold ignorant pretenders have ſometimes ſucceeded in caſes of this ſort by the application of cauſtic ointments with ſublimate, which act very forcibly, enter deep, and make a large diſcharge; deſtroying by that means a great part of the ſubſtance, and diſſolve away the remainder. Though whoever is at all acquainted with the nature of ſuch medicines, muſt know how dangerous in general their operation is on theſe occaſions, and that a properly prepared cautery made like a fleam, under the direction of a ſkilful hand, may be applied with leſs danger of injuring either tendons or ligaments. After the ſubſtance of the ſwelling has been properly penetrated by the inſtrument, it muſt be kept running, by precipitate mixed with the medicine uſed in dreſſing the part, or with a mild bliſtering ointment.

Where the ſpavin lies not deep in the joint, and the bliſtering method will not ſucceed, the ſwelling may be ſafely fired with a thin iron forced pretty deep into the ſubſtance, and then the part ſhould be dreſſed as above directed. *Bartlet's Farriery*, *pag.* 257.

BOORCOLE. *See* Borecole.

BOOSE, a ſtall. Thus ox-booſe ſignifies an ox-ſtall, &c.

BOOT, profit, gain, advantage.

BORAGE, an annual plant, propagated in gardens, and if ſuffered to ſcatter its ſeeds, the plants will come up in plenty without care; or if the ſeeds are ſown either in ſpring or autumn, on a ſpot of open ground where the plants are deſigned to remain, the ground be hoed to deſtroy the weeds, and the plants cut up where they are too near each other, they will require no further care; unleſs the weeds ſhould come up again, when the ground ſhould be a ſecond time hoed over again to deſtroy them. This, if well performed in dry weather, will clear the ground from weeds, ſo that it will require no more cleaning till the borage is decayed. *Miller's Gard. Dict.*

BORECOLE, or Boorcole, a ſpecies of cabbage, of which there are three ſorts, namely, the common borecole, the green borecole, and the Siberian borecole, which is the curled colewort, by ſome called Scotch kale. All theſe are for winter uſe, but the laſt is moſt eſteemed. The two former are ſown about the middle of April, and are fit for tranſplanting in about two months after. When this is done, the plants of either of theſe ſorts ſhould be ſet a foot aſunder in rows two feet diſtant from each other. They ſhould not be eaten before the froſt has rendered them tender; for till then they are tough and bitter. The Siberian borecole, which is extremely hardy, never injured by froſt, and always ſweeter in ſevere winters than in mild ones, need not be ſown till the middle of July, and when the plants are ſtrong enough for removing, that is when they have ſix or eight leaves, they ſhould alſo be ſet in rows; the diſtance between which ſhould be about two feet, and that between the plants, ten inches. Theſe will be fit for uſe ſoon after Chriſtmas, and continue good till April. The ſoil for borecole ſhould be a good, freſh, deep-looſened earth.

Borecole has been lately found by Mr John-Wynn Baker, to be an excellent food for cattle; and the Society for the Encouragement of Arts has accordingly offered two premiums for cultivating it, one of twenty, and the other of fifteen pounds.

Mr. Baker made the experiment under the direction of the Dublin Society, who deſired him to print his account of the experiment, an abſtract of which we ſhall give the reader.

This experiment was made on a piece of ground that had been cropped the preceding year with potatoes. After he had reduced the ſoil to a pretty good tilth, and manured it with a compoſt compoſed of earth, lime, and dung, he planted three rows of borecole plants, in ridges two feet aſunder. On the 17th of Auguſt they were horſe-hoed for the firſt time, by taking off, at one furrow of the plough, only one ſide of each ridge cloſe to the plants; in which manner they remained till the twenty-fifth, when he ran the plough in the ſame furrow, by which, with the firſt furrow, he ploughed about twenty-one inches deep. This being finiſhed, the earth was immediately returned back to the plants, which afforded them freſh nouriſhment; and in order to give their roots time to penetrate this freſh earth, which, by the horſe-hoeing was become very fine mould, he let them remain in this ſtate till the 12th of September, when he horſe-hoed them again, by taking off the other ſide of every ridge; and on the twentieth deepened the furrow in the ſame manner as the former, and immediately returned the mould back to the plants; and on the eighteenth threw up a ſmall furrow to each ſide of every ridge, which finiſhed the culture, and reſtored the ridges to the form they were in when the borecole was planted.

"On the 18th of December, continues Mr. Baker, I cut two perches in length of one of the rows of borecole, which contained twenty-one plants; they weighed one hundred and eighteen pounds, which is very near five pounds ten ounces for each plant: but I am inclined to believe that theſe plants will ſucceed as well, if they are planted only eighteen inches aſunder in the rows. However, at the above proportion, there would be ſeventeen tons, and fourteen hundred upon an acre. But, if the produce would be the ſame, were the plants only eighteen inches aſunder, in that caſe, an acre would produce, by this culture, above twenty-three tons, and twelve hundred.

"This plant is well worthy the farmers or grazier's attention, for, as faſt as it is cut, it will again, in about a month or ſix weeks, afford another crop: I have been cutting theſe plants for my family uſe, ever ſince the middle of Auguſt laſt; I believe ſome of them have been cut three times, and they are excellent for the table. For feeding cattle and ſheep they are highly valuable, as no froſt will injure them; and although the firſt crop amounts not to as many pounds upon any given quantity of ground as thoſe of cabbage or the turnip-cabbage, yet the ſucceeding crops will, I believe, make their produce nearly, or quite, of equal weight with any other of the cabbage kind. But I muſt not omit to obſerve, that, as theſe plants afford only open leaves, and many of them very ſmall, there will be a little more trouble in collecting and carrying them to the ſheep and cattle, than there will be with the other kinds.

"It may not be improper to obſerve likewiſe, that, upon the approach of ſpring, when they begin to throw out their ſpring ſhoots for ſeeds, if the large leaves have not been taken off for winter uſe, they will decay and fall off.

"I have not yet tried it; but I believe the beſt way of uſing this plant, would be to allot one whole field to the culture of it, proportioned in ſize to the ſtock intended to conſume the produce; and in September or October, to turn the ewes into the field for a few hours, morning and evening, and then to lodge them on any piece of graſs or fallow, which may want improvement, to which they will greatly contribute by emptying themſelves upon it; and thus continue to turn them into the borecole field, till they have eat all the luxuriant leaves; then let the plants reſt a month, and there will be another crop. By having two ſmall fields under this crop, a flock of ſtore ſheep might be maintained a whole winter at a very ſmall expence; for while the produce of one field would be conſuming, the other would be coming on.

"This method accrued to me from an accident which attended my borecole this year. My cows got into the field, and preſently devoured ſome of the leaves of the plants; theſe plants have engaged my attention ever ſince, and I have the pleaſure of ſeeing them again in a very luxuriant ſtate.

"If any perſons ſhould be able to put this ſcheme in practice, before I can accompliſh it, I recommend it to them not to let the ſheep paſture ſo long on the crop, as to injure the ſtalks for want of leaves; as too great an injury to the ſtalks may check the ſucceeding growth; which injury, I am inclined to believe, will not happen to the plants, at leaſt not in ſo great a degree, whilſt they have a ſufficient quantity of leaves.

"It will doubtleſs be obſerved, that I confine this ſcheme to ewes or ſtore ſheep: my reaſon for that is, that fat ſheep ſhould always have as much food before them, as they chooſe to eat; add to this that ſheep when they are fat, are more ſubject to be lame than ſtore ſheep, to which ploughed ground will greatly contribute."

BORDER, a bank raiſed about a garden, and planted with flowers, fruit-trees, &c.

Borders are of four ſorts: thoſe are the moſt common, that are continued about parterres without any interruption; and wrought with a gentle riſing in the middle, like an aſs's back, and planted with low ſhrubs and flowers.

The ſecond ſort of borders are ſuch as are cut into compartments, at convenient diſtances, by ſmall paſſages, and being alſo raiſed in the middle, as before-mentioned, are likewiſe ſet off with ſhrubs.

The third ſort are ſuch as are laid even and flat, without flowers, having only a verge of graſs in the middle; being edged with two ſmall paths, raked ſmooth, and ſanded. Theſe are ſometimes garniſhed with flowering ſhrubs, and flowers of large growth; or with vaſes and flower-pots placed regularly along the middle of the verge of graſs.

The fourth ſort are quite plain, and are only ſanded, as in the parterres of an orangery; and are filled with caſes ranged in a regular order along thoſe borders, which are edged with box on the ſides next to the walks; and on the other, with verges and graſs-work next the parterre. Sometimes a yew is planted between each caſe, which makes the border appear richer, and the parterres handſomer, during the winter ſeaſon.

Borders are either made ſtraight, circular, or in cants, and are turned into knots, ſcrolls, voluces, and other compartments.

Floriſts alſo make borders either long walks, or detached; and in theſe they raiſe their fineſt and choiceſt flowers. Theſe are frequently encompaſſed with border boards painted green, which makes them look exceeding neat.

But, in large parterres, this is not to be expected; ſince, if they be ſtocked with flowers ſucceeding one another in their ſeveral ſeaſons, it is ſufficient, ſo that nothing appears bare and naked.

It is uſual to diſcontinue the borders at the ends next to the houſe, that the embroidery and riſe of the parterre may not be hidden by the ſhrubs and flowering plants, and that the deſign may be better judged of.

And ſometimes there are branched out of it foliage, palm-leaves, and ſhells ſporting among the ſands.

Since the modern taſte of gardening has been introduced into England, all the French taſte of parterres, ſcroll borders, and fret work in box, has been juſtly baniſhed our gardens: therefore I have only mentioned them here, to expoſe the taſte of thoſe architect-gardeners, who have no idea of the noble ſimplicity of an open lawn of graſs, properly bounded by plantations; but, inſtead of this, divide that part of the garden, near the houſe, into various forms of borders edged with box, and ſand or gravel-walks leading about them; by which the ground is cut into many angles, ſcrolls, &c. which is very hurtful to the eye of a judicious perſon: therefore, where flowers are deſired, there may be borders continued round the extent of the lawn, immediately before the plantations of ſhrubs; which, if properly planted with hardy flowers to ſucceed each other, will afford a much more pleaſing proſpect than the ſtiff borders made in ſcrolls and compartments, after the French manner, can poſſibly do.

Theſe borders may be made ſix or eight feet wide, in proportion to the extent of the garden, and ſize of the lawn: for a ſmall lawn ſhould not have very broad borders; nor ought a large lawn to be bounded by ſmall borders; ſo that a due proportion ſhould be always obſerved in the laying out of gardens. *Miller's Gard. Dict.*

Mr. Hitt, in his Treatiſe of Fruit-trees, has laid down the following directions for making borders for peaches, nectrines, pears, plums, cherries, &c.

" If the land, ſays he, be a ſtrong clay, take ſea-ſand, if it may eaſily be had, if not, any other ſand that is neareſt, and about one ſixth of the quantity of coal-aſhes, that have been kept very dry; riddle them, but not too fine; for if ſome of the larger parts be left, they will diſunite the tough body of clay, and make it more open and tender, and the finer parts that are more burnt, will add more ſalts to it.

" But if aſhes cannot be had, take about a twelfth part as much lime as ſand. About a third part of the depth of the borders ought to be of theſe ingredients; and in trenching the borders, there muſt be a layer of theſe, and a layer of the natural ſoil, from the bottom to their ſurface, in the above proportion; but they ought to be turned over twice at leaſt before planting, in order to mix them the better.

" If the ſoil of borders is mixed with large pebbles, they muſt be picked out, and may be of uſe, though otherwiſe hurtful, to lay in the drains.

" And as this kind of land is generally of a looſe ſandy nature, it muſt be mixed with ſomething more ſtrong and binding, which is clay, the tougheſt that can be got, and neareſt. If it be taken from the ſides of ditches, whoſe ſoil is naturally a clay, or from ditches in which there is ſometimes a current of water falling from tillage fields of that kind of ſoil, and there leaves its ſettlement, it will be as good as any.

At the bottom of the borders lay this clay ſix inches thick throughout, it will prevent the moiſture from running off too faſt in the ſummer, as it is apt to do from open ſandy ground, eſpecially where there are any drains made; then to each cart load of clay add three pecks of pigeon dung, or lime, or five of ſoot, and mix them with a quantity of the natural ſoil equal to half of them: if coal or wood aſhes are made uſe of inſtead of ſoot, they muſt be made very fine, otherwiſe they will open this ſort of land too much; beſides, the finer they are made, the more ſalts they add to it.

" But where ſandy lands are dry, the draining part muſt be omitted; and the other ingredients only are to be made uſe of. It may be ſaid, that trees will grow well upon ſandy land, without any improvement: I grant they will: but they are not ſo long-lived, being more ſubject to blights, and the fruit is both ſmaller, and of a worſe taſte, than thoſe upon ſtronger ground inclining to clay.

" If land deſigned for a garden is either hard rock or creach, and lies within the depth which the borders ought to be, let it be picked up and ſkreened to take out the ſtones; which will be of ſervice when laid under graſs or gravel walks; as they will be drier, and leſs ſubject to worm ſprouts. Then as you find the land, after ſkreening, either light or ſtrong, add to it one of the mixtures which you ſee it wants, according to the former directions, to bring it to a proper depth, and a ſoil more inclining to clay than ſand, with a covering of ſtrong clay at the bottom ſix inches thick.

" If the land be freſh and proper for fruit-trees, yet it ought to be trenched as deep as others; and if towards the top there be uſed a ſmall quantity of the ingredients mentioned before for the enrichment of ſoils, it will be of good ſervice; for it muſt be noted, that in making the trenches, the worſt part of the ſoil will be uppermoſt.

" If borders are to be planted with trees where others have grown before, the depth and quality of the ſoil muſt be examined, and if it be deep enough, and of a proper mixture of ſand and clay, then it only requires trenching, with the former addition of lime or ſoot, &c. which will be a better border than if the cold earth had been taken out, and freſh laid in without lime, &c. and alſo much cheaper.

" In borders thus prepared to ſix feet wide or more, though it is proper to make the borders as wide as the walls are high, I have known all kinds of fruit-trees proſper well, and bear excellent fruit, except vines and figs; for which the natural ſoil may be mixed with rubbiſh, as lime ſcraps, ſmall pieces of bricks, &c. for a foot deep in the bottom or more." *Hitt's Treatiſe on Fruit-trees, pag.* 6.

BORD-*Lands*, the demeſnes which lords keep in their own hands, for the maintenance of their board or table.

BORD-*Service*, the tenure of bord-lands, by which the tenants were to provide proviſions for their lord's tables. There is ſtill ſome remains of this tenure remaining; but the tenants pay only a ſmall rent per acre, inſtead of finding the proviſions formerly required.

BORER, or *Screw-borer*, an inſtrument invented by the marquis of Turbilly, for ſearching or exploring the nature of any ſoil.

This borer is compoſed of two rods of iron, Plate I. Fig. 6 and 7. each ſix feet long, and an inch in diameter. The end A, of Fig. 6, ſcrews into the end B, of Fig. 7, after taking out the ſtopper C, the uſe of which is to hinder either dirt or duſt from getting into the ſcrew. The ſcrew is an inch and a half long, and three quarters of an inch in diameter. D, Fig. 6, is a ſteel point ſomewhat blunt to pierce the earth, or any ſubſtance it may meet with. It ſhould be about three inches long, and made with either three, four, or more ſides, as may be thought moſt convenient. It is ſcrewed into the rod A in the ſame manner, and with a ſcrew of the ſame ſize as A is ſcrewed into the rod B. E is a groove ſix inches long, a third of an inch wide, and three quarters of an inch deep, rounded in the bottom, and intended to bring up part of each different layer through which it paſſes. When ſprings are ſought for, a bit of ſponge is put into the groove. At the end F, of the rod, Fig. 7, is a ſcrew to fix into another rod of the ſame kind, if it be found neceſſary to lengthen the inſtrument; and this may be repeated by the addition of more rods, to any depth deſired. G H, Fig. 6, is the handle of this inſtrument, two feet and a half long. This handle is faſtened to the rod by means of a claſp I, lined with ſteel, fixed at one end by a hinge, and at the other by the ſcrew L; ſo that it may be placed at any height. Fig. 8, is the handle ſeparated from the rod, and marked with the ſame letters as before. Fig. 9, marked with the ſame letters as before, is another handle, or rather lever, like the handle already deſcribed, except its having only one branch or lever marked G. This ſerves to ſtop the borer when we are bringing it up from a conſiderable depth, and alſo to ſcrew and unſcrew the ſeveral bars, or joints, as occaſion requires: and to put on, or take off the ſteel point at the bottom. The handle G A, Fig. 6, is that by which the rod is held, and worked into the earth, either by twiſting it round, eſpecially at firſt, or after it has penetrated to the ſame depth, by lifting it up, and letting it fall again, which it does with ſuch force as to pierce even the hardeſt rock; eſpecially if it works at any conſiderable depth, and has of courſe been lengthened accordingly; for every foot of this rod weighs three pounds. Two men will eaſily ſound the depth of twelve feet in leſs than a quarter of an hour, if they do not meet with many ſtones. When the rod becomes too heavy to be properly managed by hand, it may be raiſed by a rope faſtened at one end to the handle, and at the other to a roller, or kind of windlaſs, erected at a proper height, perpendicularly over the hole, and turned with either one or both handles. This will coſt but a trifle, and will eaſily raiſe the other rod, which, when let go, will fall with ſuch weight, as to ſtrike each time very deep into the earth. The marquis tells us, that he has ſeen it worked in this manner to the depth of more than an hundred feet.

The tougheſt iron is the beſt for making this inſtrument, which ſhould be well hammered, till its ſurface be quite ſmooth and even; for the leaſt roughneſs and inequality would occaſion a friction, which would greatly retard its working. For the ſame reaſon, and alſo to increaſe the force of its fall, it is neceſſary that it ſhould be perfectly ſtrait: nor ſhould it ever be ſtruck with a mallet, hammer, &c. to force it down; becauſe a blow might bend it, and it would eaſily break afterwards. The female ſcrew muſt be turned like that in the breech of a gun barrel, in a ſeparate piece of iron, croſs-ways to the grain, and this piece muſt be afterwards well ſoldered on to one of the ends of the rod. The reaſon for this is, that if the female ſcrew were bored only at the end of the rod, it would, by being hammered out in the ſame direction with the grain, be ſtringy and porous, and conſequently ſo weak as to give way, or burſt, in the working of the rod; whereas when made of a ſeparate piece, taken croſs-ways of the grain, the threads of the ſcrew will run with the grain of the iron, and be thence conſiderably ſtrengthened. A bit, like that of an augre, proportioned to the thickneſs of the rod, may at any time be ſubſtituted inſtead of the ſteel point, to draw up a ſample of the ſubſtance from the very bottom of the ſounding.

If the only thing wanted be to know the nature of the under ſoil, and layers of earth, ſo far as they may effect the vegetation of plants, it will be very ſufficient to bore eight or ten feet deep. A greater depth is only requiſite when water, marle, ore, &c. be ſought for.

The common augre indeed will do very well for ſhallow boring, as we have already obſerved under that article. *See the article* AUGRE.

By either of theſe inſtruments, there is a certainty of diſcovering, without much charge, or any hazard, not only what earths are under the upper ſoil, but alſo whether any other ſubſtance of value lies concealed there, ſuch as marle, chalk, fuller's-earth, foſſile ſhells, coals, quarries of ſlate or ſtone, ores, &c. many of which are hid, and entirely unthought of in places, where their value, was it known, is ten times more than that of the eſtate which covers them.

BORING, an operation ſometimes practiſed for the cure of horſes, whoſe ſhoulders are wrenched.

The operation is performed in the following manner: they cut a hole in the ſkin in the middle of the ſhoulder, and with the ſhank of a tobacco-pipe, blow it as a butcher does a ſhoulder of veal; then they run a cold flat iron, like a horſeman's ſword-blade, eight or ten inches up between the ſhoulder blade and the ribs, which they call boring; after that, they burn him round the ſhoulder with a hot iron. *Burd. Gent. Far.*

This is a very abſurd and cruel treatment, and can be of no manner of ſervice. *Bartlet's Farriery.*

BOSQUETS, ſmall groves or compartments in gardens formed by the branches of trees, diſpoſed either regularly in rows, or wildly and irregularly, according to the fancy of the owner.

BOSTAL, a way up a hill.

BOTTS, a name given to a ſpecies of worms infeſting horſes and other cattle.

The botts which breed in the ſtomachs of horſes, and which are ſometimes the cauſe of convulſions, appear to be very large maggots, compoſed of circular rings, with little ſharp prickly feet along the ſides of their bellies (like the feet of hog-lice) which, by their ſharpneſs, equal to that of the fineſt needle, ſeem to be of uſe to faſten them to the part where they breed, and from whence they draw their nouriſhment, and alſo to prevent their being looſened from ſuch adheſion, before they come to maturity. The eggs from whence theſe botts are produced, are diſpoſed in cluſters round the lower orifice of the ſtomach, and are laid under the inner coat, or thin membrane of the ſtomach; ſo that when the animals come to life, they burſt through this inner coat, their breech and tail ſtrait outwards, and their trunks ſo fixed into the muſcular or fleſhy coat of the ſtomach, that it ſometimes requires a good pull to diſengage them: from the blood of this laſt coat they draw their nouriſhment, which they ſuck like ſo many leeches, every one ulcerating and purſing up the part where it fixes, like a honey-comb; and they often make ſuch quick havock as to deſtroy the horſe.

The botts which many horſes are troubled with in the beginning of ſummer, are always ſeen ſticking to the ſtrait gut, and are often thruſt out with the dung, together with a yellowiſh coloured matter reſembling melted ſulphur; they are no ways dangerous there, but are apt to make a horſe reſtleſs and uneaſy, and rub his breech againſt the poſts. The ſeaſon of their coming is in the months of May and June, after which they are ſeldom to be ſeen, and rarely continue in any one horſe above a fortnight or three weeks. And the creature may be eaſily cured when they are only in the ſtrait gut, by giving him a ſpoonful of ſavin cut very ſmall, once or twice a day in his oats, or bran, moiſtened: three or four cloves of garlic may alſo be added to advantage. The following purge ſhould likewiſe be given:

> Take fine ſuccotrine aloes ten drams; freſh jallap one dram; birthwort and myrrh powdered, of each two drams; oil of ſavin and amber, of each one dram; ſyrup of buckthorn enough to form the whole into a ball.

But the botts, which take their lodgement in the ſtomach, are, as has been already obſerved, extremely dangerous, by cauſing convulſions, and are ſeldom diſcovered by any previous ſigns before they come to life, when they throw the horſe into violent agonies. The only cure for theſe is mercurial medicines; the following will anſwer the intention:

> Take quickſilver two drams; Venice turpentine half an ounce; rub the quickſilver till no gliſtening appears; then take an ounce of aloes, a dram of grated ginger, thirty drops of oil of ſavin, and ſyrup of buckthorn enough to make the whole into a ball.

One of theſe balls may be given every ſix days, with the uſual precautions with regard to mercurial phyſic: and the following powders immediately:

> Take powdered tin and Æthiops mineral, of each an ounce; and give it every night in a maſh, or in his corn.

Theſe medicines, or any of the various preparations of antimony and mercury, ſhould be continued ſeveral weeks together, in order to free the animal entirely from theſe vermin. *Bartlet's Farriery*, *pag.* 150.

BOUDS, a name in ſome countries for the inſects generally called weevils, breeding in malt.

BOW, a name in ſome counties for a yoke.

BOWER, a ſhady place under the covert of trees or branches interwoven. It is either round or ſquare at the bottom, and covered with a ſort of dome at the top.

BOWS *of a ſaddle*, are two pieces of wood laid archwiſe to receive the upper part of the horſe's back, to give the ſaddle its due form, and to keep it ſteady.

BOX, the name of a well known tree, of which botaniſts enumerate ſeven ſpecies; viz. 1. The box-tree. 2. The narrow leaved box-tree. 3. The ſtriped box. 4. The gold-edged box-tree. 5. The dwarf box. 6. The dwarf-ſtriped box. 7. The ſilver-edged box.

The firſt and ſecond ſorts grow in great plenty upon Box-hill near Darking in Surry, where were formerly large trees of theſe kinds: but of late they have been pretty much deſtroyed; yet there are great numbers of theſe trees remaining, which are of a conſiderable bigneſs. The wood of this tree is very uſeful for turners, engravers, and mathematical inſtrument makers; the wood being ſo hard, cloſe, and ponderous, as to ſink in water; which renders it very valuable for divers utenſils.

All the varieties of the trees, or large box, are proper to intermix in clumps of ever-greens, &c. where they add to the variety of ſuch plantations: theſe may be propagated by planting the cuttings in autumn in a ſhady border, obſerving to keep them watered until they have taken root; when they may be tranſplanted into nurſeries, till they are fit for the purpoſes intended. The beſt ſeaſon for removing theſe trees is in October; though, indeed, if care be uſed to take them up with a good ball of earth, they may be tranſplanted almoſt at any time, except in the ſummer: theſe trees are a very great ornament to cold and barren ſoils, where few other things will grow; they may alſo be propagated by laying down the branches, or from ſeeds: the laſt being the beſt method to have them grow to be large, the ſeeds muſt be ſown, ſoon after they are ripe, in a ſhady border, which muſt be duly watered in dry weather.

The dwarf kind of box is uſed for bordering of flower-beds, or borders; for which purpoſe it far exceeds any other plant, it being ſubject to no injuries from cold or heat, and is of a long duration; is very eaſily kept handſome, and, by the firmneſs of its rooting, keeps the mould in the borders from waſhing into the gravel-walks, more effectually than any plant whatever: this is increaſed by parting the roots, or planting the ſlips; but, as it makes ſo great an increaſe of itſelf, and ſo eaſily parts, it is hardly worth while to plant the ſlips that have no roots; but it is now become ſo common, that it may be purchaſed from the nurſeries at a cheap rate. *Miller's Gard. Dict.*

Box *of a wheel*, the aperture wherein the axis turns.

Box *of a plough*, the croſs-piece in the head of a plough which ſupports the two crow-ſtaves. *See* Plough.

BRACE, a general name for a couple, or pair of any thing, as bucks, hounds, partridges, &c.

Brace alſo ſignifies a piece of timber framed into the beams, &c. with bevel joints, to keep the building from ſwagging either way.

BRACKEN, the ſame with brakes, or fern. *See the article* Fern.

BRACKET, a kind of wooden ſtay, ſerving to ſupport ſhelves and the like.

BRAGGET, or Braket, a ſort of compound drink, made with honey, ſpices, &c.

BRAKE, the ſame with fern. *See the article* Fern. It is likewiſe applied to the place where fern grows.

Brake, is alſo a name given to an inſtrument often uſed by farriers, &c. generally called barnacles. *See* Barnacles.

Brake *of a pump*, ſignifies the handle wherewith it is wrought.

Brake, is likewiſe the name of a wooden-toothed inſtrument, uſed to bruiſe and break the bun of hemp, and ſeparate it from the rind. *See the article* Hemp.

BRAN, the ſkin or huſks of corn, eſpecially wheat, ground and ſeparated from the flour by means of a ſearch or boulter.

Bran is a uſeful ingredient in a horſe's diet, if diſcreetly uſed, and when ſcalded is a kind of panada for ſick horſes. But nothing is worſe than a continual uſe of bran raw or ſcalded, as it is apt to weaken a horſe's bowels, and thereby expoſe them to many diſorders. *Gibſon on the Diſeaſes of Horſes*, *vol.* I. *pag.* 172.

Mr. Mills aſſures us, that a little wheat bran boiled in our ordinary beer, will make it mantle in the cup. *Huſbandry*, *vol.* I. *pag.* 407.

BRANCH, an arm of a tree, or a part which ſprouting out from the trunk, helps to form the head or crown.

As branches have their outward parts common with the chief ſtem, ſo in like manner do their inward conſiſt of a multitude of tubes, which are alſo provided with a number of ſmall glands, veins, and muſcles, interſperſed here and there, where the ſap coming from the firſt canal is rendered much more delicate.

Branches are diſtinguiſhed into various kinds: 1. Wood-branches, which are thoſe that form the ſhape of the tree, and are to be pruned from four to twelve inches, according to the vigour of the tree. 2. Fruit-branches, which are ſlenderer than the wood-branches, and have their eyes near to one another and large, by which the fruit-buds are formed. If they are too long, they are to be topped; but if they are of a juſt length, they are to be preſerved, only juſt cutting off the extremity. 3. Branch half-wood, that which, being too ſlender for a wood-branch, and too big for a fruit-branch, is cut off at the length of two or three inches, to make it produce a better ſhoot, whether wood or fruit. 4. Irregular branches, which are ſmall and confuſed: they muſt be cut off, becauſe they are neither fit for wood nor fruit. 5. Branches of falſe wood: theſe are ſuch as grow upon the true wood-branches, and have flat eyes at a diſtance one from another; for which reaſon they are uſeleſ, and therefore muſt be cut off. 6. Luxuriant branches, which are ſuch as ſhoot out from the large wood-branches: theſe are as taper and as big about as one's finger, the back being ſmooth and even, and having broad eyes at a diſtance from one another: theſe muſt all be cut off. 7. Spurious wood-branches, ſuch as come contrary to the order of nature, or otherwiſe than from the cuts of the preceding year; or which, coming on ſuch cuts, are big in the place where they ſhould be ſmall.

The diſtinguiſhing marks of good branches are, that the eyes, in the whole extent, be thick, well-fed, and very cloſe one to another. The good ſtrong branches are employed in producing yearly, on their extremities, other new branches, ſome ſtrong and others weak. The good weak branches are ſuch as are well placed, and being of a mean thickneſs and length, may be able to produce ſpeedily beautiful and good fruit.

The diſtinguiſhing marks of bad branches are, when in the lower part the eyes are flat, ill-fed, and hardly formed, and at a large diſtance one from another. See the article Pruning.

BRANK, the ſame with buckwheat. See the article Buckwheat.

BRANT, a ſteep, riſing with a conſiderable inclination.

BRAWN, the fleſh of a boar, boned, rolled up, or collared, boiled, and laſtly pickled.

Brawn is made only of the flitches, without the legs: the oldeſt boars are choſen for this uſe, it being a rule, that the older the boar the more horny the brawn.

The method of making it is as follows: the bones being taken out of the flitches, the fleſh is ſprinkled with ſalt, and laid in a tray, that the blood may drain off; after which it is ſalted a little, and rolled up as hard as poſſible. The length of the collar of brawn ſhould be as much as one ſide of the bone will bear; ſo that when rolled up it may be nine or ten inches in diameter.

The collar being thus rolled up, it is boiled in a copper or large kettle, till it is ſo tender that you may run a ſtraw through it; when it is ſet by till thoroughly cold, and then put into the following pickle. To every gallon of water add two handfuls of ſalt, and as much wheat-bran: boil them together, drain the liquor as clear as poſſible from the bran, and when the liquor is quite cold, put the brawn into it.

BREAD, a well-known food chiefly divided into white, wheaten, and houſhold; differing only in degrees of purity. In the firſt, all the bran is ſeparated; in the ſecond, only the coarſer; in the third, none at all: ſo that fine bread is made only of flour; wheaten bread of flour, with a mixture of fine bran; and houſhold, of the whole ſubſtance of the grain, without taking out either the coarſe bran, or fine flour.

We alſo meet with ſymnel bread, manchet or roll bread, and French bread: which are only ſo many denominations of the fineſt or whiteſt bread, made of the pureſt flour; except that in roll bread there is an addition of milk, and, in French bread, of eggs and butter alſo. To which may be added, ginger-bread, made of white bread, with almonds, liquorice, aniſeed, roſe-water, and ſugar; and maſlin bread, made of wheat and rye, or ſometimes of wheat and barley.

The proceſs of making houſhold bread amongſt us, is thus: to a peck of meal they add a handful of ſalt, a pint of yeaſt, and three quarts of water, cold in ſummer, hot in winter, and temperate between the two; the whole, being kneaded in a bowl or trough by the fire in winter, from it in ſummer, and a little yeaſt added, will riſe in about an hour; they then mould it into loaves, and put it into the oven to bake. *Hought. Collect.*

For leavened bread, part of the flour intended for it, being made into dough with warm water and a little ſalt, is laid in the reſt of the flour an hour or more, in which time it riſes to three times the bulk; then they mix and knead the whole with more water, till it be brought into a ſtiff dough; which, being formed into loaves, is baked in the oven: though the more uſual way is to take a piece of dough kneaded, and leave it in the tub till next time, when they break it ſmall, and mix it with the meal, adding ſome yeaſt. *Hought. Collect.*

For French bread, they take half a buſhel of fine flour, ten eggs, and a pound and a half of freſh butter, into which they put as much yeaſt, with manchet; and, tempering the whole maſs with new milk, pretty hot, let it lie half an hour to riſe; which done, they make it into loaves or rolls, and waſh it over with an egg beaten with milk: care is taken the oven be not too hot. *Ruſt. Dict.*

BREAK, land ploughed the firſt time after it has lain fallow in ſheep walks.

BREAST-PLOUGH, a ſmall plough contrived ſo that a man may ſhove it before him. It conſiſts of a cutting iron about eight or nine inches long, and having one of its ſides turned up to cut the turf. This iron is fixed to a pole bending upward about five or ſix feet long, and forked at the upper-end, having a crutch, or croſs handle, mortiſed into the forks. Againſt this crutch the ploughman places his breaſt, and ſhoves along the plough in order to turn up the turf, its only uſe being for cutting up the ſurface of the ground in the operation called burn-baking. See the article Burn-Baking.

BRECK, *or* Brack, a breach or gap made in a hedge

BREW-HOUSE, a houſe erected for the purpoſes of brewing.

The conveniency of water is one of the firſt things to be attended to in erecting a brew-houſe, becauſe the frequent carriage of that neceſſary fluid greatly enhances the coſt of the beer. The water ſhould be ſoft, and if ſupplied from an adjacent river, it ſhould be conveyed by a paſſage under-ground, in order to its being pumped up from thence into the copper, or into troughs properly placed for carrying it where it may be wanted. If there be a reſervoir for rain-water, it ſhould be made as near the brew-houſe as poſſible.

The brew-houſe ſhould be ſo ſituated as to face the north, for ſhade and coolneſs. It ſhould be as near as poſſible to the cellar, that the labour and expence attending the carriage of the liquor may be ſaved, and the danger of expoſing it to either too hot, or too cold an air prevented. The floor ſhould be paved with ſtone or hard bricks, and raiſed in the middle, to give an eaſy diſcharge to the water, ſo as to keep the brew-houſe always clean.

The copper ſhould be proportioned to the quantity brewed, and ſhould be raiſed ſo high that the water may run from it to the maſh-tub, and the wort to the coolers. For this purpoſe there ſhould be either a cock in the ſide at the bottom of the copper, or a braſs pump ſhould be fixed to its ſide, by means of which the water or wort may be conveyed through a trough to their proper receptacles.

The maſh-tub ſhould be round, not too deep, and perfectly ſmooth on the inſide. It ſhould have a falſe bottom, which may ſerve as a ſtrainer, when by turning a cock placed below, the wort may be drawn off into the receiver: or the wort may be let out by means of an upright plug ſurrounded with a baſket-ſtrainer.

The receiver ſhould be lined with milled lead, which is eaſily kept perfectly clean, and is not apt to contract any bad taſte or ſcent, as wood is known to do, notwithſtanding the greateſt care. The beſt method of conveying the wort from the receiver to the copper is by means of a hand-pump.

There ſhould be two coolers, or backs, as the brewers call them. Theſe ſhould alſo be lined with milled lead, or made of the heart of oak rendered perfectly ſmooth; and placed as near as convenient to the copper.

The working veſſel or tun ſhould be placed at ſome ſmall diſtance from the cooler. It ſhould be round, but not lined with lead; becauſe this would cool the liquor too much in cold weather, during the fermentation.

The cellar ſhould, as already obſerved, be near, if poſſible, and ſunk much lower than the working-tun, that the beer may be conveyed into the caſks by a cock and hoſe, or ſome other eaſy method.

There muſt be in the brew-houſe an oar to ſtir the malt in the maſh-tub, with bowls, pails, and other utenſils, neceſſary in different operations. Theſe, as well as every other implement employed in brewing, ſhould be boiled in the copper, or well ſcalded every time before they are uſed.

Too great care cannot be taken to keep every veſſel perfectly clean and ſweet: for if they are the leaſt tainted, the liquor will contract a diſagreeable ſcent. When any taint is ſuſpected, the veſſels ſhould be well waſhed with a ſtrong leye of clean wood-aſhes. This leye ſhould be put into them ſcalding hot, and every joint, crevice, and ſmalleſt hollow muſt be well ſcrubbed. If there are no aſhes to be had, lime may be ſlaked in water in the veſſels; and if this be done in caſks, they may be bunged up as ſoon as the ebullition is over, and not opened till three days after. The more effectually to prevent the lodging of any kind of filth, the ſides of every veſſel ſhould be as ſmooth as poſſible; and after every brewing they ſhould be waſhed with boiling water, and laid up dry.

BREWING, the operation of preparing beer, or ale, from malt and hops.

The uſual proceſs of brewing is as follows: the ingredients being ready, the water muſt be made to boil very ſpeedily, and while boiling with the greateſt violence, the fire muſt be immediately damped, or put out; when the height of the ſteam is over, the water is put into the maſhing-tub, to wet the malt; then ſo much being poured out, as to make it of a conſiſtence ſtiff enough to be rowed up, let it ſtand thus a quarter of an hour, after which another quantity of water is added, and rowed up as before; at laſt the full quantity of the water is poured upon it, and that in proportion as the liquor is intended to be ſtrong or weak: this part of the operation is called maſhing. Afterwards the whole may be left to ſtand two or three hours, more or leſs, according to the ſtrength of the wort, or the difference of the weather; then let it run into the receiver, and maſh again for a ſecond wort, in the ſame manner as for the firſt, only the water muſt be cooler, and muſt not ſtand above half the time.

The two worts being mixed together, the quantity of hops that is deſigned may be added thereto, and the liquor put into the copper, which being coſely covered up, let it boil gently for the ſpace of an hour or two; then let the liquor into the receiver, and the hops ſtrained from it into the coolers.

When cool, the barm is applied; which done, it is left to work, or ferment, till it be fit to tun up.

For ſmall-beer there muſt be a third maſhing; the water muſt be near cold, and to ſtand not above three quarters of an hour; to be hopped and boiled at diſcretion.

Such is the proceſs, as commonly delivered, for brewing; but it is in many particulars ſo vague and uncertain, that proper explanations will be requiſite.

The malt is ordered to be put into the maſh-tub, when the height of the ſteam is over; but how is this to be known exactly? Some direct you to ſtay till you can ſee your face in the water, which is full as equivocal. Perhaps the method propoſed by Dr. Shaw might anſwer the purpoſe. He directs us to put a certain meaſured quantity of cold water to the malt firſt, and ſtir that very well with it, ſo as to from a kind of thin uniform paſte; after which the remaining quantity of the water may be added in a ſtate of boiling, without the leaſt danger. By this means, adds that able chemiſt, the proper or preciſe degree of heat, neceſſary to extract the virtue of the malt with all advantages, may be very expeditiouſly hit, or aſſigned, to a great exactneſs; as the heat of boiling water is a ſtandard, which may at once be let down to any deſired point of warmth, by a proper addition of cold water; due allowance being made for the ſeaſon of the year, and the temperature of the air.

To employ only one copper in brewing is generally allowed to be bad management; becauſe the buſineſs muſt, in that caſe, ſtand ſtill in ſome part or the other, however well the proceſs may be contrived. For this reaſon, the beſt and more uſual method is to brew with two coppers.

The great copper in which the water for the two firſt extracts receive their temperature, is built very near the maſh-tub, ſo that the water may be readily conveyed to the ground malt. At the bottom of the copper is fixed a cock, which being turned, lets the water run through a pipe to the real bottom of the maſh-tub. This is by far the beſt way, becauſe it is the moſt expeditious, and leaſt liable to accidents.

When the water has been brought to a proper degree of heat in the maſh-tub, the malt is run very leiſurely into it, whilſt another perſon ſtirs it all the time, ſo as to mix the whole of it uniformly with the water, and prevent any of its parts from gathering into clods. In this operation rakes ſhould be firſt employed; becauſe by their horizontal motion, leſs violent than that of maſhing, the fineſt parts of the malt are well wetted, without its flour being ſcattered or loſt in the air: but as a ſtill more perfect penetration and mixture are neceſſary, oars are afterwards uſed, by which a thorough inhibition of the water is effected. When the maſh has been ſufficiently ſtirred, it is covered with a ſprinkling of malt, and the tub itſelf ſhould alſo be covered with ſacks or other cloths to keep it warm.

After maſhing, the malt and water are left untouched for an hour and a half, or two hours; and during this interval, the large copper of water is brought to a proper heat for a ſecond maſhing. The ſecond extract is commonly maſhed three quarters of an hour, and is afterwards let ſtand the ſame ſpace of time; and the third requires half an hour, both for maſhing and ſtanding. As the firſt drawn wort is immediately put into the large copper, the water for the third maſhing is boiled in the ſmaller.

Small quantities of malt brewed in large veſſels loſe their heat ſooneſt by lying thin and greatly expoſed to the action of the air; and, on the contrary, a leſs allowance for the loſs of heat is required for large quantities brewed in proportionable veſſels. This is the only difference between brewings carried on in large brew-houſes, and thoſe which are made in private families. Care ſhould be taken that the quantity of malt be not ſo large as to exceed the bounds of one man's labour; nor ſo ſmall as to prevent the heat being uniformly maintained. It is alſo of great importance never to let the malt remain with leſs water than will cover it.

It is the general cuſtom in private families to brew their ſmall-beer after their ale: but they may be aſſured that if they have any regard to their ſmall-beer, it is their intereſt to brew it alone; for the beer thus made is incomparably better, becauſe it then contains all the flavour of the malt, is undoubtedly more wholeſome, and will keep much longer.

A correſpondent of the editors of the *Muſeum Ruſticum*, vol. vi. p. 287, has given the following uſeful directions for making a kind of ſmall-beer, which for cheapneſs, agreeableneſs, and perhaps wholeſomeneſs, is greatly preferable to that made from malt. It has alſo this further advantage, that it may be made ready for drinking in three or four days time.

The method is this: take of water fifteen gallons; and boil one half of it in any copper or pot that may be at hand. Put the part of the water thus boiled, while in its full heat, to the cold part contained in a barrel or caſk: and then add one gallon of melaſſes, commonly called treacle, ſtirring them well together. If the veſſel be new, add a little yeaſt; but if it has been uſed before for the ſame purpoſe, the yeaſt will be unneceſſary. Keep the bung-hole open for a day or two, till the fermentation appears to be abated, and then cloſe it up. The beer will in a day or two afterwards be fit to drink.

But to return to the management of the wort. The beer-wort muſt be boiled, in order to free it from particles which would render the liquor muddy and ill coloured, without adding to its ſtrength; to extract the virtue of the hops; and to render the drink fitter for keeping.

Worts, like every other ſweet vegetable juice, when once brought to ferment, are ſo inclined to continue their fermentation, that it is difficult to retard their progreſs therein, to keep their preſervative qualities, and ſo hinder them from turning acid. Among the many methods put in practice to retard this forwardneſs of the worts, none promiſed ſo much ſuccaſs as blending with them the juice of ſuch vegetables as are not of themſelves eaſily fermented. Hops are ſelected for this purpoſe; and experience, which has proved their wholeſomeneſs, has alſo demonſtrated their efficacy: for their reſinous parts retard the aptneſs of malt liquors to ferment. By this means they keep malt-liquors ſound a longer time, and by repeated and ſlow frettings, give an opportunity to the particles of the liquor to be more ſeparated and comminuted, than they would otherwiſe be. Fermented liquors require hereby a greater pungency, ſo that, even if they did not receive an additional ſtrength from this ingredient, hops would be the means of improving their taſte.

The aromatic parts of hops are volatile, and a ſmall heat diſengages them from the plant. To preſerve theſe parts in the proceſs of brewing, the hops ſhould be put into the copper as ſoon as poſſible, and be thoroughly heated while the heat of the wort is at the leaſt, and the fire under the copper has no effect there. Whoever will take the trouble of ſeeing this performed, will be convinced that the flavour of the hops is retained; inſtead of being diſſipated in the air, as it always is, when the wort is firſt ſuffered to boil.

In order to extract more gradually a fragrant tincture from the hops, they ſhould be rubbed thoroughly between the hands, and then put into a bag or fine net, ſo looſe that the wort may be eaſily admitted among them, and in this ſtate they ſhould be placed in the receiver or under-back, ſo that the wort may run upon them. After this gradual ſoaking, during which they will communicate much of their virtue to the wort, leſs boiling will ſerve, and the beer will have their full flavour.

A correſpondent of the editors of the *Muſeum Ruſticum*, vol. III. pag. 64, has made ſome judicious remarks on the common practice of boiling the hops in the wort. He obſerves that the rich, fat wort ſheaths up the pores of the hop, and, as it were, embalms the leaves, ſo that the beer or ale-wort can extract a very ſmall part only of the neceſſary quality of the hop:

but when it is put into the ſmall beer, a fluid of a thinner nature, the pores are unſheathed ; ſo that the latter becomes too bitter, while the former has hardly any taſte of the hop. To remove theſe inconveniencies, he propoſes to ſoak the hops previouſly in a pail or two of hot water, by which means the hop will impart its good qualities impartially, and both the ſtrong and ſmall beer obtain a grateful bitter. And with regard to the quantity of water uſed in ſoaking the hops, allowance may be made for it in the firſt quantity.

When the firſt wort is ſufficiently boiled, it is conveyed into the coolers ; and if the hops are not contained in a net, it muſt be run through a ſieve or ſtrainer, to keep them back. If the coolers have not been perfectly cleaned from the ſediment of former worts, which is very apt to inſinuate itſelf into old or decayed wood, the wort intended to be cooled in them, will, before it is removed, contract from that ſediment a degree of fermentation. This accident generally happens in a little more than twelve hours after the putting in of the wort ; and therefore may be eaſily prevented by not letting the wort continue ſo long in the coolers.

When the wort is of a proper degree of coolneſs, the yeaſt is generally put into a large bowl, and a little of the wort juſt warm is added to it. The yeaſt ſwims at firſt on the ſurface, but ſoon blends itſelf with the wort, and begins the fermentation. As ſoon as this happens, the whole is mixed with the wort in the working tun.

If the fermentation ſhould not riſe properly, a little of the fineſt wheat flour ſifted over the wort, ſo as to cover the whole ſurface of the liquor, will, by forming a kind of artificial head, confine the air, and ſoon produce the effect deſired. If a greater degree of warmth ſhould be wanted, a ſtone jug filled with boiling water, and put into the wort, will communicate a gentle heat to the whole, and as the liquor warms, the fermentation will come on in a gradual and proper manner. In the courſe of the fermentation, it may ſometimes be neceſſary, in order to quicken it, to beat in the yeaſt, or rather to ſtir it with a whiſk, which ſhould be perfectly clean, ſcalded in boiling water, and then wiped dry. It will alſo by this means retain ſome degree of warmth, which will likewiſe help to promote the fermentation. Theſe meaſures, with an additional warmth given to the air, and warm coverings laid over the working tun, ſeldom fail to anſwer the end deſired.

If the fermentation proceeds too violently, owing to the warmth of the weather, or too great quantity of yeaſt, the beſt way of checking it is, to cool the air, by giving it a more free admiſſion, and to mix a little cold wort with the fermenting liquor. The practice of adding ſome unctuous ſubſtance is bad, and therefore ſhould be rejected.

Care ſhould be taken to have the caſks in good order againſt the time that the fermentation is completed in the tub ; that is, they ſhould be tight and clean, and perfectly free from filth or ſmell ; for if they have either of theſe defects, the whole labour will be loſt, becauſe the excellency and fine flavour of the liquor will be deſtroyed.

The perfection of malt liquors depends not only on the proportion of the oils to the ſalts, and on the proportion of hops uſed in brewing, but alſo on the fermentation's being carried on ſlowly and cooly. For this reaſon cool weather is beſt for brewing of beer intended for long keeping. If therefore the liquor be not drawn off before the fermentation has proceeded too far, ſome of the coarſer oils will return into the liquor, and give it a diſagreeable and greaſy taſte. On the contrary, if the fermentation has not been continued its due time, the impurities which would either have ſunk down in the lees, or have been thrown up with the head, will remain in the liquor, and prevent its becoming clear and well taſted.

When the fermentation is at its height, all the dirt or foul yeaſt, which riſes on the ſurface, muſt be carefully ſkimmed off.

When the fermentation begins to ſubſide after the liquor has been drawn off into the caſk, the caſk ſhould be filled up with a reſerve of the ſame liquor taken from another veſſel, but by no means with that which runs over.

When the fermentation has ceaſed, the caſk being filled up, ſhould be bunged cloſe down, leaving the vent-hole open, or but ſlightly covered, till all motion in the liquor is ſubſided ; and after this is over, the vent-hole ſhould be ſtopped quite cloſe. The cuſtom of uſing bungs made of cork is wrong. A wooden bung ſhould be fitted to the bung-hole as exactly as poſſible, and covered with a clean cloth.

BRIDLE, a contrivance made of ſtraps or thongs of leather, and pieces of iron, in order to keep a horſe in ſubjection and obedience.

The ſeveral parts of a bridle are, the bit or ſnaffle, the head-ſtall, or leather from the top of the head to the rings of the bit ; the fillet, over the forehead and under the foretop ; the throat-band, which buckles from the head-band under the throat ; the noſe-bands, going through the loops at the back of the head-ſtall, and buckled under the cheeks ; the reins or long thongs of leather that come from the rings of the bit, and being caſt over the horſe's head, the rider holds in his hand.

BRIDLE-*hand*, is the horſeman's left-hand, the right being called the ſpear or ſword-hand.

BRIM, or BRIMME, a word applied to a ſow when ſhe goes to the boar, which is called going to brim.

BRINE, pickle, or water replete with ſaline particles.

BRINING *of hay reeks*, a practice common in America, and conſiſts in mixing ſalt with the hay as they ſtack it.

A correſpondent of the editors of the *Muſeum Ruſticum* recommends this practice greatly, declaring that hay which has to all appearance been ſpoiled by the rain, will ſpend as well as that made and ricked in the fineſt weather.

" Juſt before I left America, ſays he, I had a crop of hay, which was in a manner ſpoiled by the rain, being almoſt rotted in the field ; yet did this hay ſpend as well as if it had been got in ever ſo favourably.

" When my ſervants were making up the ſtack, I had it managed in the following manner ; as ſoon as the bed of hay was laid about ſix inches thick, I had the whole ſprinkled over with ſalt ; then another bed of hay was laid, which was again ſprinkled in the ſame manner ; and this method was followed till all the hay was ſtacked.

" When the ſeaſon came for cutting this hay, and giving it to my cattle, I found that ſo far from refuſing it, they eat it with ſurprizing appetite ; always preferring it to the ſweeteſt hay, that had not been in this manner ſprinkled with ſalt." *Muſeum Ruſt. vol.* II. *pag.* 210.

BRITE, a word applied to hops when they are over ripe or ſhatter, in which caſe they are ſaid to brite.

BROAD-WHEELED *waggon. See the article* WAGGON.

BROCOLI, or BROCCOLI, a ſpecies of cabbage, of which there are ſeveral varieties. *See the article* CABBAGE.

Brocoli requires a very good and pretty light ſoil, rather deep than otherwiſe. The proper time for ſowing it is from the latter end of April, till the beginning of June ; and the manner the ſame as for cabbage. When the plants are about a fortnight or three weeks old, that is when they have got ſeven or eight leaves, they ſhould, like all others of the cabbage kind, be tranſplanted into beds of well prepared mould, and towards the end of July they will be fit to be tranſplanted into beds where they are to remain. This ſhould be a well ſheltered ſpot, but not under the drip of trees. The plants ſhould here be ſet in rows at leaſt two feet aſunder, but two feet and a half, or even three feet, will be ſtill better ; and at the diſtance of a foot and a half, or rather two feet from each other in the rows. Towards the end of December, if the weather be not very ſevere, they will begin to ſhew their ſmall heads, which, eſpecially at their firſt appearance, are not unlike thoſe of cauliflowers. Theſe heads ſhould be cut off before they run up to ſeed, with about four or five inches of the ſtalks, and a great number of ſide ſhoots, produced from the ſtem, will ſucceed them, and continue fit for eating till the middle of March. They will not indeed be ſo large as the former, but they will be equally well taſted. The ſkin of the ſtalks ſhould be taken off before they are boiled.

There are three ſorts of brocoli cultivated in our kitchen gardens, viz. The Roman or purple brocoli; the Naples, or white brocoli; and the brown or black brocoli. The firſt of theſe is the fineſt flavoured, and continues longeſt in ſeaſon; and therefore is moſt eſteemed. The ſecond, or white brocoli, has ſo nearly the taſte of cauliflower, that it is not always eaſy to diſtinguiſh them. The brown or black ſort is the leaſt delicate; but the hardieſt, and grows to the largeſt ſize.

For a ſecond crop to ſupply the table after the firſt is gone, Mr. Miller adviſes the ſowing of brocoli again in the beginning of July; but Mr. Switzer thinks it wrong to ſow this plant even ſo late as Midſummer, becauſe their ſtems will not be ſtrong enough before the winter to produce that number of ſprouts they otherwiſe would do, if ſown ſooner. He therefore directs the plants to be divided into three parts, and to cut their heads off entirely within a foot and a half, or two feet of the ground; beginning to do this to one parcel about a fortnight before Michaelmas, to the next about a month after, and to the laſt about a fortnight or three weeks before Chriſtmas: by which means a continued ſucceſſion of ſprouts will iſſue from the ſides of the remaining ſtems. Either directions may be followed; but the largeſt heads will be produced by Mr. Miller's method, and the greateſt number by that of Mr. Switzer. *Miller's Gard. Dict. Switzer's Method of raiſing Italian Brocoli*, &c. *pag.* 2.

BROKEN-WIND, a very fatal diſeaſe to which horſes are too often ſubject.

This diſorder hitherto ſeems to have been little underſtood; but Mr. Gibſon is inclined to think, that the ſource of it is frequently owing to injudicious, or haſty feeding young horſes for ſale; by which means the growth of the lungs, and all the contents within the cheſt, are ſo increaſed, and, in a few years, ſo preternaturally enlarged, that the cavity of the cheſt is not capacious enough for them to expand themſelves, and perform their functions.

A narrow contracted cheſt with large lungs may ſometimes naturally be the cauſe of this diſorder: and it has been obſerved, that horſes riſing eight years old, are as liable to this diſtemper, as at a certain period of life, men fall into aſthmas, conſumptions, and other chronic diſeaſes.

The reaſon why this diſorder becomes more apparent at this age may be, that a horſe comes to his full ſtrength and maturity at this time: at ſix he commonly finiſhes his growth in height; after which he lets down his belly, and ſpreads, and all his parts are grown to their full extent; ſo that the preſſure on the lungs and midriff is now more increaſed.

But how little weight ſoever theſe reaſons may have, repeated diſſections have given ocular proofs of a preternatural largeneſs, not only of the lungs of broken-winded horſes, but of their heart and its bag; and alſo of the membrane which divides the cheſt; as well as of the remarkable thinneſs of the diaphragm or midriff.

This diſproportion has been obſerved to be ſo great, that the heart and lungs have been almoſt of twice their natural ſize; perfectly ſound, and without any ulceration whatever, or any defect in the wind-pipe or its glands.

Hence it appears, that this enormous ſize of the lungs, and the ſpace they occupy, by hindering the free action of the midriff, is the chief cauſe of this diſorder; and as the ſubſtance of the lungs was found more fleſhy than uſual, they muſt of courſe have loſt much of their ſpring and tone.

This fleſhineſs and ſize of the lungs may, in a great meaſure, be the cauſe, why the inſpirations in broken-winded horſes are diſproportionately ſlow; for we may obſerve that they draw their in breath ſlowly, their flanks filling up, and riſing with difficulty: but that their flanks fall ſuddenly, and their breath burſts forth with violence, both from mouth and noſtrils; inſomuch, that a man in the dark, by holding his hands on the horſe's mouth and noſe, may eaſily diſcover if he is broken-winded.

Whoever conſiders a broken-wind in this light, muſt own that it may be reckoned among the incurable diſtempers of horſes; and that all the boaſted pretenſions to cure, are vain and frivolous, ſince the utmoſt ſkill can amount to no more than now and then palliating the ſymptoms, and mitigating their violence.

We ſhall therefore lay down ſuch methods as may probably prevent this diſorder, when purſued in time; but if they ſhould not ſucceed, we ſhall offer ſome remedies and rules to mitigate its force, and to make a a horſe as uſeful as poſſible under this malady.

It is uſual before a broken-wind appears, for a horſe to have a dry obſtinate cough, without any viſible ſickneſs or loſs of appetite; but, on the contrary, a diſpoſition to foul feeding, eating the litter, and drinking much water.

In order then to prevent, as much as poſſible, this diſorder, bleed him, and give him two drams of calomel, mixed up with an ounce of diapente, for two nights ſucceſſively, keeping him cloathed and well littered; and feeding him with ſcalded bran and warm water.

The following balls are then to be taken for ſome time, which have been found extremely efficacious in removing obſtinate coughs:

> Take gum ammoniacum, galbanum, and aſſa fœtida, of each two ounces; ſquills, four ounces; cinnabar of antimony, ſix ounces; ſaffron, half an ounce: make the whole into a paſte with honey; and give a ball about the ſize of a pullet's egg every morning.

Broken-winded horſes ſhould eat ſparingly of hay, which, as well as their corn, may be wetted with chamber-lye, or fair water; as this will make them leſs craving after water.

The volatile ſalts in the urine may render it preferable to water, and may be the reaſon why garlic is found ſo very efficacious in theſe caſes; two or three cloves given at a time in a feed, or three ounces of garlic bruiſed, and boiled in a quart of milk and water, and given every other morning for a fortnight, having been found very ſerviceable; for by warming and ſtimulating the ſolids, and diſſolving the tenacious juices, which choak up the veſſels of the lungs, theſe complaints are greatly relieved.

Careful feeding and moderate exerciſe has greatly relieved broken-winded horſes; and though for the firſt ſummer they have not been able to endure much labour, yet many have been found leſs oppreſſed the ſecond, and ſome ſcarce perceptibly affected the third; and even able to bear great fatigue: and could a horſe be kept conſtantly in the field, and taken up only when uſed, he might, by this management, do good ſervice for many years.

But whoever expects to cure his horſe by ſending him out to graſs, will find himſelf diſappointed, eſpecially if he remains abroad after the ſpring graſs; for on his return to the ſtable and dry meat, he will be more oppreſſed and ſhort breathed than before, for want of the open air, and the moiſt food he has been accuſtomed to.

Horſes ſent to graſs in order to be cured of an obſtinate cough, have often returned completely broken-winded, where the paſture has been rich and ſucculent, ſo that they have had their bellies conſtantly full. As the ill conſequence therefore is obvious, where you have not the convenience of turning out your horſe for a conſtancy, you may ſoil him for a month or two with young green barley, tares, or any other young herbage.

To purſive, thick winded horſes, Barbadoes and common tar have often been given with ſucceſs, to the quantity of two ſpoonfuls mixed with the yolk of an egg, diſſolved in warm ale, and given faſting two or three times a week, eſpecially on thoſe days you hunt or travel.

But in order to make all theſe ſorts of horſes of any real ſervice, the grand point is to have a particular regard to their diet, obſerving a juſt œconomy both in that and their exerciſe; giving them but a moderate quantity of hay, corn, or water, at a time, and moiſtening the former to prevent their requiring too much of the latter, and never exerciſing them but with moderation, as has been before obſerved.

The following ball may be given once a fortnight or three weeks; and as it operates very gently, and requires no confinement, except the days it is given (when warm meat and water will be neceſſary) it may be continued for two or three months.

> Take ſuccotrine aloes, ſix drams; myrrh, galbanum, and ammoniacum, of each two drams; bay berries, half an ounce; oil of amber, a ſpoonful: make the whole into a ball with a ſufficient quantity of ſyrup of buckthorn. *Bartlet's Farriery, pag.* 68.

BROODING, the act of a hen, or other bird, ſitting on a number of eggs, to keep them warm, till they hatch, or produce young ones.

BROOM, the name of a plant, of which two ſpecies are natives of this country, called the common and the ſmall broom.

The common broom is the *geniſta trifolia* of Mr. Ray. It riſes about three feet in height, with ſhrubby ſtalks, garniſhed with ſpear-like leaves, and terminated by looſe ſpikes of yellow flowers, ſucceeded by ſhort pods, which turn black when ripe, and contain four or five kidney-ſhaped ſeeds. It flowers in June or July, and the ſeeds ripen in autumn. The flowers of this plant are uſed by the dyers to give a yellow colour; whence it is called dyers broom, green-wood, wood-waxen, or dyers weed.

The ſmall Engliſh broom, called alſo petty-whin, is the *geniſta ſpartium minus Anglicum*, of Tournefort. It riſes like the former, with a ſhrubby ſtalk, but only to the height of about two feet, ſending out many ſlender branches, which are armed with long ſingle ſpikes, and garniſhed with very ſmall ſpear-ſhaped leaves, placed alternately on every ſide of the branches. The flowers branch out without ſpines, ſhort, and have five or ſix yellow flowers growing in a cluſter at the end. They come out in April and May, and are ſucceeded by ſhort turgid pods, containing four or five ſmall kidney-ſhaped ſeeds, which ripen in July. This ſort grows naturally upon open heaths, in many parts of England.

The twigs of broom are excellent for thatching barns, &c. being very tough, and of long duration. Ropes alſo, and thoſe not bad ones, are made of the ſtringy fibres of this plant, of which the ancients uſed alſo to make a kind of flax.

According to Mr. Bradley's calculation, an acre of of broom is worth upwards of ſix pounds annually, for the feeding of bees only, beſides the wythes and ſtumps, which will pay for the rent of the land. Certain it is, that no flowers are more pleaſing, or more profitable to bees, than thoſe of broom.

But conſidered as a weed, is one of the moſt pernicious plants that grows upon the land; for its roots penetrate deep, and, at the ſame time it ſheds no leaves, ſo that it is continually ſucking the moiſture from the earth. The beſt method of deſtroying it, is by burning the land, then ploughing it deep, and manuring it very well with dung and aſhes; or by ſpreading on the land chalk or marle, or manuring it with urine. If the ground be deſigned for paſture land, it is beſt to cut the broom cloſe to the ground in May, when the ſap is ſtrong in it. By this artifice the roots are deſtroyed; whereas in the common way of pulling up the young plants, ſome ſtrings of the roots will be left, and the leaſt of theſe will grow. Foddering of cattle upon broomy land is one very good way of deſtroying the broom, their urine killing the roots, and their treading the land makes it leſs proper for the roots to extend themſelves; for broom is ſeldom ſeen to grow near old paths. *Bradley's Huſbandry, vol.* I. *pag.* 181. *Mortimer's Huſbandry, vol.* I. *pag.* 308. *Mills's Huſbandry, vol.* III. *pag.* 361.

BROWN, a duſky kind of colour, inclining ſomewhat towards redneſs.

A brown horſe is not reckoned altogether ſo beautiful as the bay or cheſnut. There are alſo degrees of this colour, ſome being light, and others very dark. They have almoſt always black manes and tails, and often their joints are black, though not ſo ſhining as the bays, but ruſty. Almoſt all brown horſes grow gradually lighter towards their bellies and flanks, and many are light about their muzzles. The moſt beautiful are thoſe which happen to be finely dappled, for the plain brown are eſteemed more ordinary. Many of them are coarſe, but ſtrong and ſerviceable, fit for draught, for burden, or for war. *Gibſon on Horſes, vol.* I. *pag.* 46.

BROWN-STOUT, a name given in ſome parts to ſtrong brown beer, brewed from brown high-dried malt.

BROWSE, branches fit for the food of goats, &c.

BRUISE, a hurt cauſed by the force of ſomething blunt and heavy.

Horſes and other cattle are very ſubject to bruiſes from various accidents; but as the blood is no ways affected in theſe caſes, one general method of cure is only neceſſary; and that is by coolers and repellers, ſuch as white wine vinegar, old verjuice, or compoſitions made with alum, vitriol, and the like, which ſhould be applied frequently to the ſwelling, till the heat and inflammation is abated.

BUCK-BEAN, or *Marſh-trefoil, trifolium paluſtre*, a plant with large oval leaves, pointed at each end like thoſe of the garden bean, ſet three together on long pedicles, which embrace the ſtalk to ſome height, and there parting, leave it naked near the top, where iſſues a ſhort ſpike of pretty large, reddiſh, monopetalous flowers, each of which is cut into five ſegments, hairy on the inſide, and followed by an oval ſeed-veſſel. It is perennial, grows wild in marſhy places, and flowers in May.

Sheep, when ſound and in health, always avoid eating buck-bean; but when the ſymptoms of the rot begin to attack them, they ſearch for it by inſtinct, and devour it greedily. Where ſuch ſheep are paſtured, no buck-bean is to be found, for in a week or two they devour it all. Might it not be prudent, therefore, in huſbandmen, who graze large flocks, to cultivate an acre of this plant in ſome moraſſy ground, which otherwiſe would not yield them two ſhillings the acre? Some might be cut up green, for unſound ſheep, and given them with lucern, as occaſion requires; and ſome might be made into hay, and mixed with their fodder. I cannot remember that this advice has been given by any huſbandry writer. *Eſſays in Huſbandry, Eſſay* II. *pag.* 137.

BUCK-WHEAT, the name of a plant generally conſidered as a ſpecies of corn, though not ſuch in fact; nor does it grow like any of the eſculent grains. Its leaf, from being roundiſh at firſt, takes nearly the ſhape of that of ivy, but longer pointed, and much ſofter. Its ſtalk is round, hollow, and weak, ſometimes reddiſh, but moſt commonly green, and growing to the height of about two feet and a half. Lateral branches, which ſhoot out almoſt at every joint, are terminated by purpliſh flowers, which are ſucceeded by ſmall triangular ſeeds, black on the outſide, and white within.

Buck-wheat will thrive in any ſoil, not excepting even barren ſands, as they are commonly termed; but grows largeſt in dry ground which have been well ploughed. When raiſed for its grain, a buſhel of ſeed is ſufficient for an acre of land, which will frequently yield fifty or ſixty buſhels: but when it is intended for green fodder, which is the uſe moſt commonly made of it here, ſome people ſow three or four buſhels on an acre, in order to have a thick crop. The uſual time of ſowing it is about the beginning of May; but if it be ſowed ſomewhat earlier, and a warm ſeaſon enſues, it will bear cutting twice in the ſummer. It comes up ſoon, and ripens generally, according to M. du Hamel, in one hundred days after ſowing, ſo that buck-wheat ſown in June is reaped in September.

When mowed, it muſt be left in the field ſeveral days, that its ſtalk may dry before it is houſed. There is little danger of the ſeeds falling out, nor is it much injured by wet. Theſe ſeeds are excellent food for pigeons, poultry, hogs, rabbits, &c. and are found to make horſes thrive when given among their oats: but for theſe they ſhould be firſt cracked in a mill; being apt, otherwiſe, to paſs through them whole. The flower of buck-wheat is very white, and makes a good ſort of pancake, when mixed with a little wheat-flour. The poor in ſome countries make even bread of this mixture; but it is black, bitter, windy, and not nouriſhing. Its ſtraw, or haulm, is alſo given dry to cattle: but the beſt way is to feed it whilſt green, particularly juſt before it bloſſoms. Milch-cows fed with it will yield an extraordinary quantity of milk, remarkably good for making butter and cheeſe: and another advantage attending this paſture is, that it will continue green in the drieſt time of ſummer, when other graſſes are burnt up. It is an excellent dreſſing for land, where ploughed in without being mowed.

The ingenious author of the Eſſays in Huſbandry tells us, that in certain lands of Brabant, called Rempen, the huſbandman raiſes buck-wheat in ſmall fields near home, and places round them, under the hedges, a great number of bee-hives, from whence he draws conſiderable profit; for no plant affords theſe inſects a better ſupply of materials for making honey. *Eſſay* I. *pag.* 110. *Mortimer's Huſbandry*, *vol.* I. *pag.* 136. *Du Hamel's Elements of Agriculture*, *vol.* I. *pag.* 91. *Maiſon's Ruſtiques*, *tom.* I. *pag.* 624.

BUD, that part of the ſeed which firſt begins to ſprout, or rather the leaves which firſt appear.

Bud, alſo ſignifies the ſprout from whence the branch ariſes. Theſe buds in ſome meaſure reſemble ſeeds, as under a number of ſcaly coverings the rudiments of the young branch are ſeen: but neither the lobes nor the young root are met with; becauſe this tender ſtem is connected with a tree, which ſupplies it with the neceſſary food.

Bud is likewiſe uſed in ſome counties of England for a weaned calf of the firſt year; becauſe the horns are then in the bud.

BUDDING. *See the article* Inoculation.

BUGLE, *Middle Compound*, *Sicklewort*, or *Herb Carpenter*, the name of a low weed, with two kinds of ſtalks; round creeping ones, which ſtrike root at the joints; and upright ſquare ones, hairy on two of the oppoſite ſides, alternately, from joint to joint, bearing looſe ſpikes of blue labiated flowers, of which the upper lip is wanting: the leaves are ſomewhat oval, ſoft, ſlightly cut about the edges, and ſet in pairs at the joints. It is a perennial weed, infeſting moiſt meadows and paſture-grounds, and flowers in May.

BUGLOSS, or *Viper's Bugloſs*, the name of a plant whoſe ſtalks are rough, round, ſolid, erect, undivided, and marked with black ſpots: the leaves are very rough, long, narrowing to a point, and placed without any certain order. The flowers are large and ſpacious, of a beautiful blue colour, and grow in long bending ſpikes. They conſiſt of one petal, divided into five roundiſh ſegments, of different ſizes, and reſemble a horn in their figure, expanding by degrees, from a narrow beginning. The flower cup conſiſts of five narrow ſegments, and contains four rough ſeeds.

Bees are very fond of the viper's bugloſs, and there is reaſon to think that this plant, aſſiſted by the culture of a ſkilful gardener, may receive, perhaps, as many improvements as the auricula did. Its branches will riſe to the height of three feet, and no vegetable would better adorn flower-pots in large chimnies; for if the water be changed, it continues blowing near a fortnight after cutting. Its ultra-marine, blue-colour, is the fineſt that can be ſeen, and the ſtalks are garniſhed with flowers from top to bottom; dyers might, perhaps, extract an uſeful tincture from the roots. This plant grows wild in hard braſhy ſoils. *Eſſays in Huſbandry*. *Eſſay* I. *page* 110.

BUILDING. *See the article* Farm-houses.

BULB, or *Bulbous Root*, ſignifies a root of a roundiſh figure, and uſually furniſhed with fibres at its baſe.

Bulbous roots are ſaid to be ſolid, when compoſed of one uniform lump of matter; truncated, when compoſed of a multitude of coats ſurrounding each other; ſquamoſe, when compounded of, or covered with, leſſer flakes; duplicate, when there are only two to each plant; and congerate, when there is a congeries of ſuch roots to each plant.

BULL, the male of the ox kind. *See the article* Ox.

The bull, kept for propagating the ſpecies, ſhould have a quick countenance, his forehead broad and curled, his eyes black and large, his horns large, ſhort, and black, his neck fleſhy, his belly long and large, his hair ſmooth like velvet, his breaſt big, his back ſtrait and flat, his buttocks ſquare, his thighs round, his legs ſtrait, and his joints ſhort; this ſort of bull is the beſt for breed, and makes the beſt ox for draught. *Mortimer's Huſbandry*, *vol.* I. *page.* 226.

The bull chiefly ſerves for propagation; and though he may be ſubject to the yoke, yet there is no being certain of his working quietly, and the uſe he may make of his prodigious ſtrength, is conſtantly to be guarded againſt. This creature is naturally untractable, ſtubborn, and fierce; and in the bulling ſeaſon, abſolutely uncontroulable, and often furious; but, by caſtration, the ſource of theſe turbulent impulſes is deſtroyed, without the leaſt diminution of his ſtrength. He alſo grows larger, more heavy and unwieldly, and becomes more adapted to the labour for which he is deſigned. This operation alſo renders him more tractable, patient, docile, and leſs troubleſome to others. A herd of bulls could not be either tamed or managed by human ſkill. *Buffon's Hiſtoire Naturelle*, *tom.* IV.

BULLEN, hemp ſtalks ſtripped from the bark.

BULLIMONG, or *Bullimony*, a mixture of oats, peaſe, and vetches.

BULLS-FOOT, the ſame with colts-foot. *See* Colts-foot.

BULLWEED, *Great Knapweed*, or *Matfellon*, the name of a perennial weed common among corn: it riſes to about two feet high: the ſtalks are round, ſtreaked, and hoary: the bottom leaves are oblong and undivided, but thoſe which grow on the ſtalk are cut and divided. The flowers reſemble thoſe of the blue-bottle in ſhape, but are of a red colour. The ſeed is ſmall, oblong, reddiſh, and hairy in the upper part.

BUNS, the ſtalks of hemp after the bark is taken off.

BURN-BAKING, or *Burn-beating*, often called *Denſhiring*, or *Devonſhering*, from its being long practiſed in that country, a method of cutting up the turf, and after drying and burning it, the aſhes are ſpread over the ſurface by way of manure.

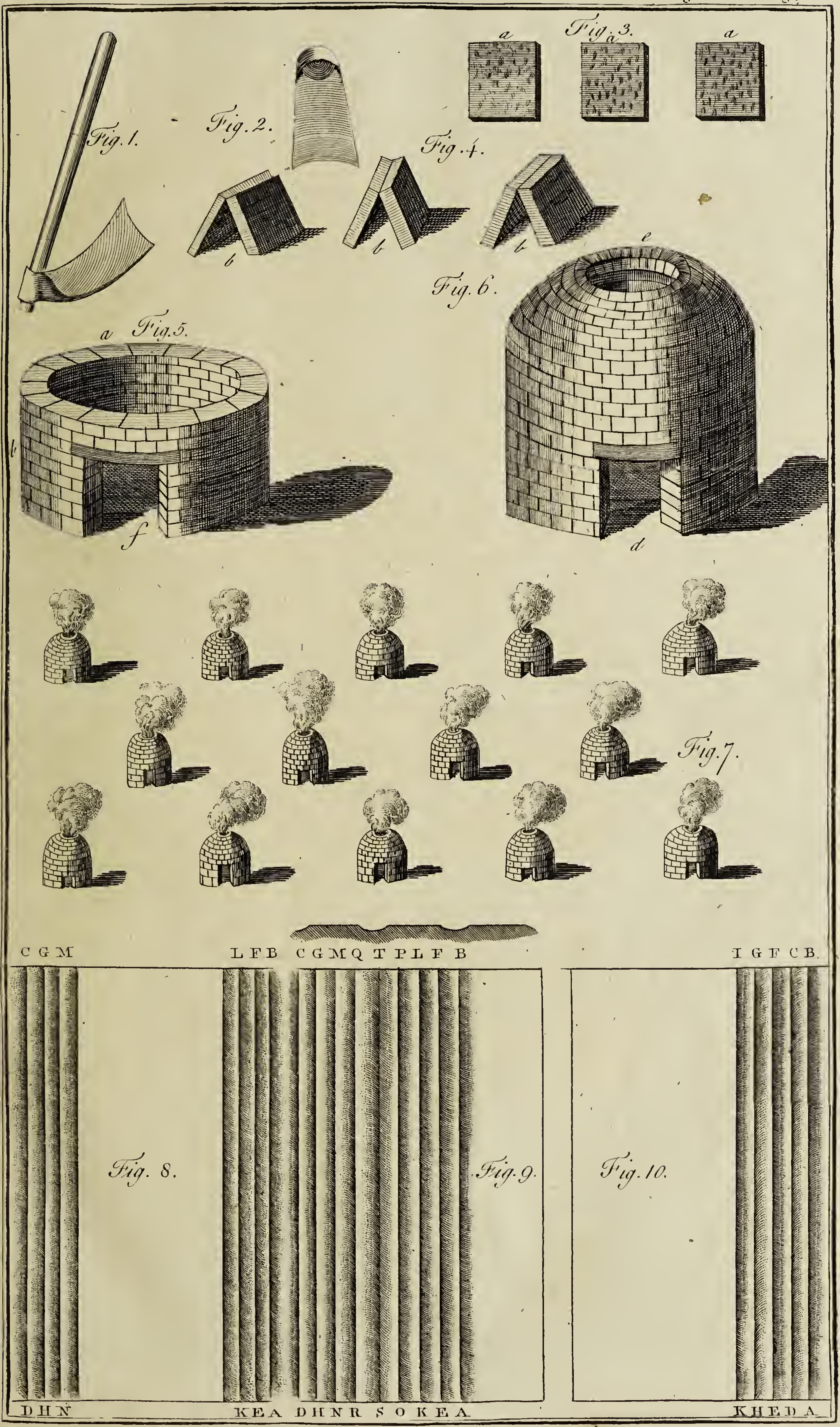
This method of improving land is very ancient, Virgil mentions it, and it has been practiſed time out of mind in Cornwal and Devonſhire. The marquis of Tourbilly has founded his famous treatiſe *Sur les Defrechemens*, publiſhed in 1761, principally on the art of burn-baking. We ſhall here give the ſubſtance of what the marquis has delivered on that intereſting ſubject.

When it is intended to break up any piece of waſte-ground, the nature of it ſhould be firſt conſidered, and may, in a great meaſure, be known from its natural produce, which is generally heath, ruſhes, fern, broom, furze, brambles, &c. intermixed with graſs: for, from the height, thickneſs, and vigour of this wild growth, a proper judgment may be formed with regard to the degree of the goodneſs of the ſoil, and what may reaſonably be expected from it.

When ſuch ground is to be broken up, it will be right to begin in the winter in order to get rid of the three principal obſtacles, namely, water, ſtones, and ſuch large roots as the paring mattock, or beating-axe, as it is called in the weſt of England, may not be ſtrong enough to cut. Afterwards, about the middle of March, the paring of this ground ſhould be begun, by a number of labourers proportioned to the extent of the land intended to be pared.

Every one of theſe labourers muſt be provided with a paring-mattock, or beating-axe, the form of which is repreſented on Plate II. Fig. 1. Towards the edge, where it is ſharpened like an addice, it ſhould be made of well tempered ſteel, and about nine inches wide. From thence the iron part, which ſhould be ſix inches in length, leſſens in breadth towards the handle, as in Fig. 2. where it is reduced to three inches. All the upper part muſt be made of the beſt iron, and ſhould be formed ſomewhat hollow, with a little bending inward. It ſhould be ſtrongeſt in the middle, and of a thickneſs

PLATE II. Facing Burn-baking.



thickneſs proportioned to its ſize, as well as to the work, for which it is intended. The hole to receive the handle ſhould be two inches in diameter, and the handle ſhould be of wood, about three feet long, or a few inches more or leſs, according to the height of the man who uſes it. This inſtrument, excluſive of the handle, ſhould weigh from ten to twelve pounds, according to the ſtrength of the labourer: a leſs weight would not be ſufficient for the purpoſe.

The ſtouteſt and moſt intelligent labourer muſt be then ſingled out to lead the reſt; for they cannot work in a row as when they dig. This leader ſtanding in a proper poſture to manage his beating-axe, muſt give two ſtrokes with it, cutting into the ſoil, to the right, two more ſtrokes to the left; and afterwards a fourth ſtrait before him; by which means he will immediately raiſe a turf about a foot and a half long, a foot broad, and four inches thick of earth. This turf reſting upon the axe as it was cut, is then, with one motion, to be placed on the labourer's right-hand, in its natural poſition, with the mould ſide downwards. (See Plate II Fig. 3. where *a*, *a*, *a*, are three turfs as cut from the ſoil.) All the wild growth upon this land, will, if not very large, come off with the turfs thus cut; and the more there is of it, the better it will be. The turf muſt abſolutely be cut with a depth of at leaſt four inches of ſoil: for if the ground be pared to a leſs thickneſs, the work will be badly done; becauſe the beating-axe will not have gone under the netted roots of all the rubbiſh growing on the ſurface, which it is indiſpenſibly neceſſary to deſtroy: otherwiſe theſe roots will make freſh ſhoots, injure the corn, and in time choak it entirely, as has happened to me in the beginning of my undertakings.

The workmen, eſpecially if they undertake the work by the acre, would be glad to take this turf off as thin as poſſible; becauſe that would ſave them a great deal of time and labour. But I have experienced to my coſt the imprudence of making ſuch bargains. They muſt therefore be well watched; for otherwiſe, beſides the inconvenience of not effectually deſtroying the wild growth, ſuch thin turf would not yield a ſufficient quantity of aſhes for manuring the land. The buſineſs will indeed go on ſlower, but practice will ſoon render the workmen more expert.

Their leader having cut a turf, and placed it on his right-hand ſide, muſt then advance a ſmall ſtep, and take off another of the ſame ſize and thickneſs, which he muſt alſo place on the ſame ſide, in a line with the former, on the further end of which the neareſt end of this ſhould reſt, ſo as to incline a little. He is then to proceed ſtrait on, laying all the turfs in the ſame manner. As ſoon as he has taken up the two firſt turfs, the ſecond labourer, ſtanding on his left hand ſide, is to take up his line of turfs in the ſame manner, and place them on his right, in the void ſpace cleared by the leader. As theſe advance, each of the other labourers, ſucceſſively one after the other, muſt put himſelf on the left of the preceding, at the ſame diſtance, and do the ſame work, following each other like reapers. Thus, if the firſt began at B (Plate II. Fig. 10.) he lays his turfs along the line which terminates the plate; and when he has cut two turfs, the ſecond begins at C, and lays his turfs in the ſpace BA, cleared by the firſt. The third follows the ſecond in the ſame manner, clearing the ſpace FE, and laying his turfs in the ſpace CD, cleared by the ſecond. The fourth clears the ſpace GH, and and the fifth JK, and ſo on. The ſame muſt alſo be underſtood of Fig. 8, and 9, which therefore require no further explanation.

When the labourers come to the end of the ground, which will likewiſe be in progreſſive order, the leader muſt return to the ſide where he firſt began, and reſume his work cloſe to the ſpace already pared; the others are to follow in their regular turns, and repeat the ſame operations as before; for this work muſt always be performed in the ſame direction, and not backward and forwards. Such ſhould be the method till the whole ground is pared.

If, as it ſometimes happens, there be reaſon to apprehend that the ſods will not dry faſt enough when only laid a little ſlanting, with the end of one juſt reſting upon the extremity of another; they may in this caſe be piled, as faſt as they are cut, in little heaps of three, four, or five together, according to their thickneſs, and the quantity of combuſtible or vegetable matter contained in them. The air paſſing between theſe ſods, which are always laid with the heath or turfy ſide uppermoſt, penetrates and ſoon dries them, eſpecially if the weather be ſultry: but at the ſame time it would be wrong to wait till they are quite dry, becauſe they would then burn too much, and too faſt; in which caſe their aſhes are neither ſo good, nor in ſo great quantity, as thoſe of turf more ſlowly burnt. A juſt medium, which practice will eaſily teach, is to be obſerved in this reſpect.

Sometimes theſe turfs are ſet upon their ends, two and two meeting at the top, and being further aſunder at the bottom, like the roof of a houſe, with their heathy ſides outwards, as repreſented at *b*, *b*, *b*, (Plate II. Fig. 4.) but this method, which lengthens the work, and therefore renders it more expenſive, is fitteſt for the turfs of bogs or maſhes, when cut too wet.

With reſpect to the roots, which I ſaid muſt be got rid of before any land can be properly broken up, I meant only ſuch large roots as the beating-axe cannot cut through, though ſharpened with a whet-ſtone from time to time, when its edge is either turned or blunted. For with regard to the roots of ſmaller ſize, ſuch as thoſe of the dwarf furze, the common heath and young fern, ſmall holly, young plants of thorns and junipers, brambles, broom, and other wild productions, which have not attained too great ſtrength, will, without much difficulty, be cut and pared off with the turf.

But the ſtrong roots of ſhrubs, buſhes, &c. which the beating-axe cannot ſever, muſt remain in the ground, though that will not hinder our taking off the turf between them to a proper thickneſs. The ſods thus cut will indeed be often very irregular in length and breadth; but they are the better for burning, as they contain a greater proportion of vegetable matter.

It has been already obſerved, that theſe turfs ſhould be laid in little heaps as they are cut; theſe ſhould be placed in the intermediate ſpaces, where the ground has been pared between the roots yet remaining in the earth. Theſe roots ſhould be grubbed up with a ſpade, pickaxe, &c. without diſordering the little piles of ſods. It will be ſufficient if this work be finiſhed before the time of ſowing. *See the article* GRUBBING.

Some grub up theſe roots before they burn the turf, and others after, as beſt ſuits their convenience: but in the latter caſe they ſhould certainly be taken up in thoſe places where the furnaces are to be made, becauſe it is of great importance not to ſtir the heaps of aſhes produced by them, till the very inſtant of ſowing. The holes alſo made by pulling up large roots, ſhrubs, &c. ſhould be filled up ſo as to render the ſurface even. In countries where wood is ſcarce, theſe roots, ſtumps, &c. are carried away, and dried for fuel, eſpecially for the kitchen; by which means they frequently repay at leaſt the expence of grubbing them up. But in places where wood is of ſo little value as to render theſe not worth the carrying off, the beſt way is to burn them with the turf, the aſhes of which they will both increaſe and improve.

The thicker any land is covered with theſe wild productions, the better it will prove. If it coſts more than another parcel of ground to break up, and bring it into order, it will, in return, make ample amends, by producing greater crops.

When the ſeaſon is not too wet, the turfs will generally dry ſufficiently in about three weeks, even without being turned; but in rainy years they require a longer time, and muſt be turned again and again, to prevent their ſtriking out new roots and ſhoots, which would hinder them from burning, as I have ſeen happen. Hence it appears, that this method of clearing and breaking up ground requires a longer time, and is attended with more labour and difficulty in rainy than in dry ſeaſons. But as the turfs may be turned by women and children, the additional expence will not be very conſiderable.

About Midſummer, or a few days before, when the turfs are ſufficiently dry, a number of women and children ſhould be employed, in fine clear weather, to gather them all up, ſome with iron forks, others with their hands, and pile them up from ſpace to ſpace, in round heaps about ten feet high, and of the ſame width at bottom, almoſt in the ſhape of charcoal furnaces. The heathy ſide of the turf muſt be placed downwards, and the earthy ſide upwards. A ſmall hollow ſhould be left in the inſide, in order to form a kind of chimney, the opening of which ſhould face the wind. *a b* (Plate II. Fig. 5.) repreſents a furnace of this kind partly built, where *f* is the door, or opening into the chimney of the furnace. Fig. 6. is a furnace completed, where *e* is the top of the chimney, and *d* the door. Fig. 7. repreſents a great number of theſe furnaces on fire.

It has been already obſerved, that this work muſt not be ſet about in rainy weather; becauſe if the heaps of turf ſhould unfortunately be ſo much wet as to imbibe the water, they would not burn, but muſt be pulled down and ſpread anew, to dry as before. They might alſo, in this caſe, require very frequent turnings, as has happened to me; which would retard the operation, and increaſe the expence: beſides which, it might not even be poſſible, by frequent turnings, to dry them ſufficiently before autumn, if the rains were frequent, which muſt occaſion a very conſiderable loſs.

However, this laſt accident, though poſſible, is very rare. It never befel me; and by enquiring of thoſe to whom it has happened, I found that it was, in a great meaſure, owing to their own negligence. The beſt method to avoid theſe inconveniencies is, to embrace the advantage of the firſt fine weather, and if it appears at all uncertain, to ſet more hands to work, without aiming at an ill-timed ſaving: for it is upon the due piling up and burning of the turfs, after being properly cut and dried, that the whole ſucceſs of this important branch of huſbandry chiefly depends. It cannot therefore be done too ſpeedily. When rain is apprehended, every other buſineſs ſhould be left for this, and all hands, men, women, and children, ſhould be inſtantly employed, to diſpatch it as ſoon as poſſible. Nothing requires greater diligence. The heaps ſhould be ſet on fire the moment they are finiſhed, or at leaſt, though the weather ſhould ſeem ſettled, before the huſbandman retires in the evening. Children may do this, by putting a little lighted ſtraw or heath, with an iron fork, into the chimnies of the furnaces. The dry heath, graſs, and roots, will catch inſtantly, and in a few moments the fire will become ſo violent, as ſcarcely to be approached. It may then be left, after taking proper precaution to prevent its extending further than it ought; eſpecially if it be near any wood, hedge, or heath, where it might otherwiſe do great miſchief.

The misfortunes occaſioned by fire have been ſo numerous and dreadful, that too much care cannot be taken to guard againſt them. If the ſituation of the land which is to be burned be ſuch as gives the leaſt room to fear any danger of this kind, the furnaces ſhould only be lighted in calm weather; leaſt the wind ſhould ſpread the flames to neighbouring grounds, where it might be impoſſible to ſtop them till they had done irreparable damage.

If it be ſurrounded on all ſides with woods, heath, or other vegetables eaſily ſet on fire, a row of furnaces ſhould, in this caſe, be made around the land to be burned, at the diſtance of twenty-five, or thirty feet from the neighbouring grounds, and at leaſt ten feet from the other furnaces, which are afterwards to be built farther within this incloſure. Care ſhould then be taken to obſerve from which ſide the wind comes, and fire ſhould be ſet to thoſe furnaces that are ſituated fartheſt from the wind, or neareſt to that ſide on which the wind blows. A number of men ſhould watch theſe furnaces while they burn, and ſhovel up earth upon them, if they are ſo full of heath or combuſtible matter as to occaſion too violent a flame.

The throwing on of this earth will deaden the flames, and concentrate the fire; by which means the furnaces will be conſumed by ſlow degrees, without hurting either the outward borders of the pared land, or its inner parts, where this fire might do miſchief two ways; firſt by ſpreading to, and burning the yet unpiled turfs, the aſhes of which would ſoon loſe their virtue, if ſcattered upon the ſoil in this looſe manner; and ſecondly, by catching the other furnaces, in caſe they ſhould be already made; by which means the fire would ſoon become ſo great, that it would be no longer poſſible to ſtop its progreſs, or prevent its extending to the neighbouring grounds.

When the firſt row of furnaces is thus conſumed, the next row may be burnt in the ſame manner, and ſo on till the whole is finiſhed.

The morning is doubtleſs the moſt proper time for lighting all theſe furnaces, becauſe the people employed in buſineſs have then the whole day before them, to watch the fire, and prevent accidents, which it might be very difficult to remedy in the night, particularly during the firſt violence of the flames. A number of proper perſons proportioned to the extent of the ground, ſhould remain upon the ſpot all night, as well to attend the burning of the turf, as to hinder wicked wretches from ſetting fire to other places, of which there have been too many inſtances.

By not neglecting any of theſe precautions, though all of them are not neceſſary where the fire cannot ſpread to adjacent grounds, every inconvenience may certainly be avoided.

If it ſhould be found neceſſary to light the furnaces in the evening, though as I have juſt obſerved, the morning is a much fitter time for it, they muſt be ſuffered to continue burning till the next day, when the violence of the fire will be abated. A few men, or even women and children, ſhould be then ſent in among the heaps, with iron forks, to give them a little ſtirring, and lay upon them the turf which may have fallen down. Theſe furnaces will ſtill continue burning for ſome days, during which the turfs will be ſlowly conſumed or calcined. If any of them ſhould be ſituated on wet ſpots, where they will not burn, theſe women and children muſt mend them, and add freſh fuel, ſuch as dry heath, ſtubble, or even a little dry wood, with ſome of the burning turfs from the adjacent furnaces. As ſoon as the fire is extinguiſhed in all the heaps, which will be then reduced to heaps of aſhes, finer or coarſer in proportion to the goodneſs of the ſoil, the women and children muſt ſhovel them up into little round heaps, leſt they ſhould loſe their fertilizing quality, if left in the manner they fell in the burning: for all our treaſure conſiſts in the ſalts contained in theſe little heaps, and the volatile parts of thoſe ſalts, which are much the beſt, would ſoon fly off, if expoſed to the air. The dews at night, and the firſt rain which falls upon thoſe heaps of aſhes, form on their ſurface a cruſt, which hinders their being blown away by the wind, renders them impenetrable to the action of the air, and keeps in all their virtue: the ſooner therefore rain falls after this operation, the better. Nor would it be any injury if it ſhould rain as ſoon as the furnaces are thoroughly lighted, unleſs it ſhould be very violent indeed, and of long continuance, which rarely happens at this ſeaſon.

When the aſhes are thus laid up in little heaps, nothing more remains to be done to this ground till the time of ſowing; care indeed muſt be taken, that neither men nor cattle approach them ſo as to break their cruſt. The land will from hence be freed from all ſeeds of weeds, and other wild productions, as well as from all worms, inſects, reptiles, and venomous creatures; the action of the fire of the furnaces being ſo ſtrong, that it heats not only the earth, beneath them, to the depth of ſeveral inches, but likewiſe all the intermediate ſoil.

A fortnight after the uſual ſeed-time of the country, for wheat and rye, will be early enough to ſow this burnt ground. When that is to be done, a number of women and children ſhould be ſent into the field, on a ſtill, calm day, with wooden ſhovels, to ſpread the aſhes equally over all the ground, excepting the ſpots where the furnaces were; for theſe are ſo thoroughly burnt, that they want no farther manure, and are always obſerved to produce the fineſt corn. Some of theſe women and children ſhould alſo carry iron forks, to break and ſpread ſuch turfs as may not have been thoroughly conſumed; for theſe having been baked or calcined by the action of the fire, will be very beneficial to the land.

Immediately after the aſhes are ſpread, the corn, whether wheat or rye, ſhould be ſown over thoſe aſhes by a ſkilful ſower, in not more than about half the quantity generally uſed for a ſimilar extent of other ground. The ploughman ſhould follow the ſower, with his team, either of horſes or oxen, yoked to a ſtrong plough, having two fins to the ſhare. *See the article* PLOUGH. He ſhould not, however, cut too deep this firſt year, but make only ſhallow furrows, going and returning, to cover the ſeed. Women and children, with hoes and iron forks, ſhould then be employed to break carefully all the clods, together with every remaining bit of turf; and finally to cloſe the tops of the ridges, which the plough cannot do with the neceſſary exactneſs in this ploughing. If ſeveral ploughs work at the ſame time, as is generally the caſe with many, the number of women and children muſt be increaſed in proportion, and there muſt be a ſower before each plough.

It is very difficult to ſow theſe lands with half the quantity of ſeed generally uſed in other places. The moſt dexterous are apt to miſtake, and I have experienced the bad effects of employing only one ſower for ſeveral ploughs. A man who goes before each of them will ſow much more equally: nor need he even loſe any of his time, becauſe when he is not employed in ſowing, he may help the women and children to break the clods. The ploughman ſhould always proceed ſlowly and cautiouſly in this firſt tillage, eſpecially if the ground ſeems never to have been ploughed before. If his plough ſhould chance to be ſtopped by any ſtones or roots, which may have eſcaped the endeavours uſed to diſcover them by means of the borer (which ſhould be always had recourſe to as ſoon as the ſurface of the ground is cleared) the other men within call, or even the wo- and children, muſt immediately take them up with crows, and pick-axes, and carry them out of the field.

Care muſt alſo be taken not to ſpread the aſhes out of the heaps over more ground than can be ſown in the ſame day and the next morning, that they may not be unneceſſarily expoſed to the hazard of loſing their efficacy: but if it ſhould begin to rain, or the ſucceeding day be a Sunday, no more aſhes ſhould be ſpread than can be ſowed and ploughed immediately. Theſe two circumſtances excepted, it would be right to ſpread over night what is to be ploughed in next morning; for I have experienced, that the little nipping froſts in this advanced ſeaſon, will often be ſtrong enough to freeze the aſhes and bits of turf not thoroughly conſumed, ſo as to render them unfit for ſpreading, till the ſun has thawed them; by which means a morning's work might, without this precaution, be loſt.

When the ſeed is ſown and covered, drains ſhould be cut with the ſame plough, either directly acroſs the furrows, or in an oblique direction to them, according as the declivity of the ground may require, in ſuch manner that they may empty themſelves into the main ſurrounding ditches, to carry off the water, eſpecially in the winter. Some of the men employed in breaking the clods will eaſily deepen theſe drains, to whatever degree you may think proper, with an inſtrument ſhaped like a hoe, with a ſtrong flat iron ſpike, about fifteen or ſixteen inches long, on each ſide of it. This inſtrument is very uſeful, and even neceſſary, upon ſeveral occaſions; nor is there any better for ſtirring the ground. It will likewiſe ſerve to complete the breaking up of ſuch parts of the ſpots where the furnaces ſtood, as may not have been ſufficiently cut by the plough; and to finiſh the imperfect ends of the furrows, next the head-lands, where the plough could not reach, and where the grain would be otherwiſe expoſed to the air and birds.

Though the ſpirit and warmth of the ſalts contained in the aſhes, will ſoon render this corn more forward than any other; yet as there will not be among it either graſs weeds, or wild productions of any kind, the ſeeds of all theſe having been deſtroyed by the action of the fire, it will appear thin during part of the winter: but on the approach of ſpring, it will ſhoot up, ſpread, and tiller, ſo as often to become too thick at laſt. It always ripens about a fortnight ſooner than any other corn in the country; and the fineſt, as already obſerved, is conſtantly found on the ſpots where the furnaces were erected; the effect of the fire having been greater, and penetrated deeper in thoſe than in any other places.

As all our riches, as before obſerved, conſiſt in the aſhes, the more there is of them, the more the ground thus broken up will be fertilized. But all kinds of ſoil do not afford an equal quantity of aſhes when burnt; for though the burning be performed with ever ſo much care, repeated experience for ſome time paſt, has taught me, that only ſome of the earth and ſtones, according to their quality, are reduced into lime, or calcined, by the operation of the fire, and that other parts of them will run into glaſs. The ſoils that calcine moſt are undoubtedly beſt, and yield the largeſt produce of aſhes; while thoſe, on the contrary, which burn to a glaſſy ſubſtance, are the worſt, and give the feweſt aſhes. Of this kind is ſand; and indeed, we may judge with certainty of any ſoil intended to be improved by burn-baking, by previouſly making trials on different parts of it. If the owner cannot go thither himſelf, he may order ſome of the turfs, cut with a depth of four or five inches of earth, to be brought to him, in order to their being dried and burnt. He may alſo have, in the ſame manner, in bags of paper, properly numbered, ſamples of the ſoil, or of the ſtones underneath, at every ſix inches from the ſurface, to the depth of eight or ten feet. Theſe ſamples may be eaſily procured by means of the borer, already deſcribed under that article.

If the perſon who makes theſe trials be not provided with a borer, holes may be dug. They will not coſt much, and he will be thereby enabled to judge what grain, trees, or other productions, each ſoil is beſt adapted to. I have often practiſed this method with ſucceſs, for improvements which lay at ſuch a diſtance that I could not immediately inſpect them myſelf: but as the judging of lands in this manner, without actually inſpecting them, requires great attention and long practice, the ſureſt method therefore is to examine them on the ſpot, and there make the neceſſary experiments. The furnaces which are the moſt burnt, or thoſe which burn the faſteſt, are not the beſt; for the aſhes are there too much calcined, and their quantity reduced.

I have often ſeen much finer corn grow in places where the uppermoſt turfs of the heaps, which had burnt ſlowly, were only calcined, and remained ſo nearly entire, that it was neceſſary to break them before the ground could be ſowed, than in thoſe place where the furnaces, after being entirely burnt, were totally converted into aſhes. In general, thoſe heaps which produce white aſhes, after they are burnt, are the leaſt valuable, and commonly yield the ſmalleſt quantity. This denotes a greater degree of vitrification than of calcination. In proportion as the aſhes are yellowiſh, brown, or blackiſh, which laſt indicates the greateſt perfection, they are better in quality, and generally more in quantity. According as theſe different colours appear, the calcination exceeds the vitrification. I have dwelt the longer upon theſe different operations of the fire in the burning of land, becauſe they are of great importance to thoſe who break up ground in this manner, and no writers have hitherto given a ſufficiently diſtinct account of them, for want of having had the neceſſary experience.

I muſt farther obſerve, that no land ought to be pared again too ſoon after it has been burnt; becauſe its turf being deſtitute of a proper covering, would not take fire well, as I have experienced. It will be neceſſary to wait till the heath or broom has ſhot up ſufficiently, which ſeldom happens in leſs than about two years. The dangerous practice of ſome country people, who frequently ſet fire to their heaths in the ſpring, under pretence of bringing up graſs for cattle, is ſo contrary to the right method of improving land, by burn-baking, that it always retards, and ſometimes abſolutely prevents the executing of this far more beneficial method; eſpecially if thoſe burnings have been too often repeated.

In countries where it is not the cuſtom to plough in ridges, but either in broad lands, or quite flat, in order to ſow afterwards with the harrow, I think it would, however, be right, to ſow the ground thus broken up, at leaſt the firſt year, under furrow, with the two-finned plough already mentioned; after which the uſual method of the country may be followed, if it be found the moſt proper. I adviſe this as the beſt practice, and am ſatisfied that none will have cauſe to repent the trial. It will ſave the greater part of the expence of ploughing; and the aſhes being leſs expoſed to the action of the air, will the more ſtrongly retain their fertilizing power. But, if, notwithſtanding theſe reaſons, the common practice of the country ſhould be ſtill preferred, even in the firſt year, the huſbandman, in this caſe, ſhould begin to ſpread his aſhes in the manner before directed, about Midſummer; as ſoon as the furnaces are cooled, without leaving any in the places where thoſe furnaces ſtood. Immediately after, a ſlight ploughing, juſt ſufficient to bury the aſhes, ſhould be given, with the precautions before-mentioned with regard to the furrows. No more aſhes ſhould be ſpread at any one time, than the plough can cover in the ſame day. A few days after this firſt ſlight ploughing, a ſecond ſhould be given, ſomewhat deeper, in the ſame direction; and theſe ploughings ſhould be continued, each going a little deeper than the former, till the ground be looſened to a ſufficient depth. Two good croſs ploughings will then be of excellent ſervice: after which a fifth ploughing a-croſs them, will bring them up to the direction they were in at firſt. The ground ſhould be harrowed ſeveral times between all theſe ploughings, with harrows heavy in proportion to the ſtrength of the ſoil; and if any hard clods have reſiſted the force of the harrow, women and children ſhould be employed to break them, it being neceſſary to pulverize the ſoil as much as poſſible. I ſay as much as poſſible, becauſe that cannot be perfectly compleated this firſt year. Perhaps the ſpiky roller would be of excellent ſervice here.

The ſame women and children will alſo clear away all the ſtones, if there be occaſion. As each ſucceſſive ploughing will turn the ſtones upon the ſurface; but ſuch only as are bigger than a man's fiſt need be removed. If any of the ſtones ſhould be too large for the women and children to remove, the carters muſt take them up as they paſs by; and if there ſhould chance to be any under ground ſo large that the men cannot move or load them, they muſt be broke with ſledge-hammers, and other iron tools proper for this work: or, if they are great rocks, they muſt be blown up with gun-powder; for nothing ſhould ſtop the progreſs of this undertaking.

The time to ſow the land thus broken up for the firſt time, will always be a fortnight later than the common time of ſowing other lands in the ſame country, with the ſame kind of grain. A few days before this is ſowed, it ſhould have another light ploughing; after which it ſhould be ſowed, in proper weather, with half the uſual quantity of ſeed, whether wheat or rye, and this ſeed ſhould be covered, in either with the plough, or with the harrow. Drains ſhould alſo be cut in this land, in the manner directed under that article, as ſoon as poſſible, to carry off the water in the winter. If any very large clods are left on the ground, women and children ſhould be employed to break them. This land being thus ſowed, nothing more need be done to it till harveſt.

The quality of the land muſt determine what ſort of grain will be moſt proper for the firſt year's ſowing in this huſbandry. If the ſoil be rich, it will bear wheat; if of a middling quality, it will produce meſlin, or a mixture of rye and wheat, conſiſting of a greater or leſſer proportion of either, according to the nature of the ground; and if it inclines to poorneſs, it will produce rye. Theſe particulars may be judged of immediately after the burning. In general, unleſs the ſoil be very excellent, I would always adviſe the ſowing of rye the firſt year. There will be a certainty of ſucceſs with that grain; and the huſbandman will be enabled by its produce, and by the ploughings, to judge what his land will be capable of doing the next year, without running any hazard. This has been my method. I have alſo experienced, that rye does much better than wheat in all light ſandy ſoils thus broken up. When they are afterwards enriched to a certain degree, they become fit to bear meſlin, and then wheat: though if they ſhould never produce any thing but rye, the difference would not be great in point of profit.

As ſoon as the ground is cleared, a light ploughing ſhould be given it, to bury the ſtubble; and ſome days after it ſhould have a ſecond ploughing ſomewhat deeper, but in the ſame direction. When this is done, two good croſs-ploughings ſhould cut the ſoil to the proper depth for ſowing; and a fifth ploughing, afterwards to be given, will leave the furrows in their firſt direction. Between theſe five ploughings, which are to be performed with the plough having only one fin to the ſhare, the ground ſhould be well harrowed ſeveral times, and the ſtones and roots picked out. All theſe ploughings and harrowings will pulverize the earth, and mix it equally with the aſhes. If this land is to remain in ridges, the above will be ſufficient till the ſixth ploughing, which ſhould be given it a few days before the ſowing, and ſhould be followed by the laſt, performed with the two-finned plough to bury the ſeed: but if it be to be ſowed in broad lands, or quite flat, the former directions in that reſpect are to be obſerved here. In whatever manner any of theſe new grounds, broken up with the plough, are ſown, they will not require near ſo many hands to break the clods this ſecond year, as were neceſſary in the firſt. With regard to the quantity of ſeed, a little more may be ſown now, that is, about a third part leſs than is commonly uſed in the country, of the ſame kind of grain, for an equal extent of land.

The lands thus brought into tillage by means of burning, become infinitely better than other grounds, and produce much greater crops. This proceſs improves the ſoil for upwards of twenty years. No weeds will ſpring up among the corn for a conſiderable time; for there are ſcarcely any, even now, in the lands I firſt broke up. The vegetable food in the earth is not therefore waſted here upon uſeleſs plants, but ſerves intirely to nouriſh the corn, which accordingly ſhoots with redoubled vigour, produces well-filled ears, without the trouble and expence of weeding it; and, when threſhed, is ſo clean, that it needs only to be winnowed. The bread made of it is excellent, and of a ſuperior quality. When in proceſs of time theſe burnt-lands ſhall produce as many weeds as other ploughed grounds, they will then be in the ſame degree of imperfection; but it will be a long while before that happens; even longer than I can ſay; for I have not yet ſeen an inſtance of it. The remedy, however, is always ſure and ready, namely, to let them reſt two or three years, by which time they will have acquired a new ſward, thick enough to be pared off, and burnt as before. This will reſtore them to their former perfection, without being near ſo expenſive as the firſt paring and burning: for there will be no roots to grub up here, nor any ſtones to carry off; nor will it be ſo difficult to break the now much fewer clods. I have managed in this manner with great ſucceſs, where there has been a ſufficient depth of mould, lands which had formerly been in tillage, and would no longer produce corn becauſe they were exhauſted, either by two many ſucceſſive crops, or too great quantities of weeds. They are now as good as any other burned land.

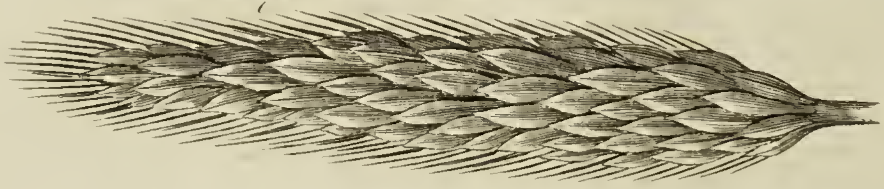
Worn-out meadows, which I have reſtored by the ſame means, and formed a-new with graſs-ſeeds, have yielded great quantities of excellent hay. I have collected plenty of this ſeed during ſome of the preceding years, from meadows which were not too wet. Several of my neighbours have practiſed the ſame method with equal ſucceſs: and, in a word, it is the moſt powerful reſtorative for worn-out land.

From what has been ſaid, it evidently follows, that the paring and burning of the ſurface of the earth, is, indiſputably, the beſt and ſureſt way, either to clear, or reſtore the ſoil. It is making a moſt advantageous acquiſition to one's own eſtate, the value of which is at leaſt doubled, and oftentimes quadrupled by this means. To enrich one's ſelf, without doing it at the expence of any perſon whatever, and, at the ſame time, to enrich the ſtate, is ſurely an action worthy of a true patriot, and of a reſpectable father of a family. This may be done by following the method here laid down; a method which has been long known, though very ſuperficially. I will venture to ſay, that it never was carried to the degree of perfection to which my practice has brought it; doubtleſs becauſe none applied themſelves particularly to it. *Memoire ſur les Defrichemens.*

A correſpondent of the editors of the *Muſeum Ruſticum* has given us the following method of performing this operation in the fens of Bedfordſhire.

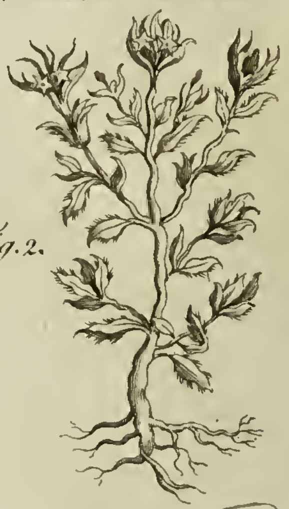
PLATE III. Facing Burnet.

Fig. 1. an ear of ſummer barley in it's natural ſize. raiſed by Sir H. Plat. 1594.



Baſtard Alkanet.

Fig. 2.



A Drill for ſowing Horſebeans.

Fig. 3.

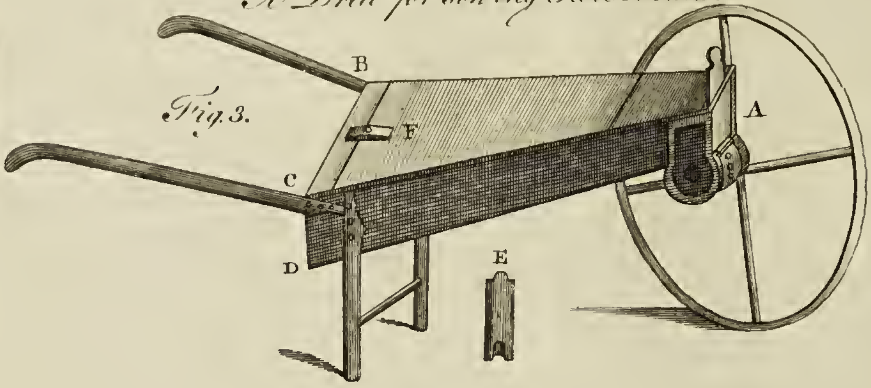


Fig. 4. A triangular Harrow for weeding Horſebeans.

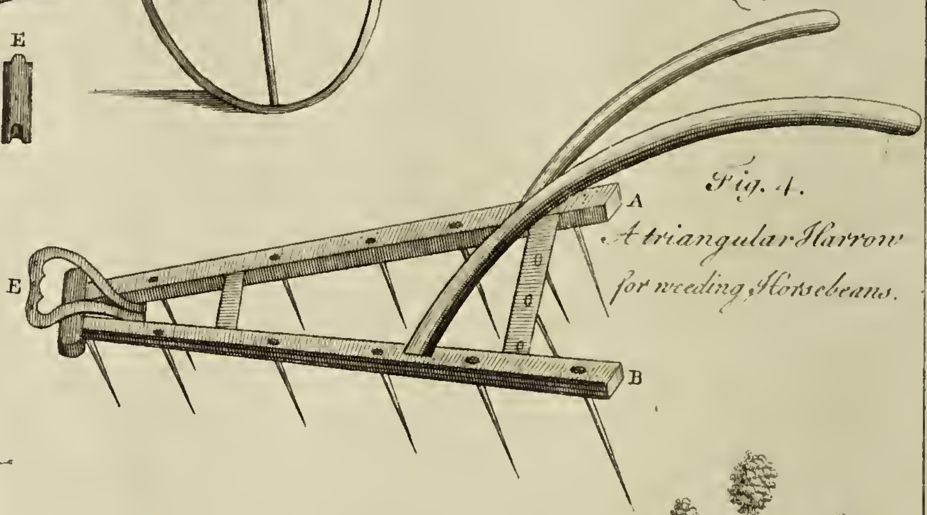


Fig. 5.

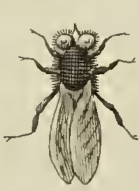


Fig. 6.

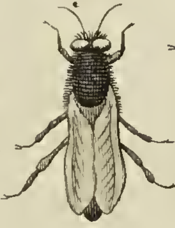


Fig. 7.

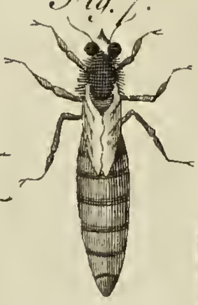


Fig. 9.

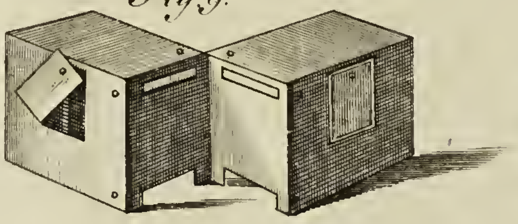
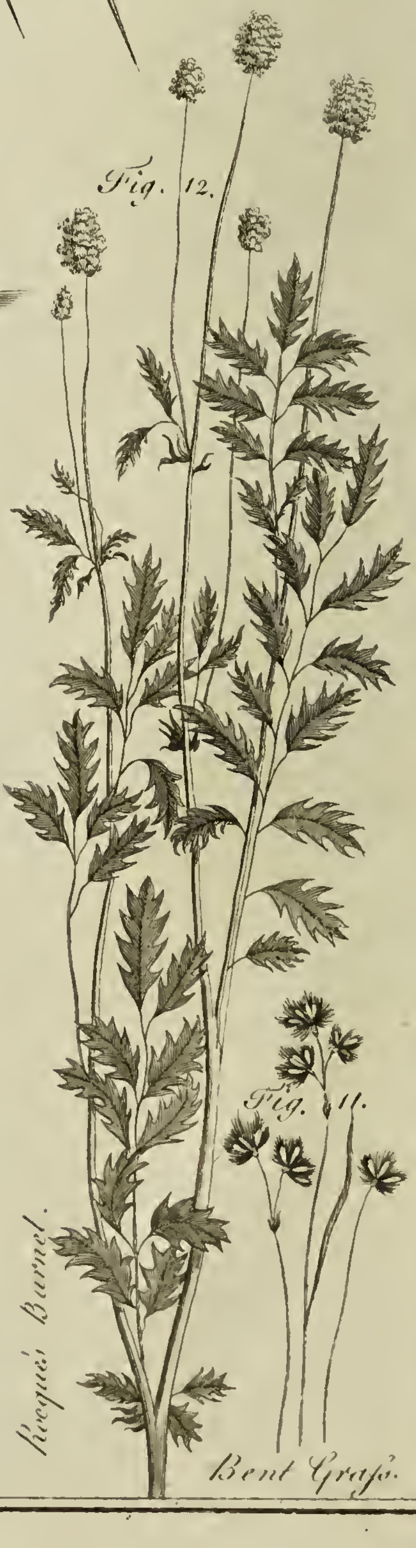


Fig. 12.

Fig. 11.



Rocque's Burnet.

Bent Graſs.

Fig. 8.

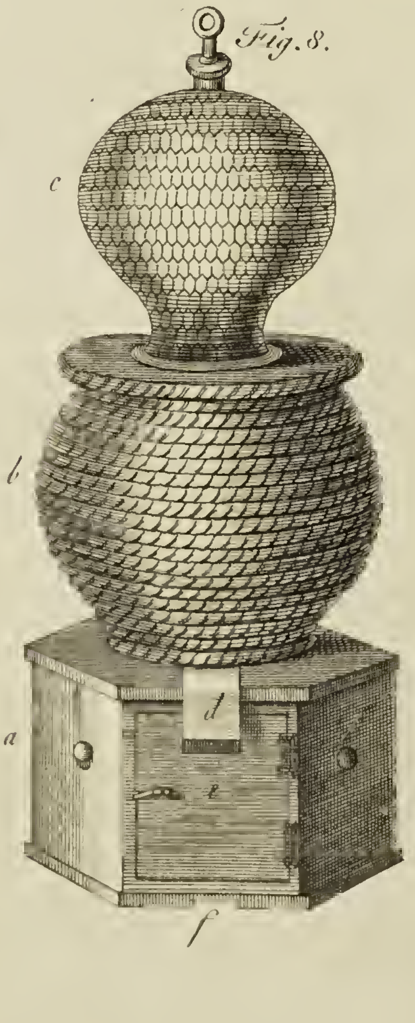


Fig. 10.

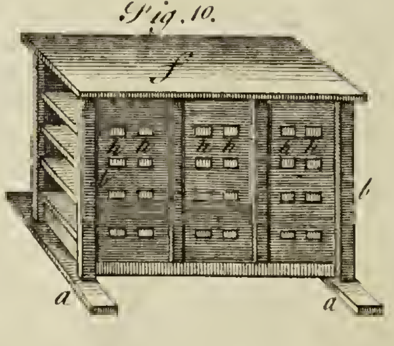
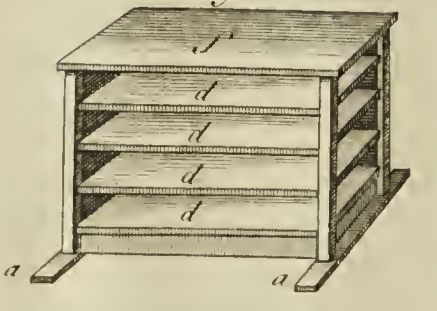


Fig. 11.



J. Hulett sculp.

About the middle of May, ſays this gentleman, we plough the land for burning, which is ſward-land, that has not been ploughed for four or five years, or perhaps a longer time: our ploughs are what are called Dutch ploughs, with a large ſhare; the edge and point are very thin and ſharp, and are kept ſo by filing: the furrows ſhould not be more than ſeven or eight inches wide, and an inch and a half thick, having as few baulks as poſſible. When it has lain ſo long that the ſods or furrows are dry (in which the farmer's own diſcretion muſt guide him, it being impoſſible to point that out by words) it muſt be made into heaps about the ſize of middling graſs-cocks, each perſon carrying on before him as heaps about ſeven furrows: the work will then direct him how big the heaps ſhould be; they ſhould be made as narrow at top as conveniently they can, by way of prevention againſt wet weather. If every perſon keeps his work as to the number of furrows, the heaps will riſe in regular rows; but it ſhould be obſerved to keep theſe rows in quincunx order (as repreſented on Plate II. Fig. 7.) that when you come to ſpread the aſhes, they may cover the ground regularly.

When it is fit for heaping, the cuſtomary way of this country is to let the burning out to people, to burn and ſpread the aſhes, which muſt be ſpread ſo as to cover the ground all over: the uſual price is from four to five ſhillings per acre; but that, in a great meaſure, depends upon the dryneſs or wetneſs of the ſeaſon. It would, however, I think, be moſt adviſeable, where hands are plenty, to do this work by the day, as you may then employ as many perſons as you think fit; for it ſhould be burnt off with all poſſible expedition, becauſe if it be long in burning, it is attended with bad conſequence, which in rainy weather is hard to prevent: it is therefore very requiſite to purſue the work briſkly, otherwiſe the graſs-roots, which lie below the reach of the plough, when ploughed for burning, will ſhoot out, and become almoſt as full of graſs, as though it had not been ploughed at all: then, when you plough it after the burning, inſtead of breaking ſo that the ſeed may fall into the cracks, it will burn up as ſtrait as clay, and then no ſeed can grow any where but in the ſeams between each furrow.

When one ſide of the field is cleared, and the aſhes ſpread, you muſt, as ſoon as there is room, get to ploughing and ſowing the ſeed. Nor muſt the furrows now be wider than thoſe already mentioned, and about two inches deep; for as fen-land in general ploughs tough, rather than breaks, you will have more ſeams than if the furrows were made wider: the cuſtom with us is to ſow the ſeed as ſoon as poſſible after the land is ploughed. *Muſeum Ruſticum, vol.* i. *p.* 420.

BURNET, the Engliſh name of a plant, now greatly cultivated as a green food for cattle in the winter. We have given a figure of this plant taken from a ſpecimen gathered in a field belonging to Mr. Rocque at Walham-green, on Plate III. Fig. 12.

It is very natural to think that we have in England many ſorts of graſſes, which are well adapted to the climate, are wholeſome food for cattle, and, with the aſſiſtance of proper culture, would produce very advantageous crops both to the grazier and farmer. We have, for many years, been ſenſible of the great advantages that reſult from the culture of ſaintfoin: in ſome ſoils lucern has been ſown with conſiderable profit, and the Dutch trefoil is known to be excellent, when properly managed: but theſe only ſerve for green fodder in ſummer: they may, indeed, be dried, and made into hay, and in that form be reſerved for the cattle's food in winter; but this, independent of the inconvenience, trouble, and uncertainty, that attend the making and keeping it in proper order, is not ſufficient; the farmer has alſo occaſion for green fodder in the winter, and early in the ſpring, and that on many accounts, particularly for feeding ſuch of his ewes as will yean early in the year, as well as keeping them from loſing their fleſh after they have dropped their lambs.

A plant therefore which will not only live through the winter, but will alſo, if poſſible, vegetate in that ſeaſon, cannot fail of being highly advantageous, provided it be at the ſame time a pleaſing and nouriſhing food for cattle. All theſe properties have been lately found in burnet; it not only preſerves its verdure during the hardeſt froſts of our winters, but alſo increaſes in bulk, and grows, if the weather be at all open and mild; and is now known to be an excellent food for cattle. This diſcovery is owing to Mr. Rocque, of Walham-green, who, at the requeſt of the late Mr. Wyche, ſpent ſome years in endeavouring to find a plant that would prove an uſeful and ſucculent food for cattle during the winter; and, at laſt, fortunately diſcovered that burnet would anſwer the intention.

Mr. Rocque has alſo found by experience, that it will grow in the drieſt land: for he has planted ſome of it even in the gravel walks in his garden, where every thing elſe is burnt up in the ſummer, but this never withers; one of the qualities of burnet being to continue in ſap all the year. It is the opinion of many, who have ſeen the burnet of his raiſing, that if this plant is generally cultivated, there will never be a ſcarcity of hay in England, even in the greateſt drought.

The land, on which it is ſown, ſhould be fine, becauſe it is apt to ſhed, and it ſhould afterwards be dried perfectly.

Burnet does not loſe its leaves in drying; and though the hay made of it be ſticky, it will, after threſhing, be very agreeable to horſes, which are ſo fond of it, that they never waſte any. One acre will produce upwards of three loads of hay, and above forty buſhels of ſeeds. Horſes are fonder of this ſeed, than they are of oats: and Mr. Rocque is of opinion, that it is a more proper food for thoſe who do not labour hard, becauſe it is not of ſo hot a nature. Burnet bears ſeed twice a year, and will afterwards yield a good ſpring crop.

It is not only good for horſes, but alſo for all manner of cattle; even for ſwine: and Mr. Rocque has experienced another virtue in it, which is, that, being ſtung by a waſp, the leaves of this plant rubbed pretty hard upon the part ſo injured, immediately took off the inflammation.

If the burnet does not grow equally every where, ſome plants muſt be drawn where they are too thick, and planted where they are thinneſt: or the vacant ſpaces may be ſupplied from the nurſery. If the land was not got in good order to ſow the ſeeds at a proper ſeaſon, the burnet may be tranſplanted at Michaelmas from this nurſery, and ſet at nine or twelve inches diſtance every way, according to the richneſs of the ſoil.

The ſeed ſown in May may be mowed at the latter end of July. That ſown in June will yield a pretty good crop, and muſt be cut but once; and the ſame of that which is ſown in July. The plants produced by ſeeds ſown in Auguſt ſhould be mowed, to deſtroy the weeds. Theſe mowings may either be given green to horſes, or made into hay. The firſt ſpring cutting will purge horſes; and Mr. Rocque believes it will alſo cure the greaſe: but it is only the firſt crop that purges.

Burnet ſhould be mowed but once the firſt year, in order to leave it rank in the winter; and in this caſe it will be ready to feed in February or March, or to mow again in April.

If natural graſs grows among the burnet, it may be harrowed in the ſame manner as lucern; for having a tap-root, the harrow will not hurt it: but it muſt not be ploughed, leſt the roots ſhould be broken in the ground.

When the ſeeds of this plant are to be ſaved, it muſt neither be fed, nor mowed, in the ſpring. The ſeed will be ripe about the middle of June, when it muſt be reaped like wheat, and threſhed on a cloth. It ſhould be threſhed before it is too dry, becauſe it is apt to ſhed, and it ſhould afterwards be perfectly dried.

As a great deal has been written on the ſubject of burnet, we ſhall endeavour to ſet the whole in a fair light, by adding two letters which have been ſent from gentlemen of known character and reputation, to Dr. Templeman, ſecretary to the Society of Arts, Manufactures, and Commerce. The firſt is from Davies Lambe, Eſq; and was ſent in conſequence of a letter ſent that gentleman by a member of the ſociety, requeſting his opinion with regard to the uſefulneſs of burnet.

"My burnet, ſays Mr. Lambe, though very green and beautiful all the winter, made no great progreſs till the middle of April following, when I thought it abſolutely neceſſary to feed it. I did ſo, but I did it too late, and kept my cattle upon it too long, from the middle of April to the 20th of May. This was a very great miſtake; the burnet plants were now headed for ſeed, and the ſtock chiefly fed upon the heads, which greatly leſſened my quantity of ſeed, as well as retarded the growth of the plants. I turned into the field, ewes, lambs, and calves, and they all fed very greedily upon the burnet. From what I had heard of M. Rocque, I very much expected them to ſcour, but there was not the leaſt appearance of it, and the cattle throve accordingly.

The 6th of July I began to mow, the weather being favourable; ſix men and four boys threſhed and cleaned the ſeed in ſeven days. I had 200 buſhels of very fine clean ſeed, as many ſacks of chaff, and ſeven loads of hay, from a field of ſeven acres and a quarter.

Satisfied that 200 buſhels of ſeed would be more than I ſhould be able to diſpoſe of, I was not anxious after another crop, being rather deſirous of ſeeing what it would perform as a paſture. Accordingly, in about ten or twelve days after the field was cleared, I turned into it ſeven cows, two calves, and two horſes; they all throve very remarkably, and the cows gave more, and we thought a richer milk than in any other paſture; I really expected, (as burnet is ſo ſtrong an aromatic) that the milk would have had a particular taſte; but far otherwiſe: the milk, cream, and butter, were as fine, if not finer taſted, than any from the beſt meadows. I am ſatisfied, that there is no better paſture for cows, whether milch or barren, than burnet. The weather was now extremely droughty, all our paſtures were burnt up, yet the burnet flouriſhed, and grew away, as if it had a ſhower every week. My ſtock of cows, horſes, and calves before-mentioned, paſtured in it almoſt continually, till Michaelmas; by the middle of November it was grown ſo conſiderably, that I have again turned in ſix head of cattle, and if the weather is not ſevere, I am of opinion, it will maintain them till Chriſtmas.

The burnet-ſtraw, or haum, is, after the ſeed is ſeparated from it, a very uſeful fodder for horſes, cows, calves, and ſheep; the chaff is of good value, if mixed with any other, however ordinary, chaff. I have fed all the above-mentioned ſtock with it promiſcuouſly together in one field; putting the haum into racks, and the chaff into troughs, and if the haum was chopped with an engine, it would ſtill be of much more value.

Burnet, I am fully perſuaded, will prove a very great acquiſition to huſbandry on many accounts, but more particularly for the following reaſons:

Burnet is a good winter paſture, conſequently it will be of great ſervice to the farmer as a conſtant crop he may depend upon, and that without any expence for feed or tillage, after the firſt ſowing; whereas turneps are precarious and expenſive, and when they fail, as particularly this year, the farmer is very often put to great inconveniencies to keep his ſtock.

It affords both corn and hay too. Burnet-ſeed is ſaid to be as good as oats for horſes. I know they will eat it very well; judge then the value of an acre of land, which gives you at two mowings ten quarters of corn and three loads of hay.

The ſeed indeed is too valuable to be put to that uſe at preſent; though it multiplies ſo faſt, that I doubt not but in a few years the horſes will be fed with it.

It will bear paſturing with ſheep.

It makes good butter.

It never blows or hoves cattle.

It will flouriſh upon poor light ſandy, ſtoney, ſhaltery, or chaulky land.

Burnet, after the firſt year, will weed itſelf, and be kept clean at little or no expence.

The cultivation of burnet is neither hazardous nor expenſive: if the land is prepared as is generally done for a crop of turneps, there is no danger of any miſcarriage; and any perſon may be ſupplied with the beſt ſeed at ſixpence per pound, by Mr. Charles Thorp, ſeedſman, in the White-Hart-Inn-yard, Borough.

I make no doubt but that burnet might be ſown late in the ſpring, with oats or barley. A gentleman in my neighbourhood did ſo laſt ſummer, and it ſucceeded very well. I ſhould think a buck-wheat ſeaſon, which is ſown the laſt of all corn, would ſuit it very well; but of this I have no experience, and could wiſh to have the experiment tried. A pea-field, drilled in rows, and kept clean, would make an excellent ſeaſon for burnet, as the pea crop would come off ſoon enough to prepare the land with two ploughings by the middle of Auguſt, after which time I ſhould not chuſe to ſow it.

It very frequently happens, that every farmer who ſows many acres with turneps, has ſeveral worth little or nothing; the fly, the dolphin, the black caterpillar, the dry weather, or ſome unknown cauſe, often defeating the induſtry and expence of the moſt ſkilful farmer. When this happens, as it too often does, I would by all means adviſe him to ſow it with burnet, and in March and April following, he will have a fine paſture for his ſheep and lambs.

Burnet is a native of England, and will certainly perfect its ſeed twice in one ſummer; and a farmer, with a ſmall plantation, may ſupply himſelf with ſeed of his own growth at very little or no expence: he may then be encouraged to make experiments on various ſeaſons, without much loſs or damage.

Thus, Sir, I have ſent you a true account of the ſucceſs of my burnet, and alſo my opinion of it. I wiſh what I have ſaid may any ways contribute to diſpel the prejudice, or inform the ignorance of my countrymen."

The other letter is from Chriſtopher Baldwin, Eſq; of Batterſea, a gentleman well known, and juſtly reſpected for his candor and fidelity.

" In the years 1763 and 1764, ſays Mr. Baldwin, I made ſeveral experiments on burnet, with a view to make myſelf acquainted with its manner of vegetating, and the uſes to which it might be applied: and having by this means acquired that knowledge I was deſirous of attaining, I determined laſt year to lay down ſeveral acres with burnet; nor would I content myſelf with doing it in any one particular method: therefore in the beginning of July, 1764, I ſowed about eight rod of ground with five pounds of Rocque's burnet ſeed. Rain falling ſoon after the ſeed was ſown, the plants came up very finely, and throve in ſuch a manner, that I was tempted to plough up about an acre of ground and plant it that autumn, in order to ſee what effect the winter would have on the young plants. Accordingly on the fourth of October I planted them in rows, about twenty inches apart, and about fifteen inches from each other in the rows. This diſtance, from experiments and obſervations which I have made, ſeems to me a very proper diſtance. Theſe plants took very well, and through the winter throve with ſurpriſing vigour. Laſt ſpring I ploughed the remainder of the field, being three acres, and planted it in the ſame manner with my plants, the whole of which, notwithſtanding the uncommon drought of laſt ſummer, grew well, and the verdure of the plants was really very beautiful. No water was uſed; indeed it would have been a vaſt work in a field of that ſize: however, I never ſaw any need of it. The plants were once hoed, and ſtood over for ſeed, of which the quantity collected was not very great; but this muſt be attributed to the uncommon drought, for I think we had not above one ſhower of rain from the planting to the gathering of the ſeed, the whole of which amounted to about 160 pounds.

The ſeed being got, I was impatient to ſee how the cattle would take to it, as it was roundly aſſerted by ſome gentlemen, that no cattle would eat it. Accordingly I ordered four cows and two horſes to be turned into the field; the cows fed freely upon it, but the horſes did not ſeem to like it ſo much at firſt, though in two or three days they fed well upon it. Burnet has ſtrongly the taſte of cucumbers, and I was fearful it might give a diſagreeable taſte to the milk; it therefore gave me great pleaſure to find, in about four or five days, that the quantity of milk was not only much increaſed, but the flavour of the cream much ſuperior to any I had ever had before, or ever taſted from cows fed upon the richeſt meadows. The cows and horſes having fed down the field, it was hoed again, and then harrowed once over, which laid it very clean, nor could I find that the burnet was at all hurt by the harrow.

Here let me obſerve to you, that I fed my horſes in the ſtables for about five weeks with the burnet ſtraw, or rather haum, from which the ſeed had been threſhed. Theſe horſes fed very freely, and throve much upon it, though they had only half their uſual allowance of oats. However, as I would by no means ſecrete any circumſtance that may appear unfavourable to burnet, ſo I muſt tell you that I obſerved, when any friend called upon me, and their horſes were put into the ſtable, that ſome horſes eat very greedily of it, and others would not touch it. I cannot ſay this gave me much concern. I ſatisfied myſelf with thinking, that ſome horſes did not know what was good for them; or to ſpeak more ſeriouſly, I thought the novelty of the food might as much diſpleaſe one horſe, as it pleaſed another; and doctor Templeman knows, that there are ſome things which we loath as children, that we are fond of as men; and that there are ſome things which we as much diſlike as men that are very wholeſome food: but to come nearer to the point. It is well known ſome ſheep and cows will not touch a turnep, yet is any one weak enough to infer from thence, that turneps are an unwholeſome or an improper food for cattle? And I was lately told by a particular friend, that he had often obſerved, when his horſes had fed for ſome time on the ſaintfoin hay, that it was ſome days before they would again take to meadow hay. I ſhould not have mentioned this circumſtance of the horſes, but to ſhew my impartiality; and I do it the more readily, as I find there are ſome gentlemen who are as fond of decrying, as others can be of promoting, uſeful experiments in agriculture.

Being well pleaſed with the ſucceſs that had attended my firſt experiments in the field, which I call four acres, I determined to proceed as I had intended in the ſpring of the year; accordingly as ſoon as the oats were got off a field of twelve acres, I ordered it to be ploughed and ſown with the 160 pounds of burnet ſeed before mentioned. This field was ſown on the twenty-ſixth of Auguſt laſt; and no rain falling till the eighteenth of September, the plants did not appear till the twenty-eighth of that month: however, there ſeems to be a good crop, and I intend as ſoon as they freſh up in the ſpring, to have the plants ſet out with ſmall hoes (ſuch as are uſed for carrots and onions) to about ſix inches apart. And in about a week after this is done, I ſhall harrow it with light harrows; for from experiments which I have made, this ſeems to me to be the beſt method of managing broad-caſt burnet. Having nothing farther to ſay in regard to theſe twelve acres, I muſt return to the four acre field tranſplanted, which having been hoed and harrowed as before-mentioned, was laid up for winter feed for my cows; but finding lately ſome gentlemen had again aſſerted, that ſheep in particular would ſooner feed on the quick-hedges than touch the burnet, I ſent to a neighbouring farmer for his flock of ſheep, and having a friend with me, we followed the ſheep into the field, who fell upon the burnet ſo greedily, that we found it very neceſſary to ſend them home again.

Being much vexed at theſe idle tales told about ſo much to the prejudice of this (as it appears to me) excellent plant, I determined to put it to as fair a trial as I poſſibly could. Accordingly, I ordered in four cows, which were in very good feed on natural graſs, and had beſides a large truſs of oat-ſtraw put in their cribs every night, notwithſtanding which they gave very little milk, and indeed were almoſt dry. Theſe cows, I declare, had not been in the burnet above ſix days, before they gave much more than double the quantity of milk; nay, was I to ſay three times the quantity, I know I ſhould not exceed the truth. The milk is exceeding fine, and free from all bad taſte; and further I muſt obſerve, that they ſoon began to leave half their ſtraw in their cribs; ſo that they are now ſerved with only half the quantity they had before. My land is a poor dry upland gravel; there are millions of acres in this kingdom of better land that do not fetch two ſhillings and ſixpence an acre. What a field therefore is here for improvement! Nay, I cannot but obſerve with amazement, the great numbers of country gentlemen who daily flock to this great city in purſuit of trifles, when they have ſuch inexhauſtible funds of knowledge within themſelves, if they would properly make uſe of them; confident I am, I could point out methods of improvement that would ſurpriſingly better their eſtates.

As the account I have now given you of burnet may appear a little extraordinary to ſome of the worthy members of your ſociety, ſo I ſhall be far from being diſpleaſed at their even doubting what I have now ſaid: on the contrary, it will give me pleaſure, provided any gentlemen, who have ſuch doubts, will do me the favour to call at my houſe, and convince himſelf by ocular demonſtration of what I have now ſaid."

BURNING *of heath*, a common practice of the country people for clearing heathy ground, in order to procure graſs and herbage for their cattle.

The fitteſt time for burning commons is towards the latter end of ſummer, when the plants are withered. But great care muſt be taken that the fire extends no farther than is intended.

This care conſiſts chiefly in clearing away all the graſs, &c. on the ſide you would preſerve from the flames, to a diſtance ſufficient to prevent all communication. The graſs, &c. cut down there ſhould be ſpread upon the part intended to be burnt, which will ſerve to kindle the fire after it is dry.

Beſides this precaution, a fair, calm day muſt be choſen; when by kindling the fire on the ſide the wind blows from, you prevent its ſpreading any further that way, and ſee it gradually remove up into the heath or common. The fire ſhould be carefully watched for fear of accidents. But, if notwithſtanding theſe precautions, it ſhould ſpread to places intended to be preſerved, and no water ſhould be at hand, the moſt effectual way of ſtopping the progreſs of the fire, is to dig a trench: for by throwing up the earth on the ſide where the fire is, you cover the graſs, and thereby hinder the flames from extending any further.

BURNING *of land*. *See the articles* BURN-BAKING.

BURNS, are accidents that often happen to animal bodies, whereby a ſolution of the continuity of the parts are produced.

In burns and ſcalds, when the ſkin remains entire, let the part be bathed well, and kept wrapped up in rags dipped in ſpirit of wine camphorated. Salt bound thick on the part has alſo been found very effectual for this purpoſe. Indeed all ſaline and ſpirituous applications excel all others, while the ſkin is yet unbroke; but when the ſkin is ſeparated, anoint the part, and keep it conſtantly ſupple with linſeed or ſallad oil, and a plaſter ſpread with bees-wax and oil. If the ſkin be ſo ſcorched, that ſloughs muſt be digeſted out, dreſs the wound with the wound-ointment and oil of turpentine, and finiſh the cure with any drying ointment.

The fire ſuppoſed to be left in the part after injuries of this kind, is nothing more than the inflammation, which is the natural effect of ſuch cauſes: ſo that the whimſical notions and conceits concerning fire remaining in the part, is extremely abſurd. *Bartlet's Farriery, pag.* 251.

BURNT-CLAY, a manure proper for cloſe compact ſoils, which it opens, warms, and invigorates, and thereby diſpoſes ſuch lands to part with their vegetative virtues.

A correſpondent of the editors of the *Muſeum Ruſticum*, tells us, that he has experienced the efficacy of this manure on wet, cold land; and given the following method for preparing it.

" I cauſed, ſays he, a labourer to dig as much clay as made a number of walls nine inches high, the ſame in thickneſs, and placed at the ſame diſtance from each other, in the ſame parallel direction, forming a ſquare of about three yards. Theſe vacancies, being like tunnels of brick-kilns, I filled with bruſh-wood, and on that threw ſome cinders or ſmall coal, of which I had ſufficient quantities, living then near ſome collieries; after which I covered the whole ſquare with clay about three inches thick, leaving the ends of the tunnels, open, which I then lighted on the windward ſide: as ſoon as the fire had got ſufficient head, I ſtopped the mouths of them; and when I perceived the covering was almoſt burnt through, I had a ſmall ſprinkling of cinders or ſmall coal, thrown on the heap, and then another covering of clay of the ſame thickneſs; and thus I went on till my fire was ſeven or eight feet high.

" When I found my fire was very well kindled, which was commonly about the time I put my ſecond coat on, I uſed to enlarge the baſe of the fire, by continuing the tunnels, and by adding new ones to the ſides (which were filled and covered as the others, and then lighted) till I made my fire about ſeven yards ſquare; for I ſoon found it never burnt well in the middle, if it was too large at firſt.

“ Care ſhould be taken that the labourer does not put on too thick a coat at once, as it will be apt to ſmother the fire: beſides, by confining the heat in too much, the clay was apt to run and vitrify, which was then of little uſe.

“ As ſoon as the heap was ſufficiently cool (for the ſooner it is laid on the land the better) I put about ten large cart loads on a ſtatute acre, and found it an admirable manure for either meadow, paſture, or corn: for the latter it will not laſt longer than three crops, though longer for the two former: and with this I have made prodigious improvements; but I do not believe it will anſwer for a ſandy ſoil, as it will render it ſtill lighter.

“ This manure I burnt all times of the year, though ſlower in the winter than ſummer, but always faſteſt in windy weather.

“ This I fancy may be burnt with bruſh-wood, or furze only; which I apprehend will anſwer better between the coats than coal, as it will keep the clay more open.” *Muſeum Ruſt. vol.* I. *pag.* 407.

BURNT-*grain*, a diſtemper common to corn, and too often confounded with ſmut, though it is, in fact, very different, and much more dangerous.

The ſmut, properly ſo called, occaſions the total loſs of the diſtempered ears; but as the black duſt is very fine, and the particles of it have no coheſion, the wind and rain carry it off, ſo that ſcarcely any thing is houſed in the barn, &c.

The burnt-grain is, on the contrary, often laid in the granary with that which is ſound, to which it communicates a contagious diſtemper, and alſo darkens the flour, and gives it a bad ſmell.

The characters of this diſtemper are, 1. The plants that produce burnt ears are ſtrong and vigorous.

2. The infected ears are not at firſt diſtinguiſhable from thoſe that are healthy; but when they are paſt their bloom, they appear of a deep green colour, approaching to blue; they afterwards become whitiſh, and are then eaſily known. As this change of colour is effected by the ſun, when a number of white ears have been ſuddenly perceived in looking over a wheat-field, the ſun's heat has been often thought to cauſe this diſtemper, or a fog preceding that heat.

3. Though all the ears produced from one grain are commonly infected, yet M. Tillet, Aimen, and myſelf, have met with ſound ears on plants that had produced others which were infected. We have even found ſome ears, part of which only were vitiated, and finally ſome grains encloſing partly a white flour, the remainder black duſt.

4. In burnt ears, the chaff, or outward coat, was commonly ſound, with this ſingle difference, that when the ears were near ripe, it appeared more withered and dry than in the healthy ears.

5. The bran, which immediately encloſed the grain, is not deſtroyed, as it is in the ſmut, properly ſo called; but has conſiſtence enough for the grain to preſerve nearly its natural form, with a whitiſh look.

6. The burnt-grains are ſhorter, rounder, and lighter than ſuch as are uninfected: they are ſometimes larger, ſometimes ſmaller. The furrow which runs the length of a grain of wheat is ſometimes totally effaced, at others is viſible: the piſtils at the extremity of the grains are dried up.

7. The bud of burnt-grains is not viſible.

8. Till the blooming ſeaſon, there is very little difference betwixt the burnt-grain and that which is healthy: they are only a little more ſwelled. But, in the blooming ſeaſon, the infected ears aſſume a bluiſh colour; the chaff is more or leſs ſpecked with ſmall white ſpots: the grains are of a deeper green, and larger than in a ſtate of nature; and, as long as they preſerve that colour, they adhere ſtrongly to the chaff. The diſtemper has often attacked very young ears, while yet encloſed in the ſheath. The ſtamina on the ſides of the grain are then dried up and ſickly; the embrio in part takes the deep green colour above-mentioned; the infected ears have not the conſiſtence of thoſe that are healthy; in the ſame meaſure the diſtemper advances, the chaff becomes dry and whitiſh.

9. The grains have ſome degree of firmneſs. On opening them, which may eaſily be done with the nail, there appears an unctuous, dark, brown, ſtinking ſubſtance, not at all reſembling the light duſt of ſmutty ears; the duſt of burnt-grain has ſome coheſion, and through a microſcope appears to conſiſt of larger particles than that of the ſmutty ears.

10. Some time before the blooming ſeaſon, the grains appear to be filled with a whitiſh ſubſtance, a little burnt towards the bottom, and this colour extends by degrees over the whole ear: the grain then appears divided, as it were, into equal quarters by furrows; which diſappear as the grain increaſes in ſize.

11. By what has been ſaid, it is evident that ſmut infects corn much ſooner than the burnt-grain.

12. Grains that are much burnt are evidently incapable of ſprouting. But I have had ſome ſound grains taken from an ear greatly burnt, which, in a kitchen-garden, have produced very ſtrong plants; and though the birds diſturbed my experiment, it appeared to me that there were ſome ſound ears amongſt many more that were infected.

13. A part of the burnt-grain is bruiſed by the flail, and their black duſt is ſcattered over the ſound grain; this unctuous duſt chiefly ſticks to the hairy extremity of the grain near the bud; it there forms a black ſpot. Corn ſo affected, is called *ſpotted grain:* many of the grains which eſcape the flail remain entire, on account of their lightneſs; a great deal is ſeparated by throwing, but the ſpotted grain remains as well as many that are burnt; and this is enough to darken the flour, and give it a bad taſte.

14. To remedy this inconvenience, and make the beſt bread, they paſs the corn through drum-ſieves (*cribles à tambour)* made of pierced iron-plates, like the graters with which they raſp tobacco; the corn is then waſhed, and all the light grains that ſwim ſkimmed off, which are moſtly burnt. The water takes off the ſpots, which are but ſuperficial; for if a ſpotted grain is wiped, the ſpot immediately diſappears.

With reſpect to the cauſe of this diſtemper, I confeſs we are hitherto as much at a loſs as in the caſe of ſmut. Some have attributed it to dung; others to fogs; many to the heat of the ſun; ſome to inſects; others to the moiſture of the land; and not a few to the ſeed not being ripe: but theſe opinions are confuted by good obſervations, and by experiments very carefully made. We refer to what has been ſaid of ſmut.

It may ſeem improbable that a meer ſuperficial duſt, that only ſticks to the bran, without penetrating the grain, ſhould be ſo contagious as to infect all the grain it touches, with a diſtemper; what is more ſurprizing is, that it ſhould injure the organs of fructification only. Yet, however improbable this may appear, the experiments made by Monſ. Tillet put it paſt a doubt; they ſhew that the farmers are not without reaſon cautious in avoiding to ſow ſpotted grain.

As it would take up too much room to mention, at large, all the experiments made by M. Tillet, which are to be found in the papers publiſhed by him on that ſubject, I ſhall content myſelf with relating the reſult of theſe experiments, and the inferences this able naturaliſt draws from them.

Several writers having mentioned dung as the immediate cauſe of this diſtemper, and others having aſſerted that it was hereditary, all M. Tillet's experiments were calculated to clear up theſe two points: he was at the ſame time in hopes, by means of the ſame experiments, of finding ſome method of guarding againſt this terrible diſtemper.

1. The ſeveral kinds of dung had no viſible effect in producing burnt-grain. The infected ſeed produced as much burnt-grain in the ground that was not dunged as in that which was. He did not find that dung had any effect, either in favour of, or againſt the diſtemper.

2. Dung made of the ſtraw of infected grain, did not ſeem to communicate the diſtemper; but the infected ſtraw unrotted ſeemed to communicate it. Yet the effect was moſt viſible when the duſt of burnt ears was mixed with the earth.

3. All grain naturally ſpotted, whether it grew on the land, or was brought from another place, bearded-wheat, ſummer-wheat, and wheat without awns, produced a great deal of burnt-grain

4. Picked wheat taken from the fineſt ears, and carefully ſelected grain by grain, that none of it might be infected, being ſowed, ſome in dunged, and the reſt in undunged beds, without having received any preparation, yielded little or no burnt-grain.

5. Some of this ſame picked wheat being ſprinkled with the duſt of burnt-grain, produced as many diſtempered ears as that which was naturally ſpotted.

6. The picked wheat, being prepared with lime and a ſolution of the ſea-ſalt, yielded ſtill fewer infected ears than when unprepared.

7. There were ſtill fewer from what was prepared with lime and nitre.

8. Early or late ſowing ſeemed to be a matter of indifference.

9. It appears by M. Tillet's experiments, ſeveral times repeated, that the duſt of burnt ears is contagious, ſince ſound wheat ſprinkled with it, or ſowed in rills in which that duſt had been put, produced a great number of infected ears. He alſo found that this duſt, though expoſed to a ſtrong heat, as of ſixty degrees, is ſtill contagious, unleſs it is abſolutely burnt by the fire when it has not that effect. Though it is kept for years, its infectious quality continues as ſtrong as ever.

10. Some farmers waſh the ſacks in which they put their ſeed. And it appears by M. Tillet's experiments, that they are in the right; for if the ſacks had any of the duſt on them, it would certainly infect ſome of the ſeed corn.

11. M. Tillet thinks he has obſerved, that the infected plants are more ſuſceptible of injury from froſt than others.

If this is the caſe, hard froſts muſt be ſerviceable, ſince by deſtroying the infected plants, they would have the ſame effect, as if ſuch plants had all been pulled up. The land being cleared of theſe uſeleſs plants, would be better able to ſupply ſuch as are found with nouriſhment, and the crop would be exempt from infected ears, which are a great hurt to it.

12. The black duſt ſo contagious, is not ſo to rye or bere; but the duſt of darnel is pernicious to wheat.

13. Smyrna wheat is leſs ſubject to this diſtemper than other grain; but ſummer wheat is greatly injured by it.

It muſt be allowed that the knowledge which has been acquired of the cauſe of this diſtemper, has put the curious obſervers in a train of finding proper preſervatives. In fact, as the duſt of burnt-grain infects all the grain it touches, it is probable that every method ſhould be deemed efficacious, that is capable of taking away this duſt, provided the virus has not from its firſt contact affected the interior part of the ſeed intended to be ſowed. In this caſe the ſeveral ſieves which we have recommended to be uſed in the preſervation of corn, and the waſhings with fair water, which in many places is uſed on ſpotted grain, may be mentioned as efficacious preſervatives, as well as lime-water which our farmers uſe, the ſtrong brine uſed in ſome provinces of France, and the ſolution of arſenic, of which ſome perſons have made ſuch a ſecret: all theſe preparations ſhould be of ſervice; and, according to M. Tillet's experiments, they are ſo: yet they are often inſufficient. This point, therefore, merited to be cleared up by particular experiments, and with all neceſſary care. M. Tillet ſet about it with ſpirit, and the following are the inferences that may be drawn.

1. The effect of the black duſt on the ſeed is only ſuperficial till it is put into the earth, not at all affecting the interior parts.

2. Therefore every means that can tend to clear them of the duſt, muſt be of ſervice to keep them healthy, and free from the diſtemper.

3. Grain perfectly free from this, and from rottenneſs, will yield no diſtempered plants.

4. Grain blackened with this infectious duſt, may be made healthy by clearing it of ſuch duſt.

5. Sifting ſeed, and waſhing it in ſeveral waters, leſſen, it is true, the effects of the contagion; but this is not ſufficient, as many infected plants will be produced, though the ſeed was waſhed in ſeveral waters.

6. Lime, which is more efficacious than water, is not always enough ſo. I ſhall obſerve, on this occaſion, that ſeed was formerly limed in a manner different from what it is now. The ſeed was then put into baſkets, which were plunged into lime-water very hot. The ſeed was ſtirred in the baſkets, and all that ſwam on the water was taken out with a cullender; by this means they got rid of the infected grain; and the good ſeed was better cleaned, than by only throwing, as they do now, lime-water on a heap of ſeed, which is then ſtirred with a ſhovel, or by only mixing the ſeed with the ſlacked lime reduced to powder.

One of our farmers, a careful man, being obliged one year to ſow ſpotted ſeed, he limed it by immerſion, in the manner above deſcribed; and the year following had no burnt-grain.

Some experiments made in the country of Caux, by M. de Goufreville, have been publiſhed; they evince the good effects of lime uſed in the manner we have mentioned. And what is ſtill a farther confirmation of this is, that whenever our farmers ſow ſeed that has not been limed, their fields are amazingly infected.

7. It is a good precaution to waſh ſpotted grain in ſeveral waters; but it ſhould be ſoaked in brine, and this brine ſhould be abſorbed by lime, by immerſion, as we have deſcribed.

A ſtrong brine of ſea-ſalt is very good, and may be employed to great advantage in countries where ſalt is a merchandize.

9. One part of nitre to nine parts water is more efficacious than ſea-ſalt; this, therefore, ſhould be uſed where nitrous earths abound.

10. Strong alkaline lyes are ſtill better; ſalt wort, pot-aſh, aſhes of tartar, lyes of common aſhes much impregnated with ſalt and human urine, or cows urine, alkaliſed by putrefaction: of theſe various articles ſuch may be choſen as are moſt common. For inſtance, in Normandy aſhes of ſea-wrack, which are very cheap there, may be uſed. This, which is rejected for dying and lyes, as being more impregnated than alkaline with ſea-ſalt, may be advantageouſly uſed in the preparation of ſeed.

11. As it is evident that ſeed picked with care yields very few infected grains, it muſt, of courſe, where a farmer has ſpotted grain, be of great advantage to him to change his ſeed, in order to procure what is uninfected.

12. M. Tillet's proceſs may be comprehended in what follows: if the ſeed is ſpotted, it ſhould firſt be waſhed in ſeveral clear waters, till the black is quite got off; it ſhould then be put into the ſteep. If it is not ſpotted, ſoaking it in the following liquor will be enough. Make ſome lye, ſuch as is uſed for linen, in a bucking-tub, putting four pound of water to every pound of aſhes. If one hundred pounds of aſhes are uſed and four hundred pounds of water, there will be two hundred and forty pounds of lye, to which muſt be added fifteen pounds of lime, which will be enough to prepare ſixty French buſhels of wheat (between ſixteen and ſeventeen buſhels Engliſh meaſure). When this ſteep is to be uſed, it muſt be heated as hot as you can bear your hand in it; the ſeed, being put into baſkets, muſt be plunged into it, and ſtirred with a ſtick; the baſkets muſt then be raiſed and kept up by ſticks on the edge of the bucking-tub for the lye to drain; the ſeed being thus prepared muſt be laid on the floor of the granary till it is dry enough to ſow. If it is prepared long before it is wanted, it muſt be, from time to time, ſtirred with a ſhovel to prevent its heating; with this precaution it may be kept a month, or even a whole year.

We prepared ſome ſeed in this manner at M. Taponat's, near Rocheſoucault in 1760; and in 1761 we ſaw with pleaſure that the corn ſo prepared was uninfected; whilſt in the neighbouring fields, a fourth, a third, and even half the crops, were ſpoiled by this diſtemper.

All the trials that have been made evince that acrid ſubſtances are proper remedies for this diſtemper: I alſo believe all the ſteeps to be good; but prefer M. Tillet's, as being more acrid, and leaſt coſtly. I imagine lye that had been uſed for linen might do, only ſtrengthening it with ſome ſea-wrack, and putting twice as much lime. I know this lye to be very acrid, but cannot anſwer for its efficacy in preſerving corn from being burnt, becauſe for ſeveral years paſt we have ſcarcely had any of our grain ſo infected.

13. Several farmers in different provinces have uſed a ſolution of arſenic to prepare their ſeeds. Great complaints have been made in all quarters of it. Among others, a phyſician publiſhed an eſſay to ſhew of how much importance it was to prohibit the uſe of this poiſonous ſteep. He there enumerates all the accidents that have happened to the ſowers, and to the men that made the preparation, of which himſelf was a witneſs. Since M. Tillet has given us a method ſimple and innocent in itſelf, but little coſtly, and of great efficacy to clean ſpotted grain, it is to be preſumed that no body will uſe this pernicious drug, from which ſuch melancholy conſequences may enſue, if by accident any of it ſhould be mixed with the meal, and if the light corn is given to the poultry or cattle; beſides, this poiſoned ſeed muſt kill all the partridges and pigeons that eat the uncovered grain.

As ſome people are fond of making objections, it may, perhaps, be urged, that if the black duſt was ſo infectious, this diſtemper would make from year to year ſuch progreſs, that in the end we ſhould have nothing but burnt-grain. But we need not be apprehenſive in this reſpect: and a year in which much corn is infected, ſucceeds one in which ſcarcely any burnt-grain was to be met with. Scarcely any was to be found in the crops of 1754, 1760, and 1761.

In reflecting on this objection, which has ſome weight, I think I have found an anſwer to it in M. Tillet's obſervations, which is, that hard winters, paſt all doubt killing the diſtempered plants, ſtop it progreſs.

It may alſo be ſaid, that if this diſtemper is only cauſed by the infectious duſt, how can it at firſt get footing in a province that was before unacquainted with it?

It is readily allowed that this diſtemper may be attributed to other cauſes beſides the black duſt: but M. Tillet's experiments inconteſtibly prove this duſt to be contagious; and his reſearches ſupply us with the means of leſſening conſiderably, if not entirely extirpating this diſtemper: thus we may have larger crops, better bread, and corn more proper for keeping. What a ſatisfaction muſt it be to a man to have made a diſcovery ſo uſeful to his fellow-creatures, whoſe chief food is the ſeveral ſorts of grain? We ſhall ſoon ſee whether habit, ſupineneſs, and ill-judged œconomy in the farmers, will not prevent them from reaping any benefit from M. Tillet's labours, who yet propoſes to them ſimple and cheap methods of attaining an end which to them ought to be of infinite conſequence. *Du Hamel's Elemens d'Agriculture, vol.* I. *pag.* 314.

BUR-TREE, a name given in ſome counties to the elder-tree.

BUSHEL, a meaſure of capacity for dry things, as grain, fruits, pulſe, &c. containing four pecks, or eight gallons, or ſixteen quarts.

A buſhel, according to a ſtatute made in the twelfth year of Henry VIII. is to contain 2,178 cubic inches, or eight gallons of wheat; the gallon of wheat to weigh eight pounds troy-weight. Mr. Ray tells us, that a buſhel in Warwickſhire is equal to two ſtrikes, or two buſhels, ſtatute, or Wincheſter meaſure.

The French buſhel conſiſts of four quarters, and the quarter of four litrons, each containing thirty-ſix cubic inches. Conſequently the buſhel contains 576 French cubic inches, which, according to Mr. Greaves's calculation, is nearly equal to 615 Engliſh inches. The French buſhel therefore is to the Engliſh buſhel, as 615 is to 2,178. That is, the French buſhel contains one peck, a quart, and two cubic inches nearly. It muſt however be obſerved, that the French buſhel for oats is double that of any other grain.

BUTCHERS-BROOM, or knee-holly, the name of a plant common in woods in divers parts of England.

BUTTER, a fat unctuous ſubſtance, prepared, or rather ſeparated, from the milk by churning it. *See the article* DAIRY.

BUTTER-BUR, or *peſtilent-wort*, the name of a weed reſembling colt's-foot in many reſpects; but the flowers are purple, and grow in a thirſe. The leaves come out after the flowers decay; and are like thoſe of colt's-foot in ſhape; but three or four times as big. It infeſts meadows and paſture grounds, where it proves a very troubleſome weed. *See the article* COLT'S FOOT.

BUTTER-FLY, the name of a numerous, and well known claſs of inſects.

M. Duhamel has frequently noticed, and made drawings of, a ſpecies of ſmall inſects, ſome of a bright red, and others black, which are found in great numbers in the ears of wheat. He ſuſpected that they fed on a ſweetiſh juice which is in the ear whilſt green: and M. Tillet, who was immediately of opinion that they might do conſiderable damage to the grain, followed them very aſſiduouſly in all their metamorphoſes, of which he has given a full account in a memoire that gained the prize of the Academy of Bourdeaux for the year 1755.

The inhabitants of a conſiderable part of the province of Angoumois have, for thirty years paſt, ſuſtained an hitherto irreparable loſs, by an inſect which begins to devour their corn even in the ear, before it is reaped. This ſcourge deprives them annually of their moſt promiſing crops. It appeared at firſt only in a few hamlets, but ſoon made a rapid progreſs, and has now ſpread to the lands of upwards of two hundred pariſhes. Famine and the moſt fatal epidemic diſeaſes have often taken riſe from leſs beginnings. Meſſieurs Duhamel and Tillet were deputed by the Academy of Sciences at Paris, of which they are members, to enquire into the nature of this inſect, and the means of preventing and curing the dreadful calamity occaſioned thereby. They have jointly publiſhed a ſmall treatiſe on this ſubject, from whence we ſhall extract the following remarks ſo much the more readily, as their means of prevention and cure in this particular caſe may be equally applicable to the injuries done to corn by inſects in general.

This inſect is moſt generally known as a butterfly, very much like the moth which preys on woollen cloths, or the falſe moth which is found in great quantities in the granaries of all countries, and which feeds on corn. M. de Reaumur, whoſe accurate inquiries into nature nothing could eſcape, has minutely deſcribed both theſe inſects.

The butterflies which proceed from the wheat caterpillar are often ſmaller than the falſe moth. Some of them are, however, larger, and longer ſhaped: but, that excepted, they are much like them: they are likewiſe of the claſs of four-winged phalenæ or night butterflies; their wings are long in proportion to their breadth, which is almoſt equal at the upper and the lower end. The colour of the upper wings varies; being ſometimes of a light, and ſometimes of a darkiſh grey brown, but always ſhining when expoſed to the ſun. The poſition of theſe wings, of which the edges are cloſe ſet with long hairs, is horizontal when the inſect firſt ſettles after having flown; but ſoon after thoſe edges incline downward. Its head (Plate V. Fig. 24, 25, 26.) is furniſhed with two antennæ (Fig. 27.) the joints of which, nicely fitted into each other, leſſen gradually up to the point. Its eyes are almoſt as large as thoſe of the falſe moth. Between the antennæ are two beards, (Fig. 28.) which proceed from the lower part of the head and riſe up above it; and likewiſe between the antennæ is a tuft of hairs, which turn up backward.

Theſe inſects do not take any food while they are in the ſtate of butterflies, as will be proved by ſeveral experiments; nor do, or indeed can they, prey upon and deſtroy corn during that time, as is the general, but miſtaken opinion in Angoumois; for they have not even organs capable of doing it the leaſt injury. Their only function then is to procreate their ſpecies.

The males of theſe butterflies ſeem, in general, to be larger than the females: but they cannot well be diſtinguiſhed with certainty, unleſs they are ſeen coupled together, which, according to the very nice and careful obſervations of Meſs. Duhamel and Tillet, never is but in the night time, or in a dark place. Their copulation then is like that of the ſilk-worm butterfly: the body of the male and that of the female then form one ſtrait line; their heads are turned different ways; the ends of their wings reſt upon each other; and their conjunction laſts ſeveral hours. The abovementioned gentlemen, with many other witneſſes, ſaw great numbers of them in this ſituation, both upon heaps of corn in granaries, and upon ears of corn in the field. They catched two of them in the act of copulation, and put them into a glaſs covered over, where they then ſeparated, but were found joined together again the next day, in the evening.

As ſoon as the female is impregnated, ſhe lays her eggs in great numbers. Meſſieurs Duhamel and Tillet put a male and female, coupled, into a glaſs veſſel, and, watching them carefully, ſaw the female, ſoon after her ſeparation from the male, depoſit her eggs, ſometimes on one ſpot and then on another, in heaps of 60, 80, or 90 together. Theſe eggs are ſquirted out, as it were, commonly by three, four, or half a dozen, and ſometimes thirty, at once; and at each ſquirt of this kind the female changes her ſituation. Thoſe which were incloſed in glaſſes caſt ſome of their eggs upon a few grains of corn depoſited at the bottom of thoſe glaſſes, and, finding themſelves cramped there, laid others on the ſides of the veſſel. Theſe eggs are accompanied with a viſcous matter which makes them ſtick to the places they are laid in; and this coheſion ſoon becomes very ſtrong.

Theſe eggs, as may eaſily be imagined from the ſize of the mother and the great number which ſhe lays, are ſo extremely ſmall that one of them would drop through a hole made in a bit of paper with the point of the fineſt needle. When examined with a microſcope, they look, as in Fig. 4, not unlike the nymphs commonly called ants eggs. They are ſtreaked length-wiſe, and appear rough or curdled. When firſt laid, they are white; and afterwards they become red, as if tinged with carmine; owing to the colour of the caterpillar within the egg, of which the ſhell is very thin and tranſparent, as is evident after the caterpillar has left it.

By means of the thinneſs and tranſparency of this covering, the caterpillar may be ſeen within the egg, as at *b*, Fig. 5. At firſt, it is bent, as in Fig. 6: ſome time after, it wriggles itſelf into the ſituation repreſented in Fig. 7; and then makes a hole through the end of the egg, and comes out there, as in Fig. 8. This opening remains at the end of the empty eggs, as at *c*, in Fig. 5.

It is with great difficulty that the caterpillar gets its two legs out of the egg; but after it has extricated four or ſix of its legs, it ſoon draws out the reſt of its body. At its firſt iſſuing from the egg, this caterpillar looks like a bit of hair about a quarter or a fifth part of an inch long.

Theſe caterpillars generally come out of their eggs on the ſixth or ſeventh day after they have been laid. Some ſay they have ſeen them hatch at the end of four days. The temperature of the air will undoubtedly influence this variation. They are red, as was ſaid before, whilſt in the egg; but that colour goes off by degrees after they are hatched, and they ſoon become almoſt white.

The female butterflies which are upon the ears of corn in a field, endeavour to place themſelves in ſuch manner as to lay their eggs cloſe to the place where the grain is faſtened to the ſtalk. Fig. 1. repreſents ſome of them, at *a*, in the attitude of thus laying; in which caſe their eggs are depoſited near the bottom of the grains, toward the ſtalk: but it often happens that, in their hurry to lay, they ſcatter their eggs in other places, as repreſented upon the huſks in Fig. 2 and 3.

As ſoon as the caterpillars are hatched, they ſet about making their way into the grain, in order to feed upon its flour. If the eggs have been laid in the granary, after harveſt, and upon the grains themſelves, they generally creep into the furrow *a* of the wheat (Fig. 9. and 10), and there weave a ſlight web *bb*. They then tear a hole in the ſkin or rind, range around them the particles of the bran thus ſeparated, and wriggle themſelves into the mealy ſubſtance which is to be their food. The hole through which the caterpillar entered can then no longer be perceived, but by a little heap of bran which lies upon it, as in Fig. 11. This ſmall quantity of pulveriſed bran, which is a ſure ſign that a young caterpillar has got into the grain, may eaſily eſcape the notice of thoſe who have not obſerved it before; but when once known, it is eaſily diſtinguiſhed.

When the eggs are hatched upon the ears, in the field, the young caterpillars ſoon find means to glide in between the chaff and the grain, and in that ſituation they pierce the latter, as was ſaid before, generally in the furrow, but ſometimes at the pointed end, which is a little hairy.

To ſet this in a yet clearer light, it is to be obſerved, that, in moſt kinds of wheat, three grains of corn adhere, or are faſtened, at the ſame height, to the ſpike or ſtalk which traverſes the ear, as at *b b b*, Fig. 1. in ſuch manner as to form a ſort of triangle, or flower-de-luce. Each grain is covered with three concave coats or huſks, the ſmalleſt and thickeſt of which is repreſented by Fig. 2 and 3: their inner huſk is covered by a broader, but thinner; and this grain is covered by a ſtill larger, from which ariſes the beard, when there is one. Over all theſe there frequently is a fourth tegument, or very thin membrane, more or leſs wide. All theſe huſks lap over each other like the ſcales of a fiſh, and envelop the grain. The end *e* (Fig. 9.) is uppermoſt, and the end *f* reſts upon its ſupporter. The germ is at the end *f*, and the extremity *e* is covered with a hairy down.

The young caterpillar finds means to creep under all theſe ſcale-like coverings, and to get at the grain, which, after having wove a ſlight web of only a few fine threads, either to cover itſelf, or to hold by, it attacks, ſometimes at the upper end *e* (Fig. 9), which is very ſoft in green corn; and ſometimes, if it has crept in at the lower end, it lodges in the longitudinal furrow of the corn, and there begins to mine in the manner before related.

As the huſks of barley are harder, and ſtick much cloſer to the grain, than thoſe of wheat, it is almoſt always at the point *d* (Fig. 12.) that theſe caterpillars ſlip into that corn, by means of a ſmall opening generally perceptible in that part.

To conceive how theſe ſmall caterpillars, which are hardly able to pierce the rind or bran of wheat, can glide into barley by means of the opening before mentioned, it is neceſſary to conſider the organiſation of this grain. It is formed of two lobes *cc*, Fig. 12. which are partly ſeparated by a furrow in its middle, and partly covered by a tegument *a a*, which fits exactly cloſe and adheres ſtrongly to the lobes *c c*, and terminates in a long awn or beard *b*, of which only part is repreſented in this drawing. The two lobes *c c* are again covered with their proper tegument, which ends in two ſmall appendices at *d*. Here generally is a chaſm or opening, through which the caterpillar penetrates to the mealy ſubſtance.

To trace this caterpillar in its further progreſs after it had crept in at this opening, and conſequently diſappeared, Meſſieurs Duhamel and Tillet tore off the appendices *d*, Fig. 13, and found, that after having wove a ſlender web, it had immediately begun to attack the lobes of the grain of barley, as was evident from the bran around it. After it had made its way entirely into the grain, and was buried there, they ſaw nothing but the little heap of bran it had thrown up, over the hole through which it entered.

Notwithſtanding the induſtry of this inſect, it ſeems highly probable that the young ones meet with great difficulties in their attempts to get into the grain; ſince very many of them die before they can effect a lodgment in the mealy ſubſtance. This number is ſo great, that it might induce one to wonder how ſuch quantities of corn can be deſtroyed by theſe caterpillars, if one did not conſider the vaſt fecundity of the female butterflies. But the ſequel of this account will ſhew, that if prodigious numbers of them did not periſh, it would hardly be poſſible to ſave a ſingle grain of any kind of corn.

The people of Angoumois were ſtrongly of opinion, that the miſchief occaſioned by this inſect was peculiar to the corn of their country, and that what was brought to them from other places always eſcaped unhurt. To clear up this point, Meſſ. Duhamel and Tillet put into different glaſſes wheat of the growth of other provinces, and with the grains, in each glaſs, ſome of theſe butterflies actually coupled. They ſoon ſaw the female lay her eggs upon theſe grains, and afterwards beheld the caterpillars hatch, and make their way into the grains. Their farther obſervations proved, that the principal cauſe of the ſpreading of this evil is, that the inſect itſelf, which multiplies exceedingly, is conveyed to other parts with the corn in which it is incloſed.

The caterpillar incloſed in a grain of corn preys upon the mealy ſubſtance of that grain, till it has eaten it all; by which time the inſect has attained its full growth. Whenever a grain was opened (Fig. 19.) in which the caterpillar was not full grown, a deal of flour yet remained: but when this inſect was full grown, there remained only the ſkin, or bran, ſo deſtitute of flour, as not even to diſcolour clear water. Hogs, though very greedy creatures, and fond of bran, would not touch theſe hulls when given to them unmixed; but they eat them readily enough when mixed with other food.

M. de Réaumur ſuſpects that when theſe caterpillars have conſumed all the flour, they eat the excrements which they had voided whilſt young. At leaſt it is certain that, upon opening ſeveral grains in which the inſect was young, a number of ſmall white pellets, like eggs, was found near the caterpillar; and a half-grown caterpillar being taken out of a grain, and laid upon a piece of glaſs at the focus of a microſcope, it was ſeen to void a quantity of excrements, very white, ſmooth, and oval; and when the caterpillars were ready to be metamorphoſed in the ſpring, there remained only a very ſmall portion of dark brown excrements, quite different from the white that were obſerved at firſt.

The length of the corn-caterpillar, when full grown, is very little more than the twelfth part of an inch; and its thickneſs is, at moſt, equal to half the circumference of the grain that contains it: its body is ſmooth and entirely white: it is thickeſt towards the head, in which one may perceive its mouth, two large eyes, and two kinds of horns: the head is a little browner than the reſt of the body. This caterpillar has ſixteen legs, of which the eight intermediate and membranous are only ſmall prominencies, ſo minute as not to be diſtinguiſhed even with the help of a microſcope, unleſs the inſect be laid upon its ſide.

Our authors make here the following digreſſion, to ſhew the difference between this inſect (Fig. 23.) and the falſe moth (Fig. 31.); it being the more important to diſtinguiſh them, as they are very much alike in many reſpects, and often blended together in the ſame granaries.

The falſe moth proceeds from a ſmall caterpillar, the body of which is ſmooth and whitiſh. It has ſixteen legs, does not lodge in the grains of corn, but contrives to faſten ſeveral of them together with a web which it ſpins, and with which it makes itſelf a dwelling place like that of common caterpillars. This dwelling-place, or ſheath, in which the caterpillar of the falſe moth uſually abides, is generally in the middle of the little heap of grains which it has collected for its food, as in Fig. 30: but, which diſtinguiſhes it from the caterpillar of the true moth, it can quit this ſheath at any time, to eat the grains around it, one after another. It generally attacks ſeveral grains at once, and always without order, eating ſometimes of one, and ſometimes of another, ſo that ſeveral are gnawn when not one is wholly conſumed. When theſe inſects are very numerous in a granary, all the grains upon the ſurface of the corn are linked together by a web, ſo as to form a cruſt which is ſometimes three inches thick. This caterpillar turns into a chryſalis, or aurelia, in a grain which it has hollowed, or in the ſheath of its web, and iſſues from thence, in the month of June, in the form of a butterfly. When a heap of corn is ſtirred in which there are many caterpillars of the ſpecies of this falſe-moth, thoſe inſects crawl up the walls: but they ſoon return to the heap, and, by the very next day, cover it all over with a new web.

The inſect which deſolates many parts of Angoumois is more ſparing of the mealy ſubſtance of the corn, than the caterpillar of the falſe-moth; for the former ſeldom conſumes more than the contents of a ſingle grain. Nothing is more uncommon than for it to paſs from one grain to another, even though it be immediately contiguous. It eats the flour in ſuch manner that the ſkin or rind of the grain, which is entirely emptied, looks whole and ſound: but the leaſt preſſure then eaſily reduces it to powder; and it riſes up to the ſurface of water more or leſs quickly, according as the inſect has left in it more or leſs flour.

As heat haſtens the metamorphoſis of the inſect, it is not unuſual to find, in very hot weather, ſome of theſe caterpillars transformed into aureliæ, before they have conſumed the groſs excrements before-mentioned, or even eaten all the mealy ſubſtance of the grain. In this caſe, the aureliæ are very ſmall, and produce only ſmall butterflies. The ſame happens to other inſects of this kind. Silk-worms eat but little when they are ſickly, and, if that ſickneſs continues, they are metamorphoſed ſooner than others which are healthy; but then their cocons always are ſmall. If a field caterpillar be ſhut up in a box before it has attained its full growth, it will, after having faſted ſome days, be converted into a ſmall aurelia, from will iſſue a butterfly ſmaller than others of the ſame ſpecies. In like manner, when one ſees among the corn caterpillars ſome larger than others, it may reaſonably be preſumed that this difference proceeds from there having been a greater quantity of flour in the grains on which they fed, than in thoſe which were the nouriſhment of ſmaller flies; or from their having been of a ſtronger conſtitution. It likewiſe appears that ſome of theſe caterpillars are ſo much more voracious than others, that the flour of one grain is not ſufficient for them. M. Duhamel put ſeveral of them into a box of flour: they throve there, and ſeemed to grow larger than in their common way of feeding in the grain.

In general, they are matamorphoſed much ſooner in ſummer and when the air is warm, than in winter, or in cold weather. It may likewiſe be obſerved, that the mealy ſubſtance of a grain is more completely conſumed when the metamorphoſis is ſlow, then when the contrary happens.

The ſagacity of M. de Réaumur was requiſite to diſcover a ſingular circumſtance relative to the working of this inſect, and of which Meſſ. Duhamel and Tillet have been witneſſes. The caterpillar, exactly incloſed in its grain, foreſees, or acts as if it knew, that, in its future ſtate of butterfly, it will be deprived of the organs neceſſary to pierce through the rind of bran which forms its priſon. However, whether it has or has not that foreſight, the fact is, that the caterpillar, before it is changed into an aurelia, makes in this covering of bran a ſmall trap *a* (Fig. 21.) which remains ſhut. Meſſrs. Duhamel and Tillet could not eaſily diſcover it at firſt; but after ſome ſearch, a little ſpot whiter than the reſt, about as big as the head of a ſmall pin, and ſomewhat prominent, ſhewed them where it was. They then, upon lifting up this trap (Fig. 22.) with the point of a fine needle, could ſee the chryſalis in the inſide of the grain, and could alſo, ſometimes, cloſe the trap again ſo exactly, as not to leave the leaſt appearance of a hole.

When the caterpillar has attained its full growth, and formed its trap, or outlet, it weaves a cocon, and is afterwards metamorphoſed, within the grain, into an aurelia (Fig. 20.) which ſeems at firſt to be divided by ringlets (Fig. 14.): but when the butterfly is formed within the aurelia, its wings may be diſcerned through the membranes which cover it, as in Fig. 15, 16, 17, 18. The above-mentioned accurate obſervers opened ſome of theſe aurelia in an advanced ſtate, and took out of each of them a butterfly greatly rumpled and benumbed. When one of theſe caterpillars fiſt iſſues out of an egg, and when a full grown one is taken out of a grain of corn, the body of each, then ſeemingly more at eaſe, dilates, ſo that one can hardly conceive how it could be contained in ſo ſmall a ſpace as that from whence it came. The caſe is different when one opens a grain in which there is an aurelia; for it is eaſily ſeen that this occupies little more than half of the inner capacity of the grain which incloſes it, and that the caterpillar, in forming a cocon, has divided the grain into two ſpaces or cells, in the largeſt of which, being ſomewhat more than half, the aurelia is lodged, whilſt one ſees in the other nothing but its excrements. The aureliæ are therefore ſmall in compariſon to the caterpillars that were metamorphoſed into them. Nor is it leſs ſurpriſing how a butterfly juſt come out of the aurelia could be contained within that covering.

The butterfly, being entirely formed in the aurelia, breaks the ſkin of it at the end, opens with its head the little trap which the caterpillar had made on the outſide of the grain, and comes out at the little hole which was covered and ſhut by that trap. The mealy ſubſtance of the grain has, by that time, been ſo far conſumed, and the outſide huſk or bran rendered thereby ſo light, that the butterfly, after having diſintangled its wings, takes its flight, and ſometimes carries away the empty hull. As ſoon as the butterflies are out of the grains which contained them, they couple, and the females lay their eggs in the manner before related. Such is the circle of their life.

This inſect, like all others of the ſame ſpecies, remains, as was ſaid before, a longer or ſhorter time in its different ſtates, according as the temperature of the air is more or leſs favourable to its ſeveral changes. It is known that an aurelia of a caterpillar, which generally produces a butterfly in eight days, will continue three months in the ſtate of an aurelia, if it be put into an ice-houſe, and that the butterfly does not, in that caſe, come out, till after it has been removed into a much warmer air. For this reaſon one cannot fix preciſely the time within which the caterpillars are transformed into aureliæ, nor how long they remain in this ſtate: it can only be ſaid, that they come out of their eggs very ſoon when the air is warm, and that they ſometimes continue long in the ſtate of caterpillars, as well as in that of aureliæ, if the weather be cold: to which may be added, that both caterpillars and aureliæ, of different ſizes, are ſeen in the field in warm weather; that butterflies are ſeen to iſſue out of corn from harveſt till the end of September; and that caterpillars of various ſizes may be found in the infected grains during the whole winter.

" In the middle of May 1761," continue Meſſieurs Duhamel and Tillet in their account of this inſect, " when we arrived at la Rochefoucault, there were many caterpillars in the corn, very few aureliæ, and not many butterflies. The weather was then very dry, and the nights were cold. On the 21ſt, the wind changed to the weſt; and in a few days after it began to rain, and continued ſo to do till the end of the month. During this time the thermometer was at from 13 to 14 degrees of Réaumur, or from 56 to 58 of Farenheit.

" In the beginning of June, we found in the grains of corn many more aureliæ than caterpillars; and on the 5th of that month, the air being then become pretty warm, we ſaw numbers of butterflies. By the 15th, they were increaſed ſo prodigiouſly in the cloſets where we made our experiments, that they perfectly darkened the day, and flew into our mouths if we opened them. We could then find but very few caterpillars, except in the corn which had been laid in cool places. We believe that the duration of the life of the butterflies is, in general, a fortnight or three weeks; though ſome of them have lived a month in our glaſs veſſels. The ſequel will ſhew that the whole circle of the life of this inſect may be completed in leſs than fifty days, when the air is warm.

" The coming out of the butterflies is generally denoted by a great heat in the heaps of corn, or in the ſheaves, according as the grain is laid up in one or other. It was ſuch as to make the liquor in M. de Réaumur's thermometer riſe to 25 and 30 degrees (from 62 to 71 of Farenheit) when the outer air was at 15, (35 and a half of Farenheit). This heat certainly accelerates the hatching of the inſects; for prodigious multitudes of butterflies iſſue out of the heated corn in a few days after the ferment has taken place.

" The coolneſs of autumn interrupts their propagation; and no more butterflies appear from that time, till the warmth of ſpring begins to be felt. But, may not the heat which favours the multiplication of theſe inſects be produced by the creatures themſelves when aſſembled in vaſt numbers? This is very poſſible: for it is well known that there is a conſiderable warmth in well ſtocked bee-hives; and that corn greatly infeſted with weevils or moths, is alſo very hot. We ſhall hereafter have occaſion to obſerve that no ſenſible heat is perceived in heaps of grain in which there are but few caterpillars, and that the heat abates after moſt of the caterpillars have been changed into butterflies. It ſometimes happens that, through ſome cauſe or other, the heat goes off ſoon, and at other times it laſts three weeks or even a month. Perhaps too this great heat of corn full of caterpillars may proceed from the moiſture which thoſe inſects occaſion, and from thence may ariſe a fermentation capable of hatching the eggs, of making the caterpillars grow, of haſtening their transformations, and of bringing forth the butterflies, at the ſame time that it damages the corn, which thereby contracts a bad ſmell. It is certain, that when the harveſt is wet, and warm rains fall at that time, the corn heats very ſoon, and then theſe inſects make an extremely rapid progreſs. The heat which the corn contracts is doubtleſs very favourable to that progreſs, and the inſects certainly may then attack the grains ſoftened by the moiſture, more eaſily than they can thoſe which are hardened by drought. Accordingly, in 1760, a year in which the heat was great, and the air very dry, the corn in Anjou kept cool ſo long that many of the inhabitants of that province thought there would be but few inſects, and that the great heat of the ſun had killed moſt of the caterpillars. They flatter themſelves with the ſame hopes whenever theſe inſects do not appear in great numbers quite ſo ſoon as uſual, and imagine that few or none of them will come afterwards: but in that very year, which they thought ſo fatal to inſects, we ſaw butterflies come out of the ears of corn while they were in the reapers hands; we ſaw ſtill more fly about the ſheaves laid up in barns, and an inexpreſſible multitude upon the ſurface of corn depoſited in granaries, though neither of theſe grew very perceptibly hot till about the middle of September. In 1761, the corn was ſo much heated on the 8th of September, that though the outward air was of the ſame temperature as that in the vaults of the obſervatory at Paris, Réaumur's thermometer placed in one of thoſe heaps roſe to 53 degrees, (131 of Farenheit's). The great heats of the ſummer had therefore only deferred the evil, and perhaps leſſened it a little. But this dreadful ſcourge returns every year. Theſe caterpillars, incloſed in their grain of corn, and ſheltered in barns or granaries, are ſcreened from the viciſſitudes and rigour of the air which deſtroy other inſects that are expoſed to them.

" Let us now review our inſect in all the ſeaſons of the year, in order to try to find under what circumſtances it may be attacked with moſt advantage.

" At harveſt-time, we ſaw butterflies come out of ſome grains, which were already empty and entirely conſumed, before they were reaped. Doubtleſs theſe firſt butterflies couple and lay their eggs upon the other unreaped ears, and probably part of thoſe eggs are deſtroyed by the action of the flail, when the corn is threſhed and cleanſed ſoon after its being cut: but as the caterpillars are hatched very ſpeedily in hot weather, and many of them can, as in fact we ſaw them, enter into the corn that is reaping, and ſhelter themſelves there; they will do all their miſchief, if ſpeedy care be not taken to ſtifle them, as we ſhall hereafter obſerve.

" The reaped corn is laid up in ſheaves, in barns, till the huſbandman can find time to threſh it, which is ſometimes ſooner, and ſometimes later. The corn thus piled up, heats; and the transformations of the inſects incloſed in it are then the ſooner effected. When any of theſe piles of ſheaves were ſtirred in our preſence, we ſaw butterflies come out of them, and the grains from which they iſſued were empty of flour, and abſolutely ſpoiled. The moment theſe butterflies are out of their priſon,

priſon, they couple, and lay their eggs upon the ears which they find in the barn. Part of theſe eggs, and of the young caterpillars, might certainly be deſtroyed by the flail and winnow, as we ſaid before, if they were uſed ſpeedily.

" Many peaſants in the country we are ſpeaking of make all the haſte they can to threſh their little crops, which they generally do upon a very dirty floor made in a hurry in the open air. They winnow and cleanſe their corn as ſoon as it has been threſhed; and the empty grains are then partly ſeparated from thoſe that are full, by the wind, which carries the lighteſt away with the chaff.

" As the dirtineſs of the floor on which the ſheaves are threſhed fouls the grains of corn, theſe people waſh them, and thereby take off ſuch of the remaining light grains as ſwim upon the water. They likewiſe ſeparate the grains of which the caterpillars have eaten ſo much of the mealy ſubſtance as to render them ſpecifically lighter than the water: but the grains of which the caterpillars have not eaten much of the flour, ſink to the bottom with ſound ones; and the caterpillars devour thoſe infected grains after they are ſoftened by the water, much ſooner than thoſe which are thoroughly dry.

" Moſt of theſe peaſants, knowing the ill fate that will attend their corn, ſell it as ſoon as poſſible to dealers, who carry it into the neighbouring provinces, and with it the contagion. This is the real cauſe which ſpreads the evil. Others have their corn ground immediately after harveſt; and this is the beſt method they can take, though not without its inconveniencies: for, in the firſt place, there are not mills enough in the country to grind immediately the whole produce of the crop; ſecondly, the meal of corn gathered in a wet harveſt will not keep long; and laſtly, though the friction of the mill-ſtones undoubtedly deſtroys almoſt all the inſects, it is not certain but that ſome of them may eſcape; and in that caſe they will thrive, and go through their ſeveral metamorphoſes, firſt into aureliæ and afterwards into butterflies, in the flour, as we have experienced in the manner before related.

" Several of the inhabitants of the country in queſtion lay their corn up in granaries, in order therewith to pay their rent, which, in general, is not due till the beginning of October. From theſe heaps of reſerved corn iſſue multitudes of butterflies, which, as we have obſerved, couple and lay upon that corn an immenſe quantity of eggs, from whence proceed caterpillars which get into the grains, and devour their inſide during the whole winter.

" It is highly probable that, in mild and moiſt autumns, ſome of the firſt hatched caterpillars may be changed into butterflies early enough to produce a ſecond generation before winter; nor will this ſeem ſurpriſing to thoſe who know how rapidly warm weather makes theſe inſects go through all their metamorphoſes. But, independant of this, it is certain that butterflies are continually ſeen to come out of all the heaps of wheat, barley, and rye, in Anjou, during the whole ſummer, and till the autumn begins to grow cold; that numbers of live caterpillars are found in the grains during the winter; that many aureliæ are found in them towards the end of May; and that prodigious multitudes of butterflies iſſue from them as ſoon as the weather begins to be hot, that is to ſay, towards the middle of June.

" Thus we ſee that there are, in a manner, two flights of butterflies; one which appears from harveſt time till the weather grows cold in September, and the other which appears in June, and laſts till harveſt. The former, in our opinion, proceed partly from granaries in which corn of the preceding year has been laid up with young caterpillars in it, and partly from the eggs firſt laid upon the ears, towards the end of May, or upon the new reaped corn; ſo that the ſecond flight begins juſt as the firſt flight ends.

" A circumſtance well worth obſerving, and which will be more particularly noticed hereafter, is that moſt of the butterflies of the ſummer flight remain in the granaries, faſt clung to the threſhed corn, upon which we have ſeen them couple and lay their eggs. It looks as if theſe butterflies knew that there then no longer is in the fields any corn fit to feed their poſterity. On the contrary, thoſe of the ſpring flight endeavour to get out of the granaries, and do in fact get out in vaſt numbers, through the windows, to ſpread in the fields, and lay their eggs upon the yet green corn."

That this is really the caſe, and that theſe inſects are of the ſpecies called *phalenæ*, appeared evidently from ſeveral very accurate obſervations, made by Meſſrs. Duhamel and Tillet, and of which it may be ſufficient to mention here only the following.

In June 1761, they went, at different hours of the day, into granaries where there were heaps of corn infected with theſe inſects. While the day laſted, they perceived a multitude of butterflies which ſtirred a little upon thoſe heaps, but did not quit them. When they returned into the ſame granaries a little after ſun-ſet, they ſaw thoſe butterflies riſe from the corn, and fly to the walls, where they ſettled for a while; after which they took their flight in vaſt numbers, through the windows, and went off with ſuch rapidity that they ſoon got out of ſight. If Meſſrs. Duhamel and Tillet went back into theſe granaries at ten or eleven o'clock at night, they no longer ſaw ſo great a number of butterflies, and thoſe that did remain ſeemed to be leſs agitated.

To be ſtill more perfectly acquainted with ſome circumſtances of the life of this inſect, they put different ſorts of corn into ſmall cloſets, in September 1760, after having paſted white paper all over the walls and ceiling. In the beginning of June 1761, theſe cloſets ſwarmed with butterflies, which ſeemed to be pretty quiet during the day, and were ſeen to be greatly agitated towards the ſetting of the ſun: but they could not get out of the cloſets, becauſe the windows were cloſely ſhut. On the 9th of June, towards eight o'clock in the evening, one of the cloſet doors being opened, a prodigious number of butterflies immediately iſſued out, and, with ſurpriſing ſwiftneſs, traverſed an oppoſite granary, without making the leaſt ſtop, though ſeveral heaps of wheat lay in it. They bent their courſe directly to an open widow of the granary, at ſome diſtance from the cloſets, and inſtantly haſtened out. Several people, who were preſent, followed them with their eyes, till the ridge of a barn near forty feet off, and the decline of the day, prevented their ſeeing them any further. Our obſervers returned to the ſame cloſet at about ten o'clock at night, and then found the remaining butterflies very quiet, ſcarce one of them attempting to fly out.

Theſe obſervations prove ſufficiently that this ſpecies of butterflies is nocturnal, and that thoſe of the June flight have a different inſtinct from thoſe which do not appear till after harveſt. Theſe laſt remain upon the corn in the granary, and there couple and lay their eggs, from whence proceed caterpillars which penetrate into the grains as ſoon as they are hatched. The June caterpillars, on the contrary, act as if they knew that the bloſſoming of the corn is paſt, and that its ears are fitted to ſupply their poſterity with the neceſſary food. They ſeldom leave the granary before ſun-ſet, unleſs dark clouds chance to beguile them earlier, in which caſe numbers of them become the prey of ſwallows and martins, which fly about the windows.

As theſe little inſects fly very ſwiftly, and riſe to ſuch a height that the eye cannot follow them long, eſpecially when the duſk of the evening begins to come on, Meſſrs. Duhamel and Tillet were obliged to try ſeveral methods before they could be certain what became of them. The caterpillars which they found in the grains of ſtanding corn made them conclude that the butterflies, when out of the granary, flew directly to the green corn, and laid their eggs upon its yet tender ears: but none of the country people, of whom they inquired, had ever obſerved them in the fields, or could give any ſatisfactory account of them. Another well atteſted circumſtance, which ſtrengthened their conjecture, was their being aſſured by perſons of undoubted credit, that the corn which grows neareſt to villages, farm-houſes, barns, or buildings uſed for granaries, is always much more damaged by inſects than that which grows at a diſtance from any habitation. Their own obſervations confirmed this fact; and their experiments, dictated by reaſon, ſoon proved that they had conjectured right.

Deſirous to know what was become of the ſwarms of butterflies which they had ſeen go out of the granaries in June 1761, they ſearched all the neighbouring fields of every kind of corn, and beat even the ſurrounding hedges, at all hours of the day, to no ſort of purpoſe: not a butterfly could they find, excepting a few dead and dried ones intangled in ſpiders webs along the outſide of the corn. This very circumſtance led them to the diſcovery they were in queſt of: for, rightly reflecting that theſe inſects, which neither they nor any other perſons had been able to find in the fields in the day time, muſt certainly be of the *phalenæ* or nocturnal kind; they, without farther delay, ſet out with a candle and lanthorn, repaired to one of the corn fields which they had viſited in the afternoon, and, in the night between the 5th and 6th of June, ſoon deſcried a great number of the very butterflies they were ſeeking for, upon the beards of the ears of wheat. They returned to the ſame ſpot early the next morning, and could not then find a ſingle one.

From that time they ſaw and ſhewed to whoever choſe to ſee them, a great number of theſe butterflies upon the ſtanding wheat and barley. Some were upon the beards, and others had made their way to the point of the grain. Scarce an evening paſſed without their ſeeing ſome of them coupled. Though every circumſtance concurred to prove, and indeed left no room to doubt, that theſe butterflies were the ſame as thoſe which infeſted the corn in granaries; yet, to be thoroughly convinced, and to convince others, in this reſpect, they took ſome of them from off the ears of corn in the field, examined them with a microſcope, and found them to be of the very ſame ſpecies. A farther demonſtration of this reſulted from the following incidents. M. de Taponnat, one of their friends in Angoumois, had, in a ſmall granary, ſeveral heaps of wheat differently prepared, which he kept by way of experiment. Meſſrs. Duhamel and Tillet obſerving numbers of caterpillars in two of thoſe heaps, adviſed him to put that corn into an oven properly heated, in order to prevent the diſperſion of the butterflies, which they knew would otherwiſe infallibly proceed from thence: but this was neglected. On the 21ſt of June, about ſeven o'clock in the evening, they viſited this little granary, and found upon the corn a multitude of butterflies in great agitation, and of which a conſiderable number ſoon flew out at the windows. They took leave of M. de Taponnat, aſſuring him that this flight of inſects would ſoon light upon his ſtanding corn. When they were gone, M. de Taponnat had the curioſity to ſtep out, to ſee whether any great quantity of butterflies ſtill continued to iſſue from his granary; which he could eaſily do, as the window was very low. He was amazed at the numbers he ſaw fly out at that one window; being, as nearly as he could compute, about fifty in a minute. He obſerved, that they directed their flight towards a field of wheat not far off, and thereupon went thither with five or ſix other perſons, all of whom ſaw them arrive in ſwarms, proceeding chiefly from the granary. They ſaw many of them light upon the ears, and on their running a cane gently over the awns, beheld them riſe by dozens at a time. M. de Taponnat was ſo ſtruck with this ſight, that he ordered the window of his granary to be ſhut the next day, and his corn to be put into an oven properly heated, as ſoon as poſſible.

A clergyman in the neighbourhood, who had a little barley infeſted with theſe inſects, could not be perſuaded to do the ſame, though his whole quantity was but a few buſhels. The conſequence was, that a multitude of butterflies were ſoon ſeen to proceed from the window of his granary, and ſpread ſo thick over an adjacent field of barley, that not an ear could be found without ſeveral of them upon it.

Theſe facts confirm all the former remarks of our accurate inquirers, who, after obſerving that the fitteſt time to find theſe butterflies upon the ears of ſtanding corn, is about half an hour after ſun-ſet, continue thus.

“ On the 10th of June, about eight o'clock in the evening, we viſited the fields around la Rochefoucault, and then perceived only a few butterflies upon the ears of the corn: they were greatly agitated; and we ſoon after ſaw numbers of the ſame ſpecies arrive on all ſides, but chiefly from certain mills on the banks of the river. Thoſe that were upon the corn flew away as ſoon as we approached them with a light. This was probably the time of their arrival. Towards nine o'clock we renewed our ſearch, and ſaw many of them clung to the ears, either actually coupled, or ſeeking to couple. The light did not affright them then, and we had time enough to examine them with a microſcope. We found fewer of them towards midnight, and could not ſee any early the next morning. It is not to be ſuppoſed that the diſperſion of theſe butterflies happens always regularly at the hours before-mentioned; for we have obſerved ſeveral variations, which depend on the warmth of the air; and they commonly ſettle upon the corn earlier when the ſun is over-caſt with clouds juſt before its ſetting.

“ As we have not ever met with theſe butterflies in the day-time, it may be aſked, where they then retire to? This queſtion deſerves an anſwer. We have ſearched for them in vain in hedges and among the blades of corn. Light certainly incommodes them: for when we expoſed to the ſun veſſels in which ſome of them were incloſed, they hid themſelves in the ſhade formed by creaſes of the paper at the bottom of thoſe veſſels, in ſuch manner that we were ſometimes puzzled to find them again. One day that the ſun ſhone very bright, we took two cryſtal cups, into one of which we put a few grains of wheat with ſome butterflies, then covered it with paper, and placed it upon its bottom, in a garden expoſed to the ſun. We put ſome butterflies into the other, but not any corn, and placed it cloſe to the former, with its bottom uppermoſt, that the butterflies might receive the full heat of the ſun: and laſtly, we ſet one of M. de Réaumur's thermometers upon the ground, juſt by theſe cups. When the liquor had riſen to from 45 to 50 degrees, (from 112 to 124 of Farenheit's) we ſaw that all the butterflies in the cup where there was not any corn, were dead: in the other, only ſome were dead; becauſe moſt of them had found a ſhady ſhelter, either by making their way into the grains, or by hiding themſelves under the paper cover. We knew before, that theſe butterflies are greatly agitated, and flutter very much when they are expoſed to the ſun; but we could not tell whether that proceeded from pleaſure or pain. The doubt is now removed; and we are of opinion that they retire to a cool or ſhady place during the day-time, and that their ſmallneſs prevents our finding where they are hidden, which may perhaps be in woods or thickets, in crevices in the barks of trees, or in the earth.”

That the caterpillars which produce firſt aureliæ, and then theſe butterflies, can, and frequently do, live under-ground, that they can paſs the winter there incloſed in the grain with which they are ſown, and even undergo their ſeveral metamorphoſes in the earth, ſo as to ariſe from thence in the form of butterflies in the ſpring, has been demonſtrated by the following experiments.

In May, 1761, Meſſieurs Duhamel and Tillet planted, in a garden-pot, corn in which they knew there were caterpillars. They buried it an inch deep, watched it carefully, and ſaw that, notwithſtanding plentiful rains had fallen upon it, thoſe caterpillars changed into aureliæ juſt as if they had been in a granary. Theſe aureliæ produced butterflies, which, weak as they were when firſt hatched, ſoon made their way out of the ground.

To be the more certain of their power, with reſpect to this laſt article, the ſame gentlemen put ſome thoroughly dry, and well pulveriſed earth into a glaſs veſſel, then laid upon that earth a layer of corn in which they knew there were aureliæ, and covered this with equally well dried and pulveriſed earth, at leaſt half an inch deep; after which they tied a paper over the veſſel, to keep in the butterflies, in caſe they ſhould pierce through the upper mould. In effect, they did pierce through it, coupled, and laid ſuch quantities of eggs as covered its whole ſurface.

To ſee whether theſe inſects would riſe as eaſily from underneath a ſtiffer earth, and what effect their being buried deeper would have, a wooden box was divided into three partitions, and filled with common mould taken out of a kitchen-garden. Corn known to be infeſted with theſe caterpillars was planted an inch deep in one of theſe partitions, two inches deep in another, and three inches in the third. All of them were then covered with a glaſs frame, and butterflies ſoon appeared in each of the diviſions; but they were far moſt numerous in that where they had been buried but an inch deep. In another trial, a number of infected grains was covered with a ſtill ſtiffer earth, wetted, and preſſed down; and not any butterflies appeared there. At their firſt coming out of the ground, they are rumpled, as when taken out of a chryſalis: but after reſting a moment, they ſhake their wings, ſet them right, and ſoon take their flight.

That ſome of theſe butterflies can, and do come out of the ploughed ground which has been ſown with infected ſeeds, is certain: but Meſſieurs Duhamel and Tillet are thoroughly ſatisfied that their number is but ſmall, that moſt of the caterpillars ſown with the grain periſh before they can reach the ſurface of the earth, and that the butterflies which proceed from granaries are the great ſource of the increaſe of this inſect: for, ſay they, the grain which contains a young caterpillar will grow, if its germe has not been damaged; and as its mealy ſubſtance is conſumed by the plant, the caterpillar muſt die for want of food. Beſides, as is proved by the laſt-mentioned experiment, the butterflies cannot pierce through a cloſe and hardened earth; which generally is the caſe of ploughed land that has been expoſed to the winter rains.

After obſerving that the two ſexes ſometimes unite a ſecond time after ſeparation; that the female depoſits her eggs almoſt immediately after they are fecundated, in ſmall parcels of from 6 to 30, and that each female lays in all from 60 to 90; adding to this, that there are generally three flights in a year, one at the latter end of May or in the beginning of June, a ſecond in Auguſt, and a third in ſome of the ſubſequent months, during which a fourth alſo, and even a fifth, have been known; we may, from the following calculation, form an idea of the aſtoniſhing multiplication of theſe inſects, and conſequently of the ravages which they muſt make where they have eſtabliſhed themſelves.

Every female produces from 60 to 90 eggs, of which 75 is the medium: but let us ſuppoſe the number to be no more than 70. Let us ſuppoſe alſo, that of thoſe 70 eggs, one half only produces females, which makes the number 35. This multiplied by 70, the number of eggs laid by each, gives for the ſecond brood, from a ſingle inſect, 2450: the half of this number, ſuppoſed to be females, is 1225, which multiplied by 70, gives 85,750 for the third brood. The half of this number, being 42,875, multiplied by 70, gives for the fourth brood, 3,001,250; and the half this, 1,500,625, multiplied by 70, gives 105,043,750 for the fifth brood: ſo that ſuppoſing five broods in a year, each female butterfly of this ſpecies that exiſts in May, produces, before the May following, no leſs than one hundred and five millions, forty three thouſand, ſeven hundred and fifty individuals of the ſame kind.

It is not agreed whether theſe inſects prefer wheat, barley, or rye. The obſervations and trials made by Meſſ. Duhamel and Tillet ſeem to prove, that they attack indifferently whichever lies moſt convenient for them; and that they do not ſpare maize, when it is ſtripped of its ſtalk and laid up in a granary, where they can come at the ſoft inſide part of the grain; or even oats, though it be the common, but miſtaken opinion of the people of Angoumois, that this laſt grain is a preſervative of others, eſpecially of barley, when ſown with it, or intermixed in the ſame heap.

M. Tillet incloſed ſeveral ears of ſtanding oats in a wide-mouthed glaſs bottle, and put into it ſome of theſe butterflies; after which he covered the mouth with a piece of fine linen. The butterflies coupled there, laid their eggs upon the ears, and ſeveral caterpillars which proceeded from thoſe eggs, actually introduced themſelves into the grains. A manifeſt proof that, though the pendent poſition of the grains of oats, whilſt growing, may be inconvenient to the female butterflies, many of whoſe eggs may be waſhed or blown off, more eaſily than from other corn, before they are fixed by the viſcous matter which faſtens them to the huſks; yet the corn-caterpillar can live upon oats. What is ſtill more extraordinary is, that grains of wheat, barley, rye, and oats, were mixed together in a glaſs veſſel, into which ſome of theſe butterflies were put: and the oats were damaged by caterpillars, as much as any of the other grain: though it is certain that theſe inſects do but little miſchief to oats in the granary; happily for the poor people who make bread of this corn.

In guarding againſt theſe inſects, the farmer has three objects: 1, to preſerve his grain for ſeed; 2, to keep it for food and market; and, 3, the total deſtruction of the inſects.

To preſerve the corn for ſeed, it ſhould be threſhed out as ſoon as poſſible, in order to prevent the transformation of the caterpillars brought from the field, which otherwiſe ſoon become butterflies, whoſe prodigious number of eggs would exceedingly increaſe the evil. For want of this precaution, two thirds of the ſtore of ſeed-corn has frequently been deſtroyed.

The ſeed ſhould either be dried in an oven, in which the heat ſhould be ſtrong enough to kill the caterpillars, without deſtroying the vegetative power of the grain; which will be properly effected by 124 degrees of heat on Farenheit's thermometer, or ſoaked in a ſtrong lye of wood-aſhes and quick-lime, heated to ſuch a degree that the finger can juſt bear it. Let the corn contained in a baſket be ſtirred in this lye, and the grains ſkimmed off that float on the ſurface. When the corn has been thus ſoaked for about two minutes, the baſket which contains it ſhould then be lifted up, and ſuſpended by two poles, till the lye is drained off. The grain ſhould then be ſpread very thin on the floor of a granary to dry, while a ſecond baſket-full is prepared in the ſame manner. The corn thus ſteeped, and well dried, will keep a year, and continue fit for ſowing.

By following the above directions, corn may be preſerved from the ravages of theſe or any other ſimilar inſects that prey upon it. *Hiſtoire d'un Inſecte qui devore les Grains de l'Angoumois.*

BUTTER-JAGS, flowers of the wild trefoil.

C.

CABBAGE, the name of a plant well known, and of which there are ſeveral ſpecies cultivated in gardens, and alſo in fields as a food for cattle.

Cabbages of all ſort delight in a deep, rich, light, and well-looſened ground, in an open ſituation. They will indeed grow in any ordinary ground that has been dug; but the better the ſoil and its tilth are, the finer and better flavoured the plants will prove.

The early and the ſugar-loaf cabbages, are the ſorts generally ſown for ſummer uſe. The moſt proper ſeaſon for ſowing them is about the end of July, or beginning of Auguſt. When the plants have ſeven or eight leaves, they ſhould be removed into beds of well prepared mould, and there ſet about three or four inches aſunder every way, that they may grow ſtrong, without running up in height: and towards the latter end of October they ſhould be again tranſplanted in the place where they are to remain. They ſhould be here ſet in rows three feet aſunder, and two feet and a half diſtant from each other in the row. They muſt be kept clear from weeds, and ſhould either be earthed up from time to time, as is the common practice, or, which will be much more beneficial, the ground between them ſhould be repeatedly dug pretty deep, or otherwiſe well ſtirred and looſened, during their growth. About May they will turn in their leaves for cabbaging; and if this be then aſſiſted by tying them up pretty cloſe with a ſlender twig of oſier, their heads will be blanched in the middle, and fit for cutting, at leaſt a fortnight ſooner than they would be, if not tied up. But it muſt be obſerved of this early kind, that the cabbaging is ſoon completed after the leaves begin to turn, and that the heads almoſt as quickly afterwards become hard and burſt. The ſugar-loaf cabbage is therefore more generally planted, becauſe it is not ſo cloſe leaved, grows and cabbages more ſlowly, and continues good for a longer time.

The muſk cabbage, which requires exactly the ſame culture as the former, will be fit for uſe in October, and will laſt till Chriſtmas; but is more tender, and therefore more liable to be killed by hard weather.

The common white, red, flat, and long ſided cabbages, are cultivated chiefly for winter uſe. The time for ſowing them is in the beginning or middle of April. The young plants of theſe ſorts, like thoſe of all other cabbages, ſhould be pricked out into ſhady borders, when they have got ſix or eight leaves, that they may acquire ſtrength, and not run up with high ſtems; for the ſhorteſt ſhanked cabbages are always found to ſucceed beſt. Towards the middle of June they ſhould be tranſplanted from theſe borders into the places where they are to remain, at the diſtance of two feet and a half from each other, in rows three feet and a half aſunder; for this will be ſufficient either for earthing up the ſtems, as is commonly practiſed; or for the more beneficial method of digging and ſtirring the earth between them. If they are planted out in a dry ſeaſon, they ſhould be watered every other evening, till they have taken freſh root.

The kitchen gardeners near London generally plant rows of theſe cabbages between their artichokes, cauliflowers, &c. but they ſeem, upon the whole, to do beſt when planted alone. They will begin to be fit for uſe ſoon after Michaelmas, and will continue good till the end of February, if the winter be not ſo ſevere as to deſtroy them. This may, however, be prevented by pulling them up in November, trenching the ground up in ridges, laying the cabbages as cloſe as poſſible, on one ſide againſt thoſe ridges, and then throwing in the earth ſo as wholly to bury their ſtems. In this manner they may be kept till after Chriſtmas: for though their outer leaves may decay, as they often will in very wet or hard weather, their inſide will remain ſound, provided they were large and hard when thus laid down.

That ſpecies of cabbage called ſavoy, require exactly the ſame treatment as the foregoing, except that, as they do not grow ſo large, they need not be planted ſo far aſunder. Two feet and a half ſquare will be a ſufficient diſtance between them. They always thrive beſt in an open ſituation, quite free from trees and hedges; for they are very apt to be greatly preyed upon by caterpillars and other vermin, in cloſe places, eſpecially if the autumn proves dry. If theſe vermin are not very numerous, they may be picked off by hand as faſt as they are ſeen, and deſtroyed by treading them under foot: but when their numbers are very great, the moſt expeditious way of deſtroying them is, to turn a parcel of hungry turkeys in among them. Savoys are moſt eſteemed after they have been pinched by the froſt.

The management of the Ruſſian cabbage, which is ſo hardy as to bid defiance to the ſevereſt winter, requires the ſame management, except the time of ſowing, which like the ſavoy ſhould not be till late in the ſpring, and being very ſmall, does not require ſo much room when planted out. It ſhould alſo have a clear open ground to grow on; but it will not laſt long before it will burſt, and run up to ſeed. Many think it a very ſweet and well taſted plant, though it is not now cultivated near ſo much as formerly. The trading gardeners around London ſeem to have excluded it entirely from their grounds; perhaps chiefly on account of its ſmallneſs: but it ſtill deſerves a place in private kitchen gardens.

The ſea-cabbage grows naturally upon the gravelly ſea-ſhores of many parts of England, and particularly in Suſſex and Dorſetſhire, where many people dig it up from among the gravel, in the ſpring, and prefer it to every other kind of cabbage. In that blanched ſtate, before its ſhoots have been expoſed to the air, it is very ſweet and tender, and may be eaſily propagated in gardens, by ſowing its ſeeds ſoon after they are ripe, in a ſandy or gravelly ſoil. It will thrive there exceedingly, and increaſe greatly by its creeping roots; but its heads will not be fit to cut before the ſecond year. To have it in perfection, a layer of ſand or gravel, four or five inches thick, ſhould be ſpread, at Michaelmas, upon the bed in which theſe plants grow, in order to allow a ſufficient depth for cutting their ſhoots, before they appear above ground; for till then they will be white, tender, and well taſted; but the air renders them green, tough, and bitter. This earthing up, or rather new ſanding or gravelling the bed, ſhould therefore be repeated every autumn, in the ſame manner as is practiſed for aſparagus. It is the only culture that this ſort of cabbage will require.

The beſt methods of ſaving the ſeed of all ſorts of cabbages is this: about the end of November you ſhould make choice of ſome of your beſt cabbages, which you ſhould pull up and carry to ſome ſhed or other covered place, where you ſhould hang them up for three or four days by their ſtalks, that the water may drain from between their leaves; then plant them in ſome border, under a hedge or pale, quite down to the middle of the cabbage, leaving only the upper part of the cabbage above ground, obſerving to raiſe the earth about it, ſo that it may ſtand a little above the level of the ground; eſpecially if the ground be wet, when they will require to be raiſed conſiderably above the ſurface. If the winter ſhould prove hard, you muſt lay a little ſtraw, or peaſe-haulm, lightly upon them, to ſecure them from the froſt; taking it off as often as the weather proves mild, leſt by keeping them too cloſe they ſhould rot. In the ſpring of the year theſe cabbages will ſhoot out ſtrongly, and divide into a great number of ſmall branches: you muſt therefore ſupport their ſtems, to prevent their being broken off by the wind; and, if the weather ſhould be very hot and dry when they are in flower, you ſhould refreſh them with water once a week, all over the branches, which will greatly promote their ſeeding, and preſerve them from mildew.

When your pods begin to change brown, you will do well to cut off the extreme part of every ſhoot with the pods, which will ſtrengthen your ſeeds: for it is generally obſerved, that thoſe ſeeds which grow near the top of the ſhoots are ſubject to run to ſeed before they cabbage; ſo that there will be no loſs by this method, but a great advantage. When your ſeed begins to ripen, you muſt be very careful to ſecure it from being eaten by the birds, which are very fond of it: and when it is fully ripe, cut off the ſtalks, thoroughly dry the whole, threſh out the ſeed, and preſerve it in bags for uſe.

Cabbages have lately been cultivated for the food of cattle, and by ſeveral experiments found to produce a very large increaſe when managed according to the principles of the new huſbandry. M. de Chateauvieux has been very particular in relating the ſucceſs of his experiments, which we ſhall therefore give the reader.

"I began, ſays this curious gentleman in a letter to M. du Hamel, by retrenching the dung; though the ſpot I choſe for my firſt trial had not received any for ſeveral years. It had indeed been well prepared by ploughing the preceding year, when one half of it bore barley, and the other oats. I now made it into a bed, the middle of which was directly over the laſt year's furrow. I ploughed this bed on the twenty-fifth of September, 1751, in the ſame manner as if it had been intended for wheat. I planted on it a ſingle row of white cabbages, which I watered to make them take root the better. The length of this bed was one hundred and ſixty feet, and its breadth ſix feet ſeven inches.

"That I might be able to make a juſt compariſon between the cabbages of this bed, and thoſe of the kitchen garden, I planted a ſpot of ground in the latter, the ſame day, with the ſame ſort of plants. This ſpot had been extremely well dug, and plentifully dunged by the gardener, who took all poſſible care of theſe plants during the ſummer, and weeded them as often as was neceſſary. Inſtead of cabbaging, moſt of them ran up in height: upon which I plucked them up, and planted others in their ſtead.

"I beſtowed the ſame care and culture on my row of cabbages in the bed, as if they had been wheat.

"On the ninth of March 1752, the alleys were ſtirred with the plough. On the twenty-fifth of April, I gave them a ſecond ſtirring with the cultivator. On the third of June they had a third ſtirring with the plough: and on the twentieth of July, I made my gardener hand-hoe them, for fear the plough ſhould damage ſeveral ſtalks of wheat which grew on the next bed, and were bent, but not lodged.

"Theſe cabbages were never watered, except once, which was at the time of planting them; and yet they were always criſp and firm, even in the hotteſt days. By this eaſy and expeditious culture, they attained all the perfection that could be deſired; and ſurpaſſed thoſe of the kitchen garden, as much in goodneſs, as they did in bulk. Moſt of them weighed between fifteen and eighteen pounds, and the ſmalleſt between eight and ten. The weight of all the plants which grew on this bed, was 840 pounds."

The intelligent and careful cultivator Mr. John-Wynn Baker, in a report he made to the Dublin Society, tells us, that he alſo cultivated cabbages after the manner of the new huſbandry, on a piece of ground that had bore potatoes the preceding year. It was manured with a compoſt of lime, earth, and dung, perfectly incorporated. On the ſixth and ſeventh of July 1764, he planted one row of cabbage plants on the middle of every ridge, of about an acre of ground, the plants in the rows being two feet from each other, and the rows five feet aſunder. On the ſixth of July a fine rain fell, and more on the eleventh and twelfth, which ſaved the expence of watering, and ſecured life to the plants.

On the ſeventh of Auguſt the cabbages were horſe-hoed, by taking off, at one furrow of the plough, only one ſide of each ridge, cloſe to the plants: in this manner they remained till the twenty-fifth, when the plough was ran along in the ſame furrow; by which, with the firſt furrow, the ſoil was ploughed about twenty-one inches deep. This being finiſhed, the earth was immediately returned back to the plants, which afforded them freſh nouriſhment; and in order to give their roots time enough to penetrate this freſh earth, which, by the horſe-hoeing, was become very fine mould, they were ſuffered to continue in this ſtate till the twelfth of September; when they were again horſe-hoed, by taking off the other ſide of every ridge; and on the twentieth the furrow was deepened in the ſame manner as the former, the mould immediately returned to the plants. On the eighteenth of October a ſmall furrow was thrown up to each ſide of every ridge, which finiſhed the culture, and reſtored the ridges to the form in which they were when the plants were put upon them.

The plants all grew luxuriantly; and in the hotteſt weather were infinitely more brittle in their leaves, than any in the neighbouring gardens; which is a certain indication of health in theſe kind of plants.

The horſe-hoeing was ſo effectually deſtructive to the weeds, that the expence of weeding was a mere trifle.

On the eighth of December Mr. Baker cut one row of theſe cabbages, they then beginning to decay, which is indicated by their burſting. The number was two hundred and fifty-eight, and they weighed ſixteen hundred weight, three quarters, and twenty-one pounds; which, at an average, is ſeven pounds and near ſix ounces for each cabbage.

The produce upon an acre, on weighing this row, which was five hundred and ſixteen feet long, amounted to twenty-three tons, four hundred, two quarters, and fourteen pounds; which Mr. Baker obſerves is, at leaſt, from ten to ſeventeen tons leſs than the product would have been upon an acre, could he have obtained the large, late, Dutch cabbage.

The ingenious Mr. Randall, in a treatiſe lately publiſhed, entitled Semi-Virgilian Huſbandry, has given us the following method of cultivating cabbages, according to his newly-propoſed ſyſtem, which is nothing more than the New Huſbandry executed by the ordinary implements.

The ſoil on which the cabbages are to grow, is ſuppoſed to be a loam in good heart; and as the Semi-Virgilian Huſbandry requires only that the ſoil ſhould be made exceeding fine, without the aſſiſtance of any dung, therefore the land deſtined for theſe cabbages muſt be thrown up to be fallowed, that it may enjoy all the advantages of a winter and ſummer fallow, ſo as to be exquiſitely well prepared for the reception of the plants about Old Michaelmas.

As cabbages extract their nouriſhment from a conſiderable depth, as well as from the ſurface of the ſoil, it will be neceſſary that the land ſhould be double-trenched during the time of fallowing.

The loam, immediately after harveſt, is to be turned up, and the workman is to go as deep as he can with his plough, another plough is immediately to follow in the ſame furrow with a higher earth-board, which will caſt the mould over, and bury the ſtubble, if it was not before, by ſome other method, deſtroyed: in this manner the field will, as it were, be turned upſide down, double ſpitted more than a foot deep, and the ſtubble will be ſooner rotted. The harrows muſt then make the ground as fine as the ſeaſon will at that time permit.

The next thing to be done, when the weather will admit of it, is to double trench the land, and lay it up till the ſpring in ſharp ridges.

Here Mr. Randall makes a very ſenſible and uſeful obſervation, namely, that the teams muſt not be ſuffered to go upon the ground till it is firſt tried with a ſpade, to ſee whether the ſoil is dry enough to the depth it was ploughed before; for treading the ground in any ſeaſon of the year, when it is not in order, or ſufficiently dry, is a very deſtructive practice. The ſtandard in this caſe recommended, very properly by Mr. Randall, is, when the mould crumbles or feels mellow between the finger and thumb, inſtead of adhering, ſo as to judge by the touch, whether the parts will give way to the tread, or whether the earth be in ſuch a ſtate of coheſion as to be padded under the horſes feet.

The following directions are given for performing the ridge-work, or laying up the ſoil for the winter.

The ploughman is to begin in any part of the ground he pleaſes, and go one bout, throwing the furrows in ſuch a manner, that they may form a little ridge. When this is done, the horſes muſt turn to the left, and the ſhare-point be put to the end of the trench; then go another bout in the manner already mentioned, the horſes again turning to the left, and continuing to go on in this manner, till the piece of ground is ploughed throughout. If the plough begins cloſe to a hedge, it may ſave ſome little trouble in going over more ground than is neceſſary; and where it can conveniently be done, the plough ſhould croſs the path the horſes went in the firſt operation, as this croſs-ploughing is often a means of ſtirring the baulks made by a former ploughing.

The firſt bout ſhould be drawn out as ſtrait as poſſible, as the reſt will depend upon it; and if the hedge is not ſtrait enough to allow this, the ploughman ſhould begin at ſome diſtance from it for the advantage of a ſtrait line, leaving the ſkirtings near the hedge to be laſt finiſhed. The land will now lie in gentle riſing ridges and regular valleys, ready for the third operation.

In this the ploughman is to go the very ſame ground over again, with the ſame plough, or one a little wider and higher in the earth-board, and throw the mould over the right and then over the left ſide of the firſt ridge, going four inches and a half, or five inches deep, and turning off, as before, continually to the left. This trench-work requires four good horſes to a plough; and the ſecond team, in the firſt operation, if the ground be hard, and has not been ſtirred for a long time, may require five horſes, but not more.

The ground will now lie in ſharp ridges, and deep trenches; and if the work be well executed, the bottom of the hollows, or little ridges, will be near twelve, or at the very leaſt nine, inches below the baſis of the ridges, or ſurface of the ground, and about eighteen inches wide; and the diſtance from the top of one ridge to another will be near three times and a half the width of the plough, as it runs in the ground after the horſes; the breadth of the ground, which each ridge ſtands upon, being about fourteen inches.

In this ſituation the land is to remain till the month of February, when the firſt opportunity that occurs in that month, the ridges and the whole ground being of a proper dryneſs, is to be ſeized for the next operation.

In the firſt place, a pair of ox-harrows, or the heavieſt of all, in many counties called drags, are to be yoked together, and the cattle are to go a-breaſt, not in a line; but two on one ſide, and two on the other, and to walk in the trenches, having a ridge between them; by which means the harrows will move on the crown of one ridge, at the center; and the outward parts, when well guided, will reach to the top of a ridge on each ſide that which divides the cattle. The harrows, which are to go only once in a place, will greatly reduce the ſoil, and pulling down the ridges, the ſoil will be in a manner level, yet not ſo even but that the ploughman may with eaſe diſcover where the ridges ſtood. The ploughman is now to proceed in the ſame manner as when he threw the ground into ridges, keeping the plough-ſhare along the crown of a ridge, which will be viſible enough after once harrowing. When he has gone one bout, which muſt be on the tops of two ridges, the furrows will be turned to the right, and lie pretty flat on that part which was a trench before: thus proceeding throughout the field, the whole will again lie in ſingle ridges, and ſingle trenches; but, if the weather permits, as ſoon as this operation is performed, the ſoil muſt be double trenched, in the ſame manner as the ſecond ploughing of the ſecond operation, when it is laid in ridges for the winter: thus the whole field will again lie under the double work of high ridges and deep trenches.

We are now to ſuppoſe the ridge-work brought forward to the latter end of the ſpring, or the beginning of the ſummer, when weeds begin to grow plentifully.

The ridges muſt, at this time, be pulled down as before, with heavy harrows; but inſtead of going once, the ſervant muſt go twice in a place, and then uſe the lighter harrows, and afterwards the fineſt of all, in order to prepare the ground in ſuch a manner, as to induce a large crop of weeds to grow: but if the weather will permit the horſes to tread on the ground without ſpoiling it, the weeds muſt not be ſuffered to grow more than a plough can bury by going the uſual depth; and when the weeds are turned down, another plough is to follow, and to cover the furrow of the firſt, after which the land is to be harrowed down again as level as poſſible, in order to prepare it for yielding another crop of weeds.

When the ſecond crop of weeds is got to a tolerable height, it may be proper to try, with a ſpade, whether the firſt weeds, which were turned town to the bottom of the ſecond ſtratum, are ſufficiently putrified: if they are, the land is to be ploughed as before; but if they are not, the weeds now growing muſt be turned down by one ploughing by ſuch a depth only as to bury them, and the land muſt be afterwards levelled with a loaded buſh-harrow.

We may ſuppoſe, that by the middle of Auguſt, the weeds firſt turned down will be rotted; therefore at that time the third crop of weeds may be turned down by the double ſpitting, already mentioned, and left in this condition till there is occaſion to make uſe of the land.

Juſt before the time of planting the cabbages, the land muſt be laid as level as poſſible, and by frequent harrowings it will not be inferior to a garden for fineneſs.

The ground being now ready to receive the plants, it will be neceſſary to point out how they are to be raiſed and tranſplanted, which cannot be better done than in Mr. Randall's own words.

" The ground on which the cabbage-ſeed is to be ſown, muſt be exceeding fine, in great heart, and abſolutely clear of weeds, otherwiſe it will be difficult to raiſe the plants in perfection; and, in order to this, the richeſt and cleaneſt piece of ground muſt be fixed on, immediately after the ſame harveſt, when the fallow for cabbages begins, and the nurſery for the plants muſt have all the advantages of fallowing equally with that which is to receive the plants; and about the middle of July the cabbage-ſeed is to be ſown: but as huſbandmen are unacquainted with the manner of ſowing this ſeed, it will be neceſſary to employ an honeſt gardener to perform this buſineſs as it ought; and the ſame perſon may be alſo employed to pick out the young plants upon another piece of ground, in great heart, and clear of weeds, leſt they ſhould draw one another before the ſeaſon arrives when they are to be tranſplanted out for good and all, on the ground whereon they are to ſtand for a crop: one perch will raiſe plants ſufficient for more than an acre of cabbages, from two ounces of ſeed, but it is better to have a great choice, as there will be ſome puny plants in the nurſery, let the gardener, or thoſe who prepared the ground, take what care they can; and the ſeed muſt be procured from Scotland, as the Scotch cabbage-ſeed is the propereſt for this vegetable, when deſigned for the uſe of cattle, as they will grow late, and to an enormous ſize, when they have all the advantages of ploughing among them, during the time of their growth.

" If the gardener is diligent, the expence of thus pricking out the tender plants, at ſix ſquare inches, on about ſix perches and a half, will be about four or five ſhillings; but if the owner can depend upon the nurſery's being clear of weeds, though the weather be very growing, there is a much cheaper method of raiſing the plants: for if the gardener, with the above two ounces of ſeed, to be ſown on ſix perches and a half, takes care to ſet out the plants with a ſmall hand-hoe, before they begin to draw one another, he may hoe up the puny, and leave none but the ſtouteſt plants, at a proper diſtance, ſuppoſe ſix inches, aſunder, rather under than over. While he is doing this, he may aſſiſt the plants he ſuffers to ſtand, by giving them a little mould to their ſtems, and checking any weeds that appear; by this means, the plants will grow to perfection, and need not be removed till they are tranſplanted out for the crop: and if the gardener ſows the ſeed, and leaves the plants on the ſame ground, about ſix inches aſunder, one perch will tranſplant twenty-five, and, conſequently, ſix perches and about a half will tranſplant an acre, from two ounces of ſeed on ſix perches and a half, and ſet out at ſix inches from each young plant.

“ When the plants are thus raiſed on the nurſery, by either method, pricking them out, or ſetting them out with the ſmall hand-hoe, and the ſeaſon is arrived for tranſplanting them on the ground they are to ſtand on to be cabbages, the next buſineſs is to conſider the diſtance they are to ſtand from each other, when tranſplanted; and here we muſt firſt obſerve, that gardeners uſually ſet them about two feet and a half from each other throughout the piece of ground allotted for that purpoſe; and, during their ſtay on the ſoil, they only hand-hoe and earth them up, when on the bed they are tranſplanted upon, without ever giving themſelves any farther trouble about them, being no ways anxious to make them grow to the largeſt ſize which they are capable of.

“ In an acre there are 4840 ſquare yards, which is about ſixty-nine yards and a half every way; but in order to proportion an acre in a piece of ground, if the length be meaſured, and the above number of ſquare yards, in an acre, be divided by the length, the quotient is the breadth, and both dimenſions multiplied together will give 4840 yards. Now, as gardeners plant their cabbage-plants at two feet and a half aſunder, this is allowing ſix ſquare feet and a quarter for each plant, and makes the number of about 6970 plants on an acre; and plants ſet in two rows, at two feet aſunder, and the plants ſet two feet from each other in thoſe rows, and then meaſuring out four feet and a quarter from one of thoſe rows, and ſetting two rows more in the ſame manner, and ſo on throughout the ground; when the plants are ſet in this manner, the number of cabbages will be about 6970, which is the ſame as the gardeners raiſe on an acre, and the liberty of ploughing on one ſide of every row, or in the interval, and horſe-hoeing between the narroweſt rows, or the partitions.

“ When the proper ſeaſon arrives, about Old Michaelmas, or a little after, the plants are to be ſet, as above, firſt one row the length of the ground, at two feet diſtance from each other; and, when this is done, then another row in the ſame manner, at two feet diſtance from the laſt; and, when this is done, another row muſt be planted, in like manner, at the diſtance of four feet three inches from the laſt; then another row of plants, at two feet diſtance from the laſt: here, then, one ſyſtem will conſiſt of one partition of two feet, and an interval of four feet and a quarter, and of two plants to each ſyſtem; for four feet and a quarter, added to two feet, and then multiplied by two feet, the diſtance of the plants in the rows, gives the parallelogram for two plants, or twelve feet and a half; and this, divided by two, gives ſix feet and a quarter; which is the gardeners diſtance, in their practice of cultivating theſe plants, or raiſing about 6970 cabbages on an acre, which is 2130 more than can be raiſed when they are planted in ſquare yards throughout the acre.

“ The ground being thus planted, we are now to conduct theſe vegetables through all the ſtages of their growth, and to help them to nutritive principles in the ſtate of their greateſt exigency; and, in order to this, at the beginning of winter the ground muſt be taken good care of, not only to keep it dry, but alſo to drain off the chilling wets from the bed of plants, which, as was ſaid before, contains two feet. The firſt thing, then, to be done, at the approach of winter, but when the ſoil is dry, is to throw the intervals up into a ſharp ridge, at two bouts, twice in a place, and as deep, each time, as the plough can go; this ridge-work, and double ſpitted, may be performed very well at two bouts, as it will allow nine inches in the middle of the interval, when the ploughman begins to turn the mould of the firſt bout upon; and then, at the ſecond bout, he will reach within three inches of the plants, if he meaſures the ground as he ought with his plough, in leaving nine inches to turn the firſt furrow on, and keeps exactly nine inches, in the ſecond bout, from the land ſide of the firſt: however, he muſt ſo manage his two bouts, as to come no nearer than three inches to the beds of plants, whilſt he is going the ſecond bout.

“ This operation being over, the ground will then lie in the following form: there will be a high two-bout land in the interval, taking up five furrows in breadth, or three feet nine inches, reckoning nine inches for the breadth of the plough, as it runs in the ground; and there will be a drain, on the outſide of each bed of plants, nine inches wide, and, it being double ſpitted, or twice in a place, near a foot deep, at leaſt cut ſo with the plough, though ſome mould will unavoidably fall back again, notwithſtanding the care the ploughman may take to prevent it: and from the edge of the land ſide of each drain, or the breadth of each bed of plants, there will be two feet and a half of ground, which, through the winter, will be kept very ſafe from too much wet, by means of thoſe drains; which is of great conſequence to the plants, as much cold moiſture brings on ſuch a condenſation and contraction among the component parts of this vegetable, that all the expanſive principles in the ſpring and ſummer cannot unbrace; by which a dwarf ſtate of the plant neceſſarily enſues.

“ About the latter end of March, or the beginning of April, if the ground be dry, the ploughman is to go once in a place in the drain, or open trench, in order to deepen it ſtill more, and to ſtir the mould; and the ploughman need not be in any pain for the fibres of the roots, though he cuts or diſturbs ſome of them in this operation: for as the fibres, which have ſtretched out into the bed, are undiſturbed, he may cut off the outermoſt as near to the roots as he pleaſes, without doing any harm, unleſs he lets the plants down into the trench.

“ When this operation is over, he muſt immediately throw down the ridge, by turning it back again, and leave an open trench in the middle of the interval, which may be done, very conveniently, at two bouts, without overthrowing the mould upon the plants; but he muſt remember to go twice in a place with his plough, to keep the ground double ſpitted, which is of great conſequence to the plants, and therefore he muſt not think of omitting it: after this operation, the ſoil will have a double trench, in the middle of the intervals, the width of twice the breadth of the plough, and about twelve inches deep, if ſome of the earth did not fall back again; and there will be mould, the quantity of what is thrown out by the plough, in double ſpitting, lying between the plants and this open trench, and which will be thrown pretty near the roots of the plants; which mould is to continue there till the wants of this vegetable require us to make an alteration, when we have paid ſome attention to the partitions, and alſo to the plants themſelves.

“ About the middle or latter end of April, if the ground is dry, the horſe-hoe muſt be uſed in the partitions, and the ploughman muſt go as deep with it as he poſſibly can, in order not only to diſturb the young weeds, but alſo to ſtir the earth, in the moſt effectual manner, within the reach of the fibres; but, immediately before this operation, the hand-hoe is to be uſed in the rows, between plant and plant, to check the weeds, and refreſh the mould about the roots, and the hoer muſt ſtrike his inſtrument as deep as he can; and when the weeds, any time after this, appear above ground, in the partitions, or among the plants, the horſe-hoe and hand-hoe muſt be uſed as before, but generally ſo timed, to be about a fortnight or three weeks after any alteration has been made in the intervals, that the fibres may have time, in either caſe, to heal again, inſtead of being diſturbed all at once.

“ About the beginning of May the ploughman is to draw the heavy harrow, and then the finer, over the intervals, in order to pull the mould into the open trench, level, and make the whole interval fine, and to prepare it for a ploughing. Theſe harrows, being the ſame formerly mentioned, will do this buſineſs very well, without doing any harm to the plants; and if there be a good weight laid on them, they will do great execution, in pulling down the earth into the trench, and making the ground exceeding fine; which laſt article is of importance, as the plough will, in future operations, turn down this fine ſurface to a depth where the lower horizontal fibres will meet with it, and find plenty of nouriſhment therein.

“ When the harrows have done their utmoſt, the ploughman is to go one bout, and throw up a ridge in the middle of the interval, if the ground is dry, and to double trench, as before; and, in order to come near the plants, he may leave the breadth of about two furrows, on which to turn his bout, and then he will reach within ſix or ſeven inches of the plants with his ſhare: when this is performed throughout the ground, the harrows muſt immediately be uſed as before, and then the ploughman is to turn all the mould towards the plants in two bouts, and double trenching, by which there will again be an open deep trench in the middle of the intervals: and about a month after this he is to uſe the harrows again, if the plants do not ſpread too far into the intervals; if they do, he muſt level the ground with his plough, or the horſe-hoe, and then go one bout, and turn the mould on the breadth of a furrow and a half, ſtill going twice in a place; and then the ridge, and open furrow, on each ſide, will contain about two and thirty inches, or the breadth of three furrows and a half, and he will have gone within nine inches of the ſtems of the plants, which is near three inches farther off them than before.

“ In this form the ground is to lie a month, unleſs the ſeaſon be very growing, and the weeds make a bold appearance; in that caſe, it may be neceſſary to diſturb them ſooner, by turning the ridge back again into the open trenches, and leaving the interval open in the middle, as formerly; and about Lammas, or a little before, the ploughman is to throw down the mould, into the middle open trench, and make the intervals level and fine, and this is the laſt operation ariſing from ploughing; the ground being now to remain, without diſturbance, any farther than what enſues from the uſe of the horſe-hoe, in the intervals, after the ground is made level, as, before ſummer is over, there may come up ſome weeds, which muſt not be ſuffered to appear with impunity. It is preſumed, that due care has been taken throughout the ſeaſon of the partitions, and between plant and plant in the rows, and likewiſe on the outſides near the plants, in the intervals, where the ſhare and coulter could not reach without doing damage; and therefore, when the vegetables ſhut out the horſe-hoe, in the partitions, or where the plough could not, or durſt not, reach, the hand-hoe was to have done its office, to ſupply thoſe wants, in the beſt manner it could.

“ There is another method, which we have not mentioned, to tranſplant this vegetable on the ground it is to grow into a cabbage, which is cheaper; and it is this: thoſe ploughmen, who can draw out a very ſtrait furrow, ſet off firſt, and the perſons, who are ready with the plants, put them into the trench, ſo made with the plough, at their proper diſtance from each other; and when the ploughman has gone the firſt bout, within the compaſs of three feet and a half from the ſhare point, he is to go another bout, to turn the mould into the firſt open furrow, ſo as not to bury the plants, in this operation; and he will have gone theſe two bouts, one to open the ground for the reception of the plants; and the other to give them mould, by the time the people have ſupplied the furrows with plants, ſo that they may be all ready to ſtart together again when the team returns to the head land, from making his ſecond bout.

The plants, on this occaſion, muſt be placed upright in the trench, ſtanding againſt the right-ſide of it, which may be done if the plough cuts the ground true, and the mould be well ſcooped out; and this will ſhew care in the perſon that holds it, and that his inſtrument is a good one. There muſt be a perſon to carry a gage, divided into two feet, in each diviſion, ten feet in length, which will contain ſix points, the two ends, and four intermediate ones, numbered from one to ſix; which diviſion and points ſignify, that a plant muſt be placed in the open trench, directly againſt one of thoſe figures, as the gage lies upon the ground, when the man, who has the care of it, lays it down in a ſtrait line, according to his office. In order to ſhew how the plants are to be ranged, in a moſt regular manner, exactly at two feet from each other, in the rows, we will ſuppoſe the ploughman to be juſt ſetting off to go his firſt bout: in this caſe, the gager is to ſtand with his inſtrument, which may be a ſquare piece of wood, of about three inches over, or twelve in the girt, and numbered 1, 2, 3, 4, 5, 6, facing the right ſide of the plough when it ſets off; he muſt lay his right-hand juſt beyond figure 4, and his left juſt beyond figure 3, and, holding it in this manner, he will poiſe the gage very well, and lay it down, take it up, and remove it, without trouble to himſelf.

“ Now, by ſtanding about five feet, on the right ſide, from the place where the plough enters, and two perſons with plants in their aprons, and a woman with a baſket full behind him, ſtanding on the left ſide, in this poſture of the people, the plough is then to move on, and when the ploughman has paſſed by the end of the gage, the gager is then to lay it down, but in ſuch a manner, that the end, number 1, may touch the place where the plough entered the ground, and the end, number 6, may lay in the right edge of the trench, on the mould turned out. The firſt man muſt fix his eye on figure 1, and, at the ſame time, the ſecond man on figure 4, and each of them, is to place a plant againſt his own figure; and then the firſt gardener puts down another at figure 2, and another at figure 3, and while he is doing this, the ſecond gardener ſupplies figures 5 and 6, in the very ſame manner; and, when they are ſupplying figures 3 and 6, the gager is to ſtoop down to be inſtantly ready to take up the gage, in the manner before directed, and the gardeners muſt take care to keep time with each other, that there be no delay in moving after the plough, in its progreſſive motion.

“ The gager is inſtantly to remove his inſtrument, placing the left end cloſe to the laſt plant, and the other end as before; and the gardeners are to take care of the three figures belonging to their office, the firſt man managing the three firſt numbers, and the ſecond the three laſt. They may go on very faſt in this manner, if they pleaſe, and, if they are three honeſt active men, no plough can out-travel them in making one bout: and in this operation it is expected of the ploughman, that he will make his horſes ſtep on briſkly, which they may very well do with ſuch light work; for, by the ſwifter motion of the plough, there is not only leſs expence attending this culture, but the trench is better cleared of the mould, and left ſquare; and the furrow is thrown ſo far to the right as to be in leſs danger of falling back again, which it may otherwiſe do, from a creeping ſluggiſh motion of the plough.

“ Though two active gardeners, or huſbandmen, when the latter are uſed to the nature of plants, and placing them in the ground, may get forwards as faſt as the plough; yet, in order to have the plants properly put againſt the figures, it may be better to have them take their time, and to proportion their work in ſuch a manner, that they may finiſh by the time the team is at their heels, in ending the ſecond bout. The gager, and the two gardeners, need not be afraid of too much ſtooping; for the gager, when he ſtoops to put down his gage, has walked five feet, from the laſt place where he took it up, and, in fact, is only diverſion and exerciſe for him; and the firſt gardener, when he ſtoops to put down his three plants, ſtepping along at the ſame time, in that poſture, has ſix feet of ground to walk upright upon, which he may diſpatch very nimbly, if occaſion requires it; and the ſecond gardener, in like manner; and as a perſon attends them at their backs with a baſket of plants, they may, without loſs of time, be ſupplied, while they are walking, and take leſs or more into their [illegible] or hands, as they ſee convenient, and conſiſtent [illegible].

“ When the gager gets up to the far end of the ground, he muſt remember to keep on the furrow ſide of the plough, that is, on that ſide towards which the mould is turned; and the ploughman is now to receive farther directions how to proceed, when he has gone the two bouts, mentioned before. He was deſired to draw out a very ſtrait furrow when he firſt went up the ground, by taking ſight of a tree, buſh, or any other mark, exactly in the middle of the ground, and directly oppoſite to the place where he is to ſet off from, and which he judges to be in the middle; or he may uſe any method agreeable to himſelf, provided a ſtrait line be only drawn out by the plough, for on this depends the regularity of all the reſt of his bouts, and the operations of horſe-hoeing and ploughing during the growth of the cabbages. The firſt furrow being thus drawn out, the next buſineſs is, to turn the horſes to the right, and then to meaſure three feet and a half, from the edge of the land ſide of the firſt furrow, or that edge cut with the coulter; and, making a mark at the end of three feet and a half, he muſt put the ſhare point in there, and come ſtrait back again, keeping exactly three feet and a half from the far edge of the other furrow; and then, as was ſaid before, he muſt go a ſecond bout, to turn the mould into the open furrow where the plants are placed, which he may very well do without doing them any harm: if he proportions the depth of the furrows, where the plants are put, to their ſize, as they will be greater or leſs, juſt as the ſeaſon has been for their growth on the beds whereon they grew.

“ When all this is performed, and the ploughman is ready to ſet off again, in order to make another bout, he is to turn to the right, to draw out another furrow, which is to receive the plants, which muſt ſtand four feet and a quarter from the row of plants now on his right-hand; to do which he is to conſider, that the near edge of the open furrow next to him is the breadth of two furrows, or eighteen inches, from that row of plants; and taking eighteen inches from four feet and a quarter, the remainder is thirty-three inches; and becauſe the plants muſt ſtand on the furrow ſide, therefore we muſt add the breadth of the plough, which is nine inches, to the above thirty-three, which then will make three feet and a half from the edge of the open furrow next to him; and now meaſuring three feet and a half from that furrow, he muſt make a mark, and go his bout, turning to the right, and making the ſame mark from the outermoſt furrow as before, and ſo proceeding ſtrait back again.

“ He is now to go another bout, to earth his plants, and when he has done this, he muſt ſtill turn to the right, and make a halt on the head land, to conſider what is next to be done: he knows the edge of the open furrow, now on his right-hand, and next to him is eighteen inches from the neareſt row of plants, and that the furrow he is going to open is for the plants to ſtand juſt two feet from the laſt row; and therefore taking eighteen from twenty-four, the remainder is ſix: and becauſe the breadth of the plough is nine, therefore he muſt meaſure fifteen inches from the edge of that open furrow next to him, and making a mark there, that is the place where he is to ſet off: and when he gets to the far end of the ground, he muſt turn to the right, and meaſure off fifteen inches from the edge of that open furrow next to him, as he comes down again: he is to go another bout to earth his plants, and then all things will be eaſy to him, as it will be only repeating what he did before; for as he is now going another bout, he is to meaſure three feet and a half, from the near edge of the open furrow next to him on his right-hand, and go ſtrait up, and turning ſtill to the right-hand, he muſt meaſure the ſame diſtance, as he comes down again from that open furrow, and when he has made another bout to earth thoſe plants, he meaſures fifteen inches from the edge of that furrow; and when the plants are put into that he is now making and earthed, he then proceeds to meaſure off three feet and a half, which forms the interval, and ſo on earthing, and then meaſuring fifteen inches alternately with the other, for the partitions, till all is finiſhed.

“ By which operations the whole ground will be planted with two rows, at two feet the partitions, and four feet and a quarter the intervals. Thus, then, upon the whole of theſe directions, when he firſt ſets off, and gets to the far end, and, turning to the right, he meaſures three feet and a half; when he has earthed plants, he meaſures three feet and a half for the next bout to receive the plants; and, earthing theſe, he meaſures fifteen inches for another row of plants; and, earthing theſe, he meaſures three feet and a half; and earthing theſe, he meaſures fifteen inches; and ſo on, alternately, three feet and a half, and earthing; then fifteen inches, and earthing; then three feet and a half again.”

The farmer will, doubtleſs, be glad to know what crop he is to expect from his land after all his labour: he has already been informed, that the number of cabbages on an acre, if they have all ſtood to maturity, will be ſix thouſand, nine hundred and ſeventy: theſe may be allowed to weigh, one with another upon a medium, three quarters of a ſtone each; and if an ox be allowed to eat nine ſtone a day, that is, twelve cabbages, then ſix oxen will live three months on one acre of them; ſo that ſuppoſing one acre of turnips, raiſed in the common method of huſbandry, to be ſufficient during the ſame ſpace of time for two oxen, we may ſtill expect, in proportion, three times more benefit from the cabbages than from the turnips.

Mr. Randall aſſures us, that the oxen will grow very fat upon ſuch food; that he has given it to many cows for a long time together, without perceiving the leaſt diſagreeable taſte, either in the milk or butter: on the contrary, the milk was rather richer and ſweeter; and that both oxen and cows are exceedingly fond of this food. The ſame may be ſaid of ſheep, which improve in their fleſh very faſt, and grow ſurprizingly fat on cabbages; yet has the mutton no diſagreeable taſte; ſo that there is perhaps no vegetable which will raiſe lean ſheep of the largeſt breed ſooner than cabbages. *Randall's Semi-Virgilian Huſbandry, p.* 315.

CADDOW, a name given to the jack-daw, in ſome of the northern counties of England.

CADMA, the leaſt of the pigs which a ſow has at one farrowing; for they have generally one which is remarkably leſs than the reſt.

CALF, the young of a cow.

There are two ways of breeding thoſe calves you deſign to rear; the one is to let them run with the dam all the year, which is the common way uſed in the cheap breeding countries, which they reckon makes the beſt cattle; and the other way is, to take them from the dams after they have ſucked about a fortnight: then they teach them to drink flet or ſkimmed milk, which they make juſt warm for them, it being very dangerous to give it them too hot. The beſt time for weaning of calves is from January to May. Let your calves have milk for about twelve weeks; only a fortnight before you wean them from milk, let water be mixed with the milk; and after your calf hath drunk milk about a month, take ſome of the freſheſt, ſweeteſt hay you have, and put little wiſps of it into ſome cleft ſticks, which place ſo as the calf may eaſily come at them to learn to eat; and after Lady-day, when the weather is fair, turn your calves to graſs, taking them in a few nights at firſt, giving them milk and water, and ſometimes giving the ſame to them in a pail in the field, till you find they are able to feed themſelves, ſo as not to deſire it: but by no means let your graſs be too rank, but ſhort and ſweet, that they may get it with ſome labour. All wean their calves at graſs; for if you wean them in the houſe with hay and water, it is apt to make them big-bellied, and to rot; and when you have reſolved which of the males to keep for bulls, let the others be gelt for oxen, which the ſooner you do the better: when they are about ten or twenty days old, is the beſt time, and leaſt dangerous.

In Hertfordſhire, Eſſex, and moſt places near London, they commonly fat all their calves for the butcher, becauſe they have there a good market for them, and the lands are not ſo profitable to breed on as in cheaper countries; a good calf there often ſelling for as much as a good heifer, eſpecially if they are very fat and white, which they take a great deal of care to make them. Their way of doing this is by keeping them clean, giving them freſh litter every day, which they lay upon their old litter; for they clear out their coops but two or three times in a year, and moſt commonly at a time when they have no calves in them; they conſtantly alſo let them have a large chalk-ſtone or two to lick, which they bore a hole through, and hang up by a ſtring in a corner of the coop, which prevents their fouling it with dung and urine. They alſo obſerve to ſet their coops where they may have as little ſun come to them as they can, that they be not made cloſe and ſtifling, and that they ſtand a yard above the ground, that the urine may run from them: and to make them white, they often let them blood when they are about a month old, and a little before they kill them; and becauſe they are often looſe, they do not let them ſuck their fill; but inſtead of it they ſometimes give them chalk ſcraped into milk, which they pour down with a horn; alſo ſalt and water, and ſometimes they cold bathe them, and give them bole-armoniac and chalk, which they moiſten with milk, and make it into balls, and give it them. If a cow will not let a ſtrange calf ſuck her, rub both hers and the calf's noſe with a little brandy. *Mortimer's Huſbandry, vol.* I. *pag.* 228.

A young calf is left with its dam the firſt five or ſix days, that it may be kept always warm, and ſuck whenever it pleaſes: but if in thoſe five or ſix days it grows and gathers ſtrength, there is a neceſſity for making a ſeparation, as he would exhauſt the cow if left always with her. Sucking two or three times a day will now be ſufficient. If you intend to fatten him ſpeedily, and, at the ſme time, render his fleſh fine and delicate, let him have every day raw eggs, boiled milk, and the crumbs of bread: by this means the fleſh, at the end of four or five weeks, will be excellent. Calves, therefore, intended for the butcher ſhould not ſuck above thirty or forty days; but thoſe deſigned for the dam for two months at leaſt; as the more they ſuck, the ſtronger and larger they will prove. The beſt for bringing up are thoſe calved in the months of April, May, and June. It is ſeldom that thoſe which come later acquire ſufficient vigour to ſupport them during the inclemency of the following winter; the cold cauſing them to droop, and many of them to die. Thus calves deſigned for keeping ſhould be weaned at two, three, or four months; but before taking them totally from the milk, a little good graſs, or chopped hay, ſhould be given them, that they may become accuſtomed to ſuch aliment; for when they are to be entirely ſeparated from their dam, they muſt never be ſuffered to come near her either in the ſtall or paſture, whither they ſhould be ſent every day, and remain there, during the ſummer, from morning to evening; but at the ſetting in of the cold weather in autumn, they muſt not be let out till late in the morning, and brought back early in the evening. And as the pinching cold of winter will be extremely detrimental to them, they ſhould be kept very warm in a cow-houſe, and well ſupplied with water; ſaintfoin, lucern, &c. ſhould be mixed with their common hay. They muſt be let out only in warm weather. A great deal of care is neceſſary to bring them through the firſt winter, which is the moſt dangerous period of their lives; for they will acquire ſo much ſtrength during the following ſummer, that they will have nothing to fear from the cold of a ſecond winter. *Buffon's Hiſtoire Naturelle, tom.* IV.

The deſire of profiting by the milk of the cow, is often the cauſe of the calf's being two early weaned. A month or two more, in ſhort the time required by nature, would ſtrengthen it in its youth; it would grow more ſucceſsfully, and, in time, fetch a profit with good intereſt. But this is hardly done any where. No ſooner is it believed that it can ſubſiſt without the mother's milk, than the farmer thinks he gains a great deal by weaning it: ill fed, and infirm, it grows at beſt to be a ſorry bull, or feeble bullock, from which little profit, and much leſs ſervice, can be expected.

Ignorance and want of reflection form the principal ſource of this abuſe! People do not know, or do not reflect, that the vital flame, incloſed in the heart of a new-born animal, muſt be cheriſhed and augmented; that it attracts and is nouriſhed by that contained in the milk; that this vital flame, weak at firſt, would ſcarce have power to ſeparate the auxiliary fire from the milky particles with which it is incorporated, if milk was a leſs delicate ſubſtance than nature hath formed it for this firſt ſervice; but in proportion as the vital fire acquires force, the milk grows thick, becauſe its groſſer particles are deſtined for forming and conſolidating the body of the animal. When the vital flame is arrived at ſuch a degree, as to be ſuperior to the ſuccours which the milk can afford, nature excites the animal to ſeek a more ſolid nouriſhment, and then, but not before, is the time for weaning it. For, by anticipating that time, you run the riſque of leaving the animal imperfect in its interior parts: the aliment which is adminiſtered being above its ſtrength, it cannot perform a perfect digeſtion, and the nouriſhment it receives is ſo much the leſs; becauſe, in all natural bodies, the ſtrongeſt juices, and the moſt efficacious qualities are always mixed, and, as it were, blended with the hardeſt particles. Hence it happens, that a ſickly animal does not derive from the ſame food ſo much nouriſhment as an animal in health. Indeed the vital flame, too much employed in reſiſting the attacks of the corrupted humours, hath not force enough to extract from the aliment the neceſſary auxiliary fire it contains. Beſides, the food being only in part diſſolved, paſſes away in the excrements, and forms only a thin inefficacious manure.

As therefore we may be aſſured, that by weaning a calf too early, it will continue infirm and of ſmall value, ſo by leaving it with its mother, as long as its conſtitution requires, we may expect it will become ſtrong and vigorous; and by following this method, we can hardly fail of raiſing a breed of cattle, that will redound both to the honour and profit of the farmer.

Young calves are apt to be attacked by inſects, which diſturb and torment them, and, at the ſame time, prevent their fattening. In order to preſerve them from theſe inſects, and even cure them when they are attacked, it will be proper to prepare an ointment of melted hogs-lard and quickſilver, well rubbed together in a marble or iron mortar. Spread this ointment upon a linen cloth, which wrap up in three folds, and ſtitch it for a collar to the calves. It will not only cure them, but alſo diſperſe the inſects.

There is no better nouriſhment for young calves, than vetches ſoaked in water till they ſwell; but obſerve to ſteep no more than will ſerve them for once; becauſe when they continue moiſt for any conſiderable time, they are apt to grow ſour, and would then do them more harm than good. *Journal Oeconomique.*

CALKINS, a name given in ſome parts to a ſort of horſes ſhoes, made for froſty weather.

Theſe ſhoes, by forcing the horſe to tread wholly on the toes of his hind feet, are apt to occaſion bleymes, and ruin the back ſinews. The farrier, therefore, ſhould be ordered to pare the horn a little low at the heel, and turn down the ſponge upon the corner of the anvil, ſo as to make the calkin reſemble the point of a hare's ear, which will remove the conſequences often attending the common ſquare calkin.

CALTHA, the marſh marygold, the name of a perennial plant, growing naturally in the low meadows, in many parts of England.

M. du Hamel recommends this plant to the notice of farmers, as very uſeful to be cultivated as a winter paſture for cattle; and experience has juſtified his recommendation. Perhaps it might prove as uſeful in this country as in France, eſpecially as cattle are known to be extremely fond of it, and the plant might be eaſily cultivated.

CAMMOCK, the name of a troubleſome plant infeſting arable lands; but more generally known by the name of reſt-harrow. *See the article* REST-HARROW.

CANARY-*ſeed*, the name of a ſmall ſeed produced by a gramineous plant, cultivated in ſome parts of England.

A correſpondent of the editors of the Muſeum Ruſticum, has given us the method practiſed by the farmers of the iſland of Thanet, in the culture of canary-ſeed. He obſerves, that they generally chuſe to ſow it in freſh land; that is, ſuch as has only borne graſs. After ploughing up the lay, and bringing the land into tolerable rough tilth, they ſow it with peas; theſe are kept clean hoed as uſual, and yield a good crop. The next year the land is well ploughed, and planted with horſe-beans, which thrive well in that iſland. Theſe two crops effectually kill the greenſward, or graſs; take off the rankneſs of the ſoil; and the frequent hoeings, which are neceſſary to keep the weeds under, bring the land into fine tilth. After the beans are off, a thorough ploughing is given to the land, and in that condition it remains till the ſpring: about the beginning of March, if the weather be fine, and the ſeaſon dry, the land is ploughed for the laſt time; immediately after which the canary-ſeed is ſown.

The farmers in that iſland uſed formerly to ſow canary-ſeed with a broad caſt, ſpreading it all over the land; but when this was the practice, they found it very difficult to hoe and keep the plants clean from weeds: at preſent they ſow it in furrows, made a-croſs the land, conſtantly taking care to make the ridges between the furrows as ſharp as poſſible: by this means the ſeed, which is ſown by hand, ſlips from the ſides and tops of the ridges into the furrows, and the plants come up in regular rows. The plants muſt be kept very clear of weeds by means of the hoe, weeding-hook, &c. and if it be a wet ſummer, the intervals muſt be hoed ſeveral times; but of this the intelligent farmer is the beſt judge.

Three pecks of ſeed are, in general, enough to ſow an acre, ſometimes more, and often leſs. The canary-ſeed ſeldom comes on till the wheat harveſt is entirely over, and the corn houſed: but it muſt be obſerved, that the wheat harveſt is generally very early in that iſland. It is reaped with a hook, and as faſt as it is cut, the reapers lay it on the land in wads, as they call them, or parcels about the quantity of half a ſheaf of wheat unbound: in this manner, if the weather be favourable, it is left near a fortnight, at the end of which time, the wads muſt be turned, that the other ſide may be dried. If the weather be very wet, they muſt be turned oftener, to prevent the ſeed from ſprouting.

The price of reaping canary in that iſland is from ſix to eleven ſhillings per acre; and the price of threſhing and dreſſing it is five or ſix ſhillings a quarter. According to the goodneſs of the land, and the tillage that has been beſtowed upon it, the farmers there expect their return to be from twenty-five to fifty buſhels per acre; but the common crop is from thirty to thirty-four. It muſt, however, be obſerved that the farmers never pay ſo much as ten or eleven ſhillings per acre for reaping this crop, unleſs the canary be very much lodged and tangled, which it often is, owing to the land in which it grows being freſh, rich, and rank, and to the high winds to which that iſland is ſubject.

They ſow ſucceſſive crops on the ſame land for eight or ten years; and ſowing canary would be a very great improvement to lands which lie convenient for water carriage to London markets, was it not a crop the farmer ought by no means to depend upon, not only becauſe the return, or quantity it yields, varies greatly, but alſo on account of the fluctuation in the price of this ſeed in the London markets, where the greateſt and indeed almoſt the whole demand is. *Muſeum Ruſt. vol.* I. *p.* 22.

CANKER, a ſmall ſpeck made by a ſharp humour, which gnaws the fleſh almoſt like a cauſtic.

This diſtemper often attacks the foot of a horſe, and generally proceeds from thruſhes, when they prove rotten and putrid, though many other cauſes may produce this diſorder. The method uſed by farriers for the cure is generally with hot oils, ſuch as vitriol, aqua fortis, and butter of antimony, which are very proper to keep down the riſing fleſh, and ſhould be uſed daily till the fungus is ſuppreſſed, when once in two days will be ſufficient, ſtrewing red precipitate powder over the new grown fleſh, till the ſole begins to grow.

There is one great error committed often in this cure, which is, in not having ſufficient regard to the hoof; for it ſhould not only be cut off, wherever it preſſes upon the tender parts, but ſhould be kept ſoft with linſeed oil; and as often as it is dreſſed, bathe the hoof, all round the coronet, with chamberlye. Purging is very proper to complete the cure. *Bartlet's Farriery, p.* 314.

Canker, in trees, implies a wound or blemiſh in the trunk, which does not heal up naturally, but will increaſe and damage, if not endanger, the whole tree.

The canker in fruit trees is moſt commonly occaſioned by wet, which gets in at the cleft where the tree was grafted, or at ſome other wound which has been neglected: but it alſo proceeds ſometimes from the ſoils not agreeing with the nature of the tree.

If this diſtemper be only ſuperficial, ariſing from a bruiſe, for example, which the bark may have received, it may be cured by cutting the injured part out with a ſharp knife, and then binding over it a mixture of cow-dung and earth, tied on with a wiſp of hay, likewiſe daubed with cow-dung. This muſt be done before the ſap begins to riſe; for otherwiſe the bark will peel, looſen, and wither much farther than the bruiſe, to the great hazard of the whole tree, eſpecially if the ſtem be the part affected; for as to a bruiſed branch, the beſt way is to lop it off at once, if there be the leaſt ſuſpicion of danger. But when the canker has been bred in the tree, or when it has extended from the trunk to the branches, or from the branches to the trunk, ſo that after cutting away to the very quick, there ſtill remains an eye, or ſpeck, like that which is ſometimes ſeen to run through a whole plant of diſtempered corn, the ſhorteſt way is, to commit the tree to the fire, and to plant another in its ſtead. Mr. Nourſe is indeed inclined to think that, if the canker has not penetrated too far the tree or ſtock, ſuppoſing it to be of the apple kind, it may poſſibly be ſaved, by regrafting it with a winter quinnin, a boderan crab, a boon apple, or a golden pippen; neither of which he had obſerved ever to canker: but how accurate his obſervations may have been in that reſpect, we ſhall not pretend to determine. Certainly it may be worth while to try a change of fruit in all ſuch caſes, if they are not abſolutely deſperate. He aſſerts, upon his own experience, that the apple which we call a woodcock, is no way apt to canker, or to be blaſted.

This, if it be fact, renders it by ſo much the more worthy of cultivation, as it is a great and conſtant bearer, and yields an excellent juice. The misfortune is here, as well as in the attempts which have been made to ſuit the ſoil and the fruit, that each of theſe is diſtinguiſhed, either by ſuch general appellations and deſcriptions as ſerve only to puzzle the huſbandman when he comes to real practice, or by names which are not known out of the places where they are uſed. Doctor Cullen will render a great ſervice to mankind, if he ſhould happily ſucceed in that important point, which, if we are rightly informed, is the object of his preſent ſtudies; viz. to aſcertain by an exact analyſis, which no one can be better qualified to do with the utmoſt preciſion, what are the component particles of each different ſpecies of ſoil, and what proportion they bear to each other. This, diveſted of that parade of ſcience, and of ſcientific terms, which the learned are too apt to diſplay, and which ſerves only to embarraſs common underſtandings, will, ſhould ſuch a work appear, as it is hoped that it will ſoon, anſwer a very eſſential purpoſe in agriculture, as well as lay a fine foundation for uſeful entertainment to gentlemen whoſe leiſure permits them to proſecute ſuch ſtudies. But the taſk, conſidered in all its various branches, is arduous indeed! worthy of that able phyſician, we uſe the word here in its moſt extenſive and moſt proper meaning, and ſkilful chemiſt, whoſe love for the welfare of mankind has prompted him to undertake it.

Mr. Worlidge aſſures us, that he himſelf cured a tree deſperately diſeaſed with the canker, by cutting off as many as he could of the cankered boughs, laying its roots bare during all the winter, and applying to them in the ſpring a great quantity of ſwines dung, not too new, mixed with the earth, which was then returned into its former hole. If this does not do, he condemns the tree to be grubbed up, as being paſt recovery. *Nourſe's Diſcourſe on the Benefits and Improvements of Huſbandry, pag.* 138. *Worlidge's Syſtema Agriculturæ, cap.* viii. *ſect.* ii.

CAPELLETS, in horſes, are particular ſwellings which thoſe animals are ſubject to, of a wenny nature, which grow on the heel of the hock, and on the point of the elbow: they ariſe from bruiſes and other accidents, and when this is the caſe, ſhould be treated with vinegar and other repellers; but when they grow gradually on both heels or elbows, we may then ſuſpect the blood and juices to be in fault; that ſome of the veſſels are broke, and the juices extravaſated. In this caſe the ſuppuration ſhould be promoted, by rubbing the part with marſhmallow ointment; and when matter is formed the ſkin ſhould be opened with a lancet, in ſome dependent part towards one ſide, to avoid a ſcar: the dreſſings may be turpentine, honey, and tincture of myrrh. The relaxed ſkin may be bathed with equal parts of ſpirit of wine and vinegar; to which an eighth part of oil of vitriol may be added. The contents of theſe tumours are various, ſometimes watery, at others ſuety, or like thick paſte; which if care be not taken to digeſt out properly with the bag, will frequently collect again: was it not for the disfigurement, the ſhorteſt method would be to extirpate them with a knife, which, if artfully executed, and the ſkin properly preſerved, would leave very little deformity.

When thoſe tumours proceed from an indiſpoſition of the blood, they are beſt let alone, eſpecially thoſe of the watry kind, which will often wear off inſenſibly, without any applications: but when they are like to prove tedious, you ſhould endeavour to diſperſe them by bathing the parts with repellers, and have recourſe to rowels, purges, and diuretic medicines, to carry off the ſuperfluous juices and correct the blood. *Bartlet's Farriery, p.* 277.

CAPO, a word uſed in Cheſhire, to ſignify a working horſe.

CAPON, a cock chicken gelded as ſoon as left by the hen, or at leaſt as ſoon as he begins to crow.

Capons are very uſeful to lead chickens, ducklings, young turkeys, pheaſants, and partridges, which they will do better than the hen, and at the ſame time make a ſtouter defence againſt kites and buzzards. The largeneſs of their body is alſo of great advantage, as they will cover between thirty and forty of them.

CARAWAY-SEED, the ſeed of a plant growing wild in ſome rich meadows in Lincolnſhire and Yorkſhire; and is ſometimes found growing in the paſtures near London. It is alſo cultivated for uſe in Eſſex, and ſome other counties.

It is a biennial plant, which riſes from ſeeds one year, flowers the next, and periſhes ſoon after the ſeeds are ripe. It has a taper root like a parſnep, but much ſmaller, which runs deep into the ground, and hath a ſtrong aromatic taſte, ſending out many ſmall fibres; from the root ariſes one or two ſmooth, ſolid, channelled ſtalks, about two feet high, garniſhed with winged leaves, having long, naked foot-ſtalks. The ſtalks divide upward into ſeveral ſmaller branches, each of which is terminated by an umbel, compoſed of ſix or eight ſmall ſeparate umbels, ſuſtaining ſingle white flowers, with heart-ſhaped petals; the flowers of thoſe ſmall umbels are cloſely joined together. After the flowers are decayed, the germen becomes an oblong channelled fruit, compoſed of two oblong channelled ſeeds.

The beſt ſeaſon for ſowing the ſeeds of this plant is in autumn, ſoon after they are ripe, when they will more certainly grow, than thoſe ſown in the ſpring; and the plants which riſe in the autumn generally flower the following ſpring, ſo that a ſummer's growth is hereby ſaved. *Millar's Gard. Dict.*

Caraway-ſeeds delight in a dry mould, ſomething inclining to clay, or rich garden mould. Eight pounds will ſow an acre. *Mortimer's Huſb. vol.* I. *p.* 201.

CARBERRY, a name given in ſome parts of England to the gooſeberry.

CARCASE, a name generally given to the body of a horſe.

The carcaſe of a horſe ought not to be too ſmall and ſlender; for a ſmall carcaſed horſe is generally weak. On the other hand, a very large carcaſed horſe proves often heavy and unactive, and when he happens to be underlimbed, it is reckoned a great fault, though this remark often fails, and horſes, that have been reckoned very much underlimbed, have proved as ſtrong, and fully as ſerviceable as any other.

A low back is another fault that almoſt every body complains of, and indicates weakneſs, though a moderate ſinking below the withers is not at all amiſs, if the back be otherwiſe ſtrait. When this ſinking is not great, the forehand generally riſes well. But when a horſe has a low back, and is higher behind than before, it is not only ugly, but ſuch horſes are generally weak, are apt to be pinched in their ſhoulders, and have an aukward way of going, owing to the heavineſs of their hind parts, which hinders them from getting on.

Some are fond of horſes which are home ribed, which is indeed a property that denotes both beauty and ſtrength, as thoſe that are open ribed are looked upon to be weak and looſe; but in ſome horſes the ſhort ribs approach ſo near the haunches, that they have ſcarce liberty to breathe, and ſuch horſes are the moſt out of wind of any other when put upon hard exerciſe, and eaſily go broken winded. But a horſe that is open and looſe in his flanks, like a grey-hound, is liable to many diſadvantages, which it would be tedious here to relate; ſuch are always narrow over the chine, have little or no belly but what is forced by art and feeding; and though we find ſome of this kind more vigorous than others, and even exceed all expectation, yet the generality of ſuch horſes are ſeldom fit to carry a great weight, or to hold out in hard riding. Some are great admirers of ſhort backed horſes, which is a right way of judging, ſo far as this ſtands in oppoſition to a very long back. But ſome horſes are ſo very ſhort, notwithſtanding they are otherwiſe of a good ſize, that they ſeem to be loſt under common furniture. But when a tall horſe happens to have a ſhort carcaſe, and very long legs, like a ſpider, ſuch a horſe is ſeldom good for much. If a horſe's back be ſhort, his whole body and limbs ought to be ſhort, and then it denotes ſtrength and firmneſs; but moſt of theſe make but a ſlow progreſs on a journey, though they will endure and hold out as long as any other, unleſs they are urged on with horſes of greater ſpeed.

It always denotes ſtrength in a horſe, when his carcaſe is of a moderate ſize, his ribs large, his flanks not hollow but ſmooth and full, with a ſtrait back, or but a very little ſinking, his hinder parts, or uppermoſt haunches not riſing higher than his ſhoulders. *Gibſon on horſes, vol.* I. *p.* 31.

CARDOON, a kind of wild artichoke, propagated only by its ſeed, which is if an oval form, about as big as a grain of wheat, of a very dark green, or blackiſh colour, and marked with black ſtreaks from one end to the other. There are two ſeaſons for ſowing it: the firſt is from the middle to the end of April; and the other about a month later. The ſoil ſhould be rich, deep, and fine. In a bed of ſuch mould, four or five feet wide, two trenches ſhould be opened, a foot wide, ſix inches deep, and at leaſt three feet aſunder: or, to anſwer the ſame intention, the rows of holes of the ſame depth ſhould be dug ſtrait by a line ſtretched along the bed. Theſe holes ſhould be three feet aſunder, and in quincunx order; or, if a trench is uſed, the quincunx form ſhould be obſerved in ſowing the ſeeds, which is performed in the following manner. Five or ſix of the ſeeds are dropped nearly together, at the diſtances before mentioned, and then covered over: not with a deſign to let ſo many plants grow cloſe together in a thick cluſter; but, as the growth of theſe ſeeds is ſomewhat precarious, to be the more certain of having two or three plants at each ſtated diſtance: for if all of them come up, they are immediately thinned to that number; and if they miſcarry entirely in any one ſpot, the chaſm is filled up with plants taken from another place, generally a hot-bed, on which ſome of theſe ſeeds are moſt commonly ſown when its heat is expiring, for a recruit in a caſe of need. The firſt ſowing will generally come up in three weeks, and the latter in about fifteen days. Great care muſt be taken to keep thoſe plants clear from weeds, and to water them frequently, in order to make them increaſe in bulk, and not run to ſeed. But this intention will doubtleſs be much better anſwered in every reſpect by a judicious application of the principles of the new huſbandry; we mean, by deep and frequent ſtirring of the ground on each ſide of the bed, letting the ſhare or ſpade approach to within a very ſew inches of the plants.

Towards the latter end of October, the cardoons thus cultivated will be fit for tying up, in order to be blanched. In order to this a dry day ſhould be choſen, when all the leaves of each cluſter being collected cloſe together, wiſps of ſtraw, or long litter, ſhould be twiſted round them ſo as to prevent the acceſs of the air to any part of them, except their very top, which ſhould be left open. In a fortnight or three weeks the plants thus covered will become white and fit to eat.

This tying up, and blanching of cardoons, may be continued till the winter approaches, and then thoſe who are ſo fond of them as to think it worth their while to be at the trouble, may take them up, with ſome earth about their roots, and remove them into a green-houſe, if they have one, or into a cellar, and by that means keep them for uſe all the winter. Some of theſe may be replanted in the ſpring, in an open border, as before, to ſeed in June or July; or they may be cut down to the ground, when hus planted anew, and their ſecond year's ſhoots may be ied up and whitened as before.

Beſides the uſe which the Italians, French, and Spaniards, make of this cardoon, in eating it raw with pepper, ſalt, oil, and vinegar, many think it preferable to celery, when ſtewed, becauſe it is mellower, and much more tender.

CARLICK, the ſame with charlock. *See the article* Charlock.

CARPET-WAY, a green-way, or path left in an arable field, without being ploughed.

CANE, a hollow place where water ſtands. It alſo implies a wood of alder, or other aquatic trees in a moiſt boggy place.

CARRIAGE, a general name for carts, waggons, and other vehicles, employed in carrying timber, corn, perſons, &c. from one place to another.

Carriage, alſo ſignifies a furrow, or trench, for conveying of water to overflow and improve meadow-land. It is diſtinguiſhed into two ſorts; the main carriage, which ſhould be made with a convenient deſcent; and the leſſer carriages, which ſhould be ſhallow, and as many in number as poſſible.

CARROT, the name of a root, too well known to need any deſcription here.

Carrots are propagated at two or three different ſeaſons, or ſometimes oftner, where people are fond of young carrots through all the ſummer months. The firſt ſeaſon for ſowing the ſeeds is ſoon after Chriſtmas, if the weather is open, which ſhould be in warm borders, under walls, pales, or hedges: but they ſhould not be ſown immediately cloſe thereto; but a border of lettuce, or other young ſallad-herbs, of about a foot wide, ſhould be next the wall, for otherwiſe they would run up to ſeed, without making any tolerable roots.

They delight in a warm, light, ſandy ſoil, which ſhould be dug pretty deep, that the roots may the better run down; for if they meet with any obſtruction, they are very apt to grow forked, and ſhoot out lateral roots, eſpecially when the ground is too much dunged the ſame year that the ſeeds are ſown, before it be conſumed, and mixed with the earth.

Theſe ſeeds have a great quantity of ſmall forked hairs, by which they cloſely adhere, ſo that they are difficult to ſow even, ſo as not to come up in patches; you ſhould therefore rub it well through both hands, whereby the ſeed will be ſeparated before it is ſown: then you ſhould chuſe a calm day to ſow it; for if the wind blows, it will be impoſſible to ſow it equal; for the ſeeds, being very light, will be blown into heaps. When the ſeed is ſown, you ſhould tread the ground pretty cloſe with your feet, that it may be buried, and then rake the ground level.

When the plants are come up, you ſhould hoe the ground with a ſmall hoe about three inches wide, cutting down all young weeds, and ſeparating the plants to four inches diſtance each way, that they may get ſtrength; and in about three weeks after, when the weeds begin to grow again, you ſhould hoe the ground over again a ſecond time, in which you ſhould be careful not to leave two carrots cloſe to each other, as alſo to ſeparate them to a greater diſtance, cutting down all weeds, and ſlightly ſtirring the ſurface of the ground in every place, the better to prevent young weeds from ſpringing, as alſo to facilitate the growth of the young carrots.

In about three weeks or a month after, you moſt hoe them a third time, when you muſt clear the weeds as before; and now you ſhould cut out the carrots to the diſtance they are to remain, which muſt be proportioned to the ſize you intend to have them grow: if they are to be drawn while young, five or ſix inches aſunder will be ſufficient; but if they are to grow large before they are pulled up, they ſhould be left eight or ten inches diſtant every way: you muſt alſo keep them clear from weeds, which, if ſuffered to grow amongſt the carrots, will greatly prejudice them.

The ſecond ſeaſon for ſowing the ſeeds is in February, on warm banks ſituated near the ſhelter of a wall, pale, or hedge; but thoſe which are intended for the open large quarters, ſhould not be ſown before the beginning of March, nor ſhould you ſow later then the end of the ſame month; for thoſe which are ſown in April or May will run up to ſeed before their roots have any bulk, eſpecially if the weather ſhould prove hot and dry.

In July you may ſow again for an autumnal crop; and in the end of Auguſt you may ſow ſome to ſtand the winter; by which method you will have early carrots in March, before the ſpring ſowing will be fit to draw; but theſe are ſeldom ſo well taſted, and are often very tough and ſticky. Many people mix ſeveral other ſorts of ſeeds, as leek, onion, parſnip, radiſh, &c. amongſt their carrots; and others plant beans, &c. but, in my opinion, neither of theſe methods are good; for if there is a full crop of any of theſe plants, there can be no room for any thing elſe amongſt them; ſo that what is got by one is loſt by the other; and, beſides, it is not only more ſightly, but better, for the plants of each kind to be ſown ſeparate; and alſo by this means your ground will be clear when the crop is gone, to ſow or plant any thing elſe; but when three or four kinds are mixed together, the ground is ſeldom at liberty before the ſucceeding ſpring: beſides, where beans, or any other tall growing plants, are planted amongſt the carrots, it is apt to make them grow more in top than root; ſo that they will not be half ſo large as if ſown ſingly without any other plants amongſt them.

But in order to preſerve your carrots for uſe all the winter and ſpring, you ſhould, about the beginning of November, when the green leaves are decayed, dig them up, and lay them in ſand in a dry place, where the froſt cannot come to them, taking them out from time to time, as you have occaſion for them, reſerving ſome of the longeſt and ſtraighteſt roots for ſeed, if you intend to ſave any; which roots ſhould be planted in the middle of February, in a light ſoil, about a foot aſunder each way, obſerving to keep the ground clear from weeds; and about the middle of Auguſt, when you find the ſeeds are ripe, you muſt cut it of, and carry it to a dry place, where it ſhould be expoſed to the ſun and air for ſeveral days to dry: then you may beat out the ſeeds, and put it up in bags, keeping it in a dry place till you uſe it. This ſeed is ſeldom eſteemed very good after the firſt or ſecond year at moſt; but new ſeed is always preferred; nor will it grow when it is more than two years old.

The Flemings have long known the advantage of feeding their cattle with carrots; though it is but of late years that this root has been cultivated for that purpoſe in the fields in England: nor does this uſeful and profitable practice extend even now to more than a few parts of this country; though there is ſcarce any root yet known, which is more heartening food for moſt ſorts of animals, or which better merits the huſbandman's attention; as one acre of carrots, well planted, will fatten a greater number of ſheep, or bullocks, than three acres of turnips, and at the ſame time their fleſh will be firmer, and better taſted. Horſes are extremely fond of this food, and there is not any better for hogs. Theſe roots have alſo been of ſuch excellent ſervice to deer, in parks, that when numbers of theſe valuable creatures have periſhed elſewhere,

where, through want in very hard winters, when there has been an extreme ſcarcity of their uſual food; thoſe that have been fed with carrots have kept their fleſh all the winter, and, upon the growth of the graſs in the ſpring, have been fat early in the ſeaſon. This is not an inconſiderable advantage, in places where the graſs is generally backward in its growth.

This plant has alſo a very great ſuperiority over turnips; namely, that the crop is not ſo liable to fail: for as the carrots are ſown in the ſpring, the plants generally come up well; and unleſs the months of June and July prove very bad, there is no danger of their ſucceeding: whereas turnips are frequently deſtroyed by the fly at their firſt coming up; and in dry autumns they are attacked by the caterpillars, which lay waſte whole fields in a ſhort time. But carrots are not preyed upon by either of theſe vermin. Every farmer who has a ſtock of cattle or ſheep, ſhould therefore always have good ſtore of theſe roots, if he has land proper for the purpoſe, which muſt be light, and of a proper depth, to admit the roots running down.

In preparing of the land for carrots in the open field, if it has not been in the tillage before, it ſhould be ploughed early in autumn, and then ploughed acroſs again before winter, laying it up in ridges to mellow by the froſt; and if the ground is poor, ſome rotten dung ſhould be ſpread over it in winter, which ſhou'd be ploughed in before the end of January; then in March, the ground ſhould be ploughed again to receive the ſeeds; in the doing of which ſome farmers have two ploughs, one following the other in the ſame furrow, ſo that the ground is looſened a foot and a half deep, or more; others have men with ſpades following the plough in the furrows, turning up a ſpit of earth from the bottom, which they lay upon the top, levelling it ſmooth, and breaking the clods; the latter method is attended with a little more expence, but is much preferable to the firſt; becauſe in this way the clods are more broken, and the ſurface of the ground is laid much evener.

If the land has been in tillage before, it will require but three ploughings: the firſt juſt before winter, when it ſhould be laid in high ridges for the reaſons above given; the ſecond croſs ploughing ſhould be in January, after which, if it be well harrowed to break the clods, it will be of great ſervice: the laſt time muſt be in March to receive the ſeeds; this ſhould be performed in the manner already mentioned: after this third ploughing, if there remain great clods of earth unbroken, it will be proper to harrow it well before the ſeeds are ſown. One pound and a half of ſeed will be ſufficient for an acre of land; but as they are apt to adhere together, they are more difficult to ſow than moſt other ſeeds; ſome therefore mix a quantity of dry ſand with their ſeeds, rubbing them well together, ſo as to ſeparate the carrots from one another, which is a good method. After the ſeeds are ſown they muſt be gently harrowed in to bury them; and when the plants come up they ſhould be hoed in the manner above directed, with this caution, to leave the plants at a greater diſtance. *Miller's Gard Dict.*

The ingenious M. Chateauvieux tells us, that having cultivated ſome carrots in the open field, according to the principles of the new huſbandry, found, when they were taken up, which was done on the 8th of November, that they were from eighteen to twenty, and ſome twenty-five inches long, and from two and a half to three and a half, and ſome four inches in diameter, and weighed from twenty-five, to thirty-three ounces each.

The Society for the Encouragement of Arts, &c. being perſuaded that the cultivation of carrots for the food of cattle could not fail of being advantageous to the farmer, publiſhed a premium of twenty pounds to the perſon who ſhould ſow the greateſt number of acres with carrots, for the feeding of cattle only; adding, that it was expected the perſon who received the premium ſhould give an account of the ſoil, culture, time of taking up, and their effects on the cattle fed with them.

This premium was accordingly given in the year 1766 to Mr. Robert Billing, a very intelligent farmer at Weaſenham in Norfolk; he having ſowed thirty acres and two rods of land with carrots, for feeding cattle only. At the ſame time he ſent an account of the methods he uſed in the culture of his carrots, which was ſo well approved of by the Society, that it was publiſhed at their requeſt: an abſtract therefore of this pamphlet muſt, we preſume, be very acceptable to the reader.

Mr. Billing obſerves, that the uſe of carrots for the winter feed of cattle has been long known and practiſed in the eaſtern parts of Suffolk, where it is common to make carrots ſerve the ſame purpoſe turnips have many years done in moſt parts of the county of Norfolk; beſides, that many are ſent from thence to the London market: but carrots never have been ſown in the latter county, for the maintenance of cattle, till he tried a ſmall parcel in the year 1761, and another in the year 1762.

He thought it prudent, he ſays, to make thoſe trials before he became a candidate for the premium offered by the Society; the hopes of deſerving which encouraged him to venture a pretty large and unuſual expence, as well as the loſs of a great part of his winter crop, and which has thus become the means of making known, in his part of the country, a ſpecies of huſbandry with which they had before no acquaintance but by hearſay, being above fifty miles from the country where it had before prevailed.

In the year 1763, he ſowed thirty acres and an half by menſuration.

This quantity of land lying in three parcels, one, of thirteen acres, bore wheat in the year 1762; one, of half an acre only, had borne clover; and the laſt, of ſeventeen acres, turnips that year. The piece of thirteen acres is a cold loamy ſoil, ſhallow, and upon a ſort of loamy gravel. The half acre is a ſoil much mixed, upon a moiſt clay. The ſeventeen acres may be divided into two parts, the one of fourteen acres, and the other of three. Both are a light and dry ſoil, newly improved with a marle; the former, an exceeding good tempered ſoil, upon a marle; the other, a ſhallow black ſand, upon a kind of imperfect grit-ſtone, called, in Norfolk, a carr-ſtone.

Previous to giving an account of the ſucceſs of his crop of carrots, and of the uſe he made of them in feeding cattle, he deſcribes the manner in which he cultivated theſe ſeveral pieces of land, founded as well upon the beſt information he was able to procure, as upon the obſervation afforded him by his own experience of the former year.

The wheat and clover ſtubble he ſplit down with the plough early in the preceding November, and is ſatisfied, from all the obſervations he has made ſince he firſt begun the cultivation, that whether the wheat ſtubble be, as it is called in Norfolk, flat work, or in ridges, or the carrots are to be ſown after clover or rye-graſs, the land cannot be ploughed too early; ſo that the froſt and ſnow may have their full effect in mellowing the ground for the reception of ſo ſmall a ſeed; and this is the more neceſſary to be attended to, the ſtiffer and tougher the ſoil ſhall chance to be.

The land that had been turnips he let alone till the end of January, or beginning of February, thinking this time enough, becauſe the earth was thoroughly cleaned by the cultivation and ſummer hoeing neceſſary for the crop of turnips.

Of the thirteen acres of wheat ſtubble, ſix were dunged for wheat, but not for carrots; four and a half not dunged at all; and two and a half for the carrot crop only. The clover land was dunged for the carrots: and of the ſeventeen acres that had been turnips in 1762, part had been tathed for the turnips, that is, where ſheep have been folded; and the whole crop of turnips was fed off by ſheep and neat cattle.

Four pounds of ſeed on an acre is ſufficient: but as the ſeed is very ſmall, light, and hard to ſeparate and diſperſe equally on the ground, he was at firſt a good deal puzzled how to overcome this difficulty; and though he was adviſed to make uſe of a mixture of ſand, he did not find it anſwer, becauſe the weight of the ſand carried it all to the bottom of the ſeed-cot: he ſows it therefore now unmixed, as they do turnips, after having forced it through a fine chaff-ſieve by rubbing.

It will be three weeks, after ſowing, and ſometimes longer, before the carrots appear: this is the principal advantage, beſides the difference of expence, that turnips have over them, for the latter are not ſown till about Midſummer, and coming quicker to the hoe, get the better of the weeds more eaſily; for weeds do not grow near ſo faſt about Midſummer, as in the ſpring.

The carrots lying a longer time before they come up, and continuing afterwards a long time very weak, they are ſeven or eight weeks before they are fit for the hoe, and in the mean time afford the weeds an opportunity to get ſtrength, in a ſeaſon too, when unluckily they grow the faſteſt: Mr. Billing is therefore of opinion, that though it is neceſſary to ſow carrots before turnips, it is better to ſow them as late as you can with ſafety to the crop; for, of his, thoſe ſown in April on the clover ſtubble came much the ſooneſt to the hoe, though later ſown.

The wheat and clover ſtubble were ploughed three times; the piece after turnips but twice; the firſt time ſhallow, the ſecond as deep as the ſtaple of the ground would permit; and on this ploughing the carrots were ſown.

As it would remove ſome of the objections to a carrot crop, and lighten much the expence of weeding, could they be ſown later; and as this might be done could the ſeed be made to come up ſooner, this ſenſible farmer imagines the ſeed might be ſteeped in ſomewhat that would forward its vegetation, and afterwards ſown, when dry enough to ſeparate.

Yet however expenſive the ſtrength of the weeds in a crop of carrots makes the hoeing of them, the crop itſelf is not apt to ſuffer, for though the young carrots are quite covered in a thicket of weeds before hoeing, and ſhould be buried in earth after the hoeing; yet they ſeem no way hurt if they get clear again, as they generally do in a fortnight after, if not cut off, or buried too deep, for want of ſkill in the labourer.

The Norfolk hoe is ſix inches wide. If the carrots chance to be tolerably clean, they may be hoed the firſt time for eight ſhillings per acre; but if the ground be full of weeds, occaſioned either by much rain, the foulneſs of the ground before ſowing, or the length of the time between the ſowing and hoeing, the firſt hoeing will amount to ten or twelve ſhillings per acre.

About ten days or a fortnight after hoeing, they ſhould be harrowed: this will diſplace the weeds, and prevent their growing again, which many of them will otherwiſe probably do, eſpecially if it be ſhowery weather: the harrowing does not hurt the carrot plants, but, on the contrary, does them much ſervice, by bringing freſh earth to them, as well as killing the weeds.

About three weeks after the harrowing, in caſe it has not perfectly cleared the ground of weeds, or in caſe new weeds come up, Mr. Billing hoes the carrots a ſecond time, which coſts about four or five ſhillings per acre, as the ground is more or leſs foul; and after this, if there ſtill remain any weeds, which will be the caſe if much rain falls during the time of the ſecond hoeing, a ſecond harrowing is beſtowed.

Where the weather has been favourable, and thoſe employed in hoeing have done their duty, the carrots once hoed and harrowed have been as clean as thoſe on which two hoeings, and as many harrowings have been beſtowed.

Mr. Billing next proceeds to inform us of the ſucceſs he had in the year 1763, on the ſeveral parcels of ground already deſcribed. His carrots proved beſt on the piece of two acres and a half that had been wheat, not dunged for the crop of wheat, but dunged for the crop of carrots, and on the half acre clover ſtubble dunged for the carrots.

Many of the carrots out of both pieces meaſured two feet in length, thoſe on the former from twelve to fourteen inches in circumference at the upper end, and thoſe of the latter from twelve to ſixteen; a difference of bulk owing, perhaps, both to the difference of ſoil, and the effect of former crops.

On the two acres and a half Mr. Billing computes he had from twenty-two to twenty-four loads per acre, and about fifty-five, or fifty-ſix cart loads on the whole: the half acre on clover ſtubble produced about twelve loads; the ſix acres and a half dunged for wheat, but not for carrots, produced from eighteen to twenty cart-loads per acre, and in the whole about one hundred and four loads; the four acres not dunged for either wheat or carrots, produced from twelve to fourteen loads per acre, and in the whole fifty-two loads.

He had but an indifferent crop of turnips the ſucceeding year, on the ſeventeen acre piece, but had from ſixteen to eighteen cart-loads per acre of carrots on fourteen acres of it, but a very poor crop on the three remaining acres; ſo that he computes he might have on the ſeventeen acres after turnips not quite two hundred and ſeventy loads, which make, with the former, about five hundred and ten loads of carrots, equal in uſe and effect to near one thouſand loads of turnips, or three hundred loads of hay, as experience has convinced him from the various methods in which he had tried them.

Mr. Billing thinks it is not improbable that he might beſides loſe five or ſix loads, which the poor people took, inſtead of a ſingle load they might have ſtole, had the land been cropped with turnips; but this loſs will be evidently much lightened, ſhould the growth of carrots become general in the country.

The beſt method of drawing the carrots is with a four tined fork, with which a man breaks the ground ſix or eight inches deep, very carefully without injuring the carrots; and is followed by a little boy, who gathers the carrots, and throws them in heaps.

Our farmer began to draw his carrots for uſe about three weeks after Michaelmas; but as the cattle he intended to feed on them had never been uſed to ſo hard food, he thought it beſt to give them, at the ſame time, both cabbages and carrots, leſt they ſhould ſuffer by a diſtaſte at the beginning.

He had about forty load of cabbages growing on one half acre, equal in uſe, as appeared on trial, to about ſeventeen or eighteen loads of carrots. He obſerved, that cattle of every ſort naturally eat the cabbages as readily as they would have done turnips; and ſoon after having gradually learnt to eat carrots, began to prefer them. Both the cabbages and carrots, and afterwards the latter with turnips, were brought from a place where they grew, to a paſture cloſe; and, without any other preparation than ſhaking off the dirt, they were diſperſed on the ground for the cattle to feed on promiſcuouſly.

From the experience Mr. Billing has had in fattening cattle on turnips in houſes or ſtalls, he is perſuaded that by this means the carrots might have been made to go a great deal further; but beſides the great trouble attending this method, eſpecially if the number of beaſts be great, and the hazard of beaſts foundering in the way to London, an accident that often happens to ſtall fed cattle, and that the benefit of their ſtale is loſt to the ground, he is convinced the beef is not ſo good, though perhaps more ſightly.

The firſt ſtock he began to feed in this manner conſiſted of twelve neat beaſts, and forty-nine ſhearing weathers, or thoſe not quite two years old: ten of the former were Norfolk bred ſteers, and began to feed on the firſt carrots he drew: at the ſame time he put on a cow, and a heifer three years old. At old Martinmas Mr. Billing bought ſeventeen Scotch bullocks, which, with a cow from his dairy, made up the number thirty; and ſoon after he increaſed this number to thirty-three, by adding three more from his dairy.

It is, however, to be obſerved, that when the cabbages were ſpent, he allowed a load of turnips each day for ſome time for this ſtock of cattle, which, with three loads of carrots, was a ſufficient proviſion for them. This enabled him to determine, that one load of carrots is nearly equal to two of turnips; for if the cattle had been fed on turnips only, it would have coſt him little leſs than ſeven loads, computing on the experience of many years fattening cattle with turnips; yet he declares he never knew cattle thrive faſter.

Nine of the ſteers were ſold fat in Smithfield on the ſeventeenth of February, and weighed about forty Norfolk ſtone, that is, ſeventy London ſtone, each. Another ſteer and cow were killed in the country, the latter at Weaſenham town, and which died very fat, about the ſame time: the Scotch were ſold at St. Ives about the beginning of May: the ſteers ſold in Smithfield for about ſeven pounds fifteen ſhillings each.

Our farmer being told the market was then low there, ſold all the Scotch, except one, at St. Ives, where they fetched him about ſeven guineas each.

The former coſt about four pounds ten ſhillings each; the latter, three pounds fifteen. The other Scotch he ſent to London, where, though it weighed but a little above ſixty ſtone, it ſold for eight pounds, and was ſaid to be ſome of the fatteſt beef killed in London that winter, as Mr. Billing was informed by Mr. Brownſworth the ſaleſman: the others were not inferior.

The forty-eight weathers were ſold fat at St. Ives in the month of May, at about fifteen ſhillings each.

Theſe thirty-three beaſts, and forty-eight ſheep, brought Mr. Billing, according to his computation, about one hundred and twenty pounds profit; out of which deducting one tenth for the ſhare the cabbages and turnips had in fattening them, which is rather too much, eſpecially as the cattle ſoon began to leave the turnips, there remains one hundred and eight pounds to be carried to the account of the carrots.

The large quantity of carrots our induſtrious farmer had growing gave him alſo an opportunity of trying their uſe in feeding dairy cows, ſheep, horſes, and hogs.

In the month of April he found he ſhould have nine or ten acres to ſpare, beyond what was neceſſary to complete the fattening his bullocks. This happened too at a time when his turnips, as well as thoſe of his neighbours, began to decay, and enabled him to ſupply that defect, to which the Norfolk farmers are very ſubject in the ſpring of the year, and which no method of managing their turnips ever exempted them from, when the weather is wet and froſty by turns; and from this decay the carrots ſeem protected by their hardineſs. From this time he fed his whole dairy of thirty-five cows, and his flock of twenty-one ſcore of ſheep, on carrots.

At the ſame time he thought of a method of getting the carrots out of the ground with more eaſe and expedition than he had done before, which was of great uſe when he had other occaſions for his ſervants; beſides which it alſo prepared the land better for the enſuing crop.

They were ploughed up with a narrow-ſhared wheel plough; going ſlow, the ſhare opened the earth, and cut very few of the carrots; thoſe few being only ſuch as chanced to meet the very point of the ſhare.

The plat, or earth-board, turned moſt of the carrots out of the ground, and, by harrowing afterwards, were moſt of them quite cleared from the earth. Though the roots extended a good way into the ground, and below the pan, he did not think it neceſſary to plough ſo deep, and conſequently the land ſuffered no damage, which otherwiſe it might have done, as ſome few of the carrots inſtead of being turned out, were buried: it is alſo neceſſary to plough the land and harrow it a ſecond time; but though this ſhould be at an interval of a month, the buried roots will take no harm.

Mr. Billing turned his dairy cows and flock of ſheep on this land after the ploughing, without any further trouble or preparation, and had all the reaſon in the world to be pleaſed with the event: both took readily to eating the carrots, though he thinks the cows more ſo than the ſheep.

The former not only gave more milk than is uſual at that time of the year, but many continued to give milk, which would with ſuch turnips as he had then to give them, have been nearly dry. The butter made was likewiſe much better than that from turnips; and both ſheep and lambs did much better than he ever remembers them to have done at this ſeaſon of the year: beſides this, the land was evidently very much improved from the ſtale of the cattle, of which he plainly perceived the benefit in the enſuing crop.

It is proper to obſerve, that in this method, ſome few of the carrots continue buried, even after a ſecond ploughing; but theſe were turned out upon a third ploughing, when barley was ſown, and were clean eaten up by a flock of ſheep, without any injury to the new ſown barley.

In this manner the cows and ſheep were fed for three weeks, which Mr. Billing values at about twenty pounds; and, conſidering how he might have ſuffered, had he wanted turnips, and not been able to ſupply that want with carrots, he thinks, he might value his feed at a great deal more.

In November 1763, he began to feed ſixteen horſes, which did all his farming work, with carrots: they had neither hay nor corn, except his team that carried his corn to Brancaſter, a ſea-port, at fifteen miles diſtance: to this team he allowed a buſhel of oats a day to the whole team: the reſt had nothing beſides carrots, except peaſe-ſtraw and chaff, until the ſowing barley. In April he increaſed their work ſo much, that he thought it neceſſary to give them a few oats; but they continued to ſubſiſt chiefly on carrots, until they were turned to graſs, the latter end of May.

Mr. Billing declares he never knew his horſes in better order, or do their work better; and they were ſo fond of carrots, that he frequently found, that when the team mentioned before were ſo fatigued, that they refuſed to eat their corn, they would eat it when mixed with the carrots chopped.

It may be proper to obſerve, that he always chopped off the heads and tails of the carrots he gave his horſes, and ſometimes gave them another cut. Though he could not find it was neceſſary, he maſhed them alſo for his horſes, none of which trouble he found at all requiſite or even uſeful for other beaſts: the gathering and removing the carrots, and diſperſing them about the paſture-land where he fed his cattle, were ſufficient.

Mr. Billing gave the ſixteen horſes two loads of carrots every week; and theſe two loads, he computes, ſaved him more than a load of hay; which, at twenty-five ſhillings a load, amounted to thirty-five pounds.

To this might be added, the benefit received by the ſwine, to which he threw all the tops and tails of the carrots uſed for the horſes; and they throve exceedingly, and were ſo fond of them, that he could never find that any dirt which might ſtick to them, prevented their eating them: but as the principal part of the food of the ſwine was milk at firſt, and afterwards peaſe, our farmer has not ſet any value on this part of his profit; the total of what he has eſtimated it on the other articles, amounting to one hundred and ſixty-three pounds.

Of the thirty acres and a half, four were ſown in the year 1764, with oats, all the reſt with barley: the four acres were part of the land where he ploughed up the carrots; the reſt of this piece was ſown with barley: both produced a prodigious crop, not leſs than three loads of corn in the ſtraw, per acre: on the reſt of the land his crop was leſs bulky, and ſhorter, yet very good, perhaps not leſs in the quantity of grain than the other. And here it may not be improper to mention, that when in a former year, he had ſown the two ends of a large cloſe with carrots, without dung, and the middle with turnips, for which the land was well dunged, yet, when the whole encloſure was, the next year, ſown with barley, that after the carrots was the beſt.

Another recommendation of carrots is, that our intelligent farmer finds them a more certain crop, both for growth and duration, than turnips: the latter are exceedingly apt to fail, as well as rot, towards the ſpring, when moſt wanted. Perhaps the former is, in ſome meaſure, owing to the lands in Norfolk being, as the farmers expreſs it, ſurfeited with turnips, to which they have been ſo long accuſtomed. But however this be, there are many reaſons for chuſing both, that if one fail, we may rely, for ſo neceſſary a winter proviſion, on the other.

This candid farmer thinks he ought not, however, to conceal, that at the firſt beginning of a new ſort of huſbandry, many difficulties ſtand in the way: the expence is very heavy, much beyond the expence of turnips, and is, perhaps, increaſed by the aukwardneſs of labouring men and ſervants, who are both ignorant and perverſe

perverſe about moſt new employments: beſides this, the cleaning of carrots from weeds is much more neceſſary than of turnips, and yet goes on much ſlower, ſo as ſometimes hardly to be completed: and, moreover, if a long continued froſt ſhould happen, it will be very difficult to get carrots out of the ground (indeed the turnips in this caſe are apt to ſpoil); but this inconvenience may, in ſome meaſure, be prevented, by drawing the carrots before the froſt; though this will be attended with difficulty when the quantity amounts to fifty or a hundred loads.

Such is the account given by Mr. Billing, with regard to the culture and uſe of carrots, for the feeding of cattle. And as theſe experiments were made ſo much at large, the farmer may, without heſitation, adopt this method; and if his ſoil is adapted to the growth of carrots, he need not doubt of greatly increaſing his annual profit. That they are wholeſome feed for cattle has been long known; but that ſuch advantages reſulted from their uſe as Mr. Billing relates, few farmers could have imagined.

Wild Carrot, *Bird's-neſt*, or *Bees-neſt*, the name of a biennial weed common in paſture grounds. It greatly reſembles the cultivated carrot, of which indeed it is only a ſpecies. The wild ſort however differs from the cultivated in its roots, which are ſmall and ſticky. In both ſorts, after they have done flowering, the umbels contract themſelves into the ſhape of a bird's neſt.

CAR SICK, a term uſed in ſome of the northern counties to ſignify the cart-rut, or gutter made by the wheel of a cart or waggon.

CART, a vehicle mounted upon two wheels, and drawn by one or more horſes.

The chief difficulty in the conſtruction of wheel carriages, conſiſts in properly adapting the wheels and axle, which ought to be done in ſuch a manner, that the carriage may move with the leaſt force poſſible. *See the article* Waggon.

CART-LODGE, a ſmall out-houſe for ſheltering carts, waggons, &c. from the weather.

Farmers ſhould be very careful to place their waggons, carts, &c. under proper ſhelter, when out of uſe, as they will laſt twice as long by this means, as they would if expoſed in the yard to all weathers; for as they are thus ſometimes wet, and ſometimes dry, they ſoon rot, and become unfit for uſe.

CART-LADDER, a kind of rack, placed occaſionally at the tail of a cart or waggon, to make it hold the larger quantity of hay, ſtraw, &c.

CART-RAKE, the cart track, or furrow made by the wheels of a cart or waggon.

CART-RUT, the ſame with cart-rake. *See the preceding article.*

CARTWRIGHT, a perſon whoſe buſineſs it is to make carts, waggons, &c. generally called a wheelwright.

CARUE, or Kerue, ſour. Thus to carue, ſignifies to grow ſour, and is generally applied to cream.

CARUNCLE *of the eye*, the fleſhy ſubſtance in the inner corner of a horſe's eye, next the noſe.

CASINGS, or Cow-Blakes, dried cows dung, uſed in ſeveral parts for fewel.

CAST, a flight of birds, inſects, &c. Thus a caſt of bees, ſignifies a ſwarm or flight of bees.

CATCH-FLY, the Engliſh name of a ſpecies of lychnis, now greatly cultivated in gardens.

The double flowering ſort of catch-fly was accidentally obtained from the ſeeds of the ſingle; and has not been known above forty years in the Engliſh gardens. As this ſort never produces ſeeds, ſo it can only be propagated by parting and ſlipping the roots; the beſt time for this is in autumn, at which time every ſlip will grow. If this be performed in September, the ſlips will have taken good roots before the froſt, and will flower well the following ſummer; but if they are expected to flower ſtrong, the roots muſt not be divided into ſmall ſlips, though for multiplying the plant, it is no matter how ſmall the ſlips are. Theſe ſhould be planted on a border expoſed to the morning ſun, and ſhaded when the ſun is warm, till they have taken root. If the ſlips are planted in the beginning of September, they will be rooted ſtrong enough to plant in the borders of the flower-garden, by the middle or latter end of October. The roots of this ſort multiply ſo faſt as to make it neceſſary to tranſplant and part them every year; for when they are ſuffered to remain any longer, they are very apt to rot. It delights in a light moiſt ſoil.

It has the name of catch-fly, from a glutinous liquor, almoſt as clammy as bird-lime, ſweating out of the ſtalks under each pair of leaves; ſo that the flies, which happen to light on theſe places, are faſtened to the ſtalk, where they die.

CATCH-LAND, a name given to ſuch land as is not certainly known to which pariſh it belongs; and therefore the miniſter, who firſt gets the tithes of it, enjoys it for that year.

CATERPILLAR, a general name for all inſects of the butterfly kind, while they continue in their reptile or worm ſtate.

It is well known, that all winged inſects paſs through a reptile ſtate, before they arrive at perfection. This great change from a worm to a fly, or butterfly, was formerly eſteemed a real metamorphoſis, or change of one animal into another; but later diſcoveries have put it beyond all doubt, that the embrio butterfly, with all the lineaments of his parent, is contained within the external caſes, or coverings of the caterpillar. When the included animal has acquired a ſufficient degree of ſtrength, theſe coverings are thrown off, and it appears in its genuine form of a fly, or butterfly. It muſt, however, be obſerved, that before the creature can free itſelf from theſe coverings, it muſt paſs through a ſtate of reſt, called by naturaliſts nymph, or chryſalis ſtate.

Mr. Hitt obſerves, that there are two ſorts of caterpillars, at leaſt thoſe of two colours, which feed upon fruit-trees, the one black, and the other green. The black generally make their appearance in March, if the ſeaſon be dry, upon the pear, apple, and ſeveral other trees.

Sometimes great numbers of them are contained in a ſort of kel, or web, and, if they are to be come at, ſhould be taken off; for otherwiſe they will diſperſe themſelves to all parts of the tree, and there feed upon the bloſſoms, leaves, or their buds, before they are unfolded. After they have lived ſome time in this active ſtate, they generally conceal themſelves in a bunch of leaves, or in a cavity of the rind of a tree, where many of their eggs are hatched the ſame ſummer, and become very deſtructive. There is alſo reaſon to think, that ſome of their eggs are preſerved in thoſe places during the winter, as many of them, and ſome kindled or animated, have been found in old nail holes, and under pieces of dead bark, during the month of February.

The walls ſhould therefore be well waſhed, and the dwarfs and ſtandard trees well dreſſed and cleanſed at that ſeaſon.

The green caterpillars, which may, perhaps, be the ſame with the former at their firſt appearance, till their colour is gradually changed by living wholly on green food, are never ſeen ſo early in the ſpring as the former; but are very prejudicial to both the young branches and fruit of the apricot, cherry, plum, apple, pear, currant, gooſeberry, &c.

They are never ſeen in great numbers together incloſed in a kel or web; but are generally found ſingle, wrapt up in the extremity of a new made branch of the abovementioned trees, or in a bunch of bloſſoms of an apple, pear, or cherry-tree, and ſometimes on an apricot, with a leaf to cover them. Part of their bad effects may be prevented in wall-trees, or dwarfs, whoſe branches are within reach. If they be at the extremity of a branch, it will appear in a round knob, and they generally eat off the part they had wrapt together, which ſpoils the branch the next year. When they have incloſed themſelves in a bunch of bloſſoms, or young fruit, then they prove very deſtructive, by generally eating into all they had joined together, which cauſes much fruit to drop off ſoon after, and others when they are more grown.

Some of thoſe which are but ſlightly eat, will continue upon the tree till the time of gathering; but they never make good fruit, being generally ill taſted, and many times have a white grub within them.

When the caterpillars are firſt perceived upon the wall or dwarf trees, whether before or after they are wrapt up, a brine ſhould be prepared, and the trees ſwept all over with a bruſh or beſom dipt in it. This will deſtroy many of the inſects, by beating ſome off, and killing others. This work ſhould be often repeated, if there be a neceſſity for it, as there generally is in dry ſeaſons. Perhaps a ſmall engine would be the propereſt and moſt effectual inſtrument for this work.

But gentlemen, who have leiſure ſufficient, may eaſily preſerve their fruit-trees from the ravages of caterpillars, by carefully inſpecting them every day in the ſpring; for it will eaſily be ſeen when a bunch of bloſſom-leaves, or young fruit, are joined together by a caterpillar; and, on the firſt diſcovery, the leaves are to be ſeparated by the hand, and the caterpillars killed; this will ſave a young branch or bunch of fruit, which would otherwiſe have been certainly deſtroyed. Whoever perſeveres in this work will never have much of their fruit deſtroyed by ſuch inſects, which experience has ſufficiently demonſtrated to be more deſtructive to the fruit, than any other cauſes that happens in the ſpring, though many will attribute the ſcarcity of fruit to blaſts or lightnings, or to the branches being ſun-burnt, which are the common conſtructions put upon the effects of theſe inſects.

When ſtandard trees are properly ordered with cutting and dreſſing, they will not be much ſubject to be infected with caterpillars; for by taking off the old rind, and cleaning the cankered parts of thoſe trees, many of the inſects are deſtroyed, together with their eggs concealed in thoſe places; and by keeping the branches thin and open, they are more eaſily ſhaken off by the winds. *Hitt on Fruit-Trees, page* 265.

Caterpillars not only deſtroy the leaves and bloſſoms of fruit-trees, but they alſo deſtroy cabbages, and other productions of the garden; and are generally the effect of great drought.

To prevent their numerous increaſe on trees, gather them off in winter, taking away the prickets which cleave to the branches, and burn them; but if they get on cauliflowers or cabbages, take ſome ſalt water, or ſtrong brine, and water the plants with it, and it will kill the inſects: the ſame effect will be produced by taking ſome of the caterpillars themſelves, bruiſing them with garlic, and infuſing the mixture in water; or you may ſmoke them with wiſps of dry ſtraw in March, juſt as the bud begins to open.

In the ſummer while they are yet young, when, either through the coldneſs of the night, or ſome humidity, they are aſſembled together on heaps, you may take and deſtroy them; or you may waſh your trees with water, in which wormwood, tobacco-ſtalks, and coloquintida have been diſſolved; or take lime duſt, and when the wind is high, and the trees wet, ſprinkle the duſt, ſo that the wind may blow it on the trees. *Mortimer's Huſbandry, vol. I p.* 325.

CATKINS, a name given to ſuch flowers as have an aggregate of ſummits hanging down, in the ſhape of a rope, or cat's tail.

CAT's-FOOT, a name given in ſome countries to ground ivy.

CAT's-TAIL, a round ſubſtance growing upon nut-trees.

CATTLE, a general name for beaſts of paſture, that are neither wild nor domeſtic; but generally confined to thoſe of the ox kind.

Cattle are known to be very advantageous to the breeders of them; and therefore thoſe in middling fortune would do well to apply ſome part of their time and farms to this uſeful work: but people in theſe circumſtances, finding it impracticable to make large profits, too often reject, with diſdain, the ſmall advantages continually in their power. In vain the wiſe man informs them, that whoever neglects ſmall profits will daily decay; in vain reaſon dictates, that from a ſmall ſtock, they muſt be contented with ſmall gain; but that a great number of ſmall profits, which it is eaſy to multiply by labour, becomes in a ſhort time an object of conſideration.

It muſt not however be imagined, that in order to derive a conſiderable advantage from cattle, it will be ſufficient to have a great number, and to give them the neceſſary fodder: there are many other circumſtances to be attended to, without which it would be in vain to flatter ourſelves with the expectation of riches. They are often kept in too narrow a cow-houſe, from whence many inconveniencies ariſe. Sometimes they fight, and wound one another. The moſt voracious ſtarve their neighbours, from whom they carry off all the fodder within their reach; and the injured cows decay inſenſibly, become languid, or give little milk. In ſummer the heat incommodes them, a circumſtance which makes them grow lean, and diminiſhes the quantity of their milk. Care muſt therefore be taken that they have ſufficient room in their ſtalls; that they be cool in ſummer, and warm in winter. At all ſeaſons let them be dry, for that is a material point. Even in ſummer, humidity is diſagreeable to them, and in winter it chills them. To prevent this double inconvenience, it will be proper to pave the cow-houſes on a gentle deſcent, and to dig a pit to collect all water and ſtale. By this means the cattle will lye always dry, and the ſtale be collected for good purpoſes. Horned cattle ſometimes contract a habit of licking one another; and that injures ſo much, that a butcher who perceives it, will give leſs money for them than for others. They are cured of this habit, by rubbing the places they have licked with cow dung, the bitterneſs of which prevents them from purſuing it.

We ſhall inſiſt on the advantages attending the breeding of young cattle, whatever trouble it may coſt; becauſe there is no prudent countryman who is not fully perſuaded they are real. To buy what he may have of his own growth is to a farmer no acquiſition, but a diſſipation; becauſe the land produces no money, which is only to be obtained by the ſale of commodities, and very often the purchaſe of ſome goods deſtroys all the profit reſulting from the ſale of others. It ought, therefore, to be an inviolable maxim, eſpecially with thoſe in narrow circumſtances, to ſpare no pains in improving their ſtock, not making ſmall eſtimation of what has coſt them no money, but frugal as if they had bought it. By this means, if we accept unforeſeen accidents, which can never be prevented, they will find wealth flow in upon them annually, though ſlowly, and lay the foundation of a ſolid fortune. *Journal Oeconomique.*

Fattening and feeding CATTLE. Cattle are bought in to fat at ſpring, and about Michaelmas. Thoſe you buy in at ſpring will be fat in July, Auguſt, or September, according as they are forward, and you have keeping for them; and thoſe which you buy in Auguſt, September, or October, muſt be either to ſell in winter or in ſpring, and muſt be forward in fleſh to be improved the beginning of winter, and only kept up in fleſh during the hard time of winter, either with burnet hay, turnips, carrots, &c. to be fit for a good market whenever it offers; or they muſt be young, lean, cattle, that may by their growth pay for their wintering, and to be fit to fat the next ſummer. Some upon ordinary land buy in young Welch heifers, which, if they prove with calf, they ſell in ſpring, with a calf by their ſide for the dairy; and thoſe that are not with calf they fatten: all which ways turn to good account, according as prices fall out; but moſt commonly all meat, either at Chriſtmas or in the ſpring, is one third part dearer than in ſummer: becauſe all have not the conveniency either of hay, turnips, &c. to fatten cattle with in winter; and it is but in a few places, eſpecially near London, which is the chief market for fat cattle, that hay can be afforded to fatten them with; for they reckon an ox, that coſts about ſix pounds, will require about two loads of hay to keep him up all the winter.

For the wintering of cattle, you muſt about September turn out them you deſign to keep up for a winter or a ſpring market, and your cows, that give milk into your rowens, till either ſnow or a hard froſt comes on, as by that means they will need no fodder; but when either ſnow or froſt comes, you muſt give hay to ſuch cows as are near calving, or thoſe that have lately calved, or that give a great deal of milk, and alſo to your fattening cattle. This muſt be done every morning and evening, in proportion to the quantity of rowen you have upon the ground; for the more rowen you have, the leſs quantity of hay will do, and even the ſour graſs which your cattle would not eat before, will, when the froſt hath taken it, become good, ſweet food for them, and what they will eat with pleaſure, if it be not covered ſo deep with ſnow, that they cannot come at it. But for your lean cattle, and thoſe that give but little milk, ſtraw will do well enough to fodder them with; only you muſt obſerve to give barley-ſtraw firſt, and the oat-ſtraw laſt, except you value your milk: if you do, give ſuch cows your oat-ſtraw, provided the quantity of milk they give doth not deſerve hay, or hay be ſcarce with you; for barley-ſtraw will quite dry up the little milk they have, though it is good food for dry cattle. But if your hay and carrots fail you, pour ſcalding hot water upon your malt-duſt, and, when near cold, give it the cows you deſign to continue the milk of, and it will cauſe them to give a great deal, though they eat ſtraw with it. A buſhel, which coſts about three-pence, will be ſufficient for a cow a week. But about London, where they have grains in plenty, they give them to their cows in winter, which makes them give a great deal of milk; but is apt to rot them, if given in too great quantities, and for too long a time.

When your rowen is quite eaten up, which will commonly be about February, you muſt houſe your milch-cows, which you give hay to all night in your cow-houſe, and your other cattle in your yard: for which uſe you ſhould have two yards; one for your cattle which eat ſtraw, with racks and other conveniencies to fodder them in; obſerving to feed them often, and not to give them too much at a time; becauſe when they have blown upon it, they will not eat it; both your yards ought to be well ſheltered, and made as dry as poſſible, and a good deal of ſtraw given them to lye dry and warm in, which is a very great advantage to them, and will greatly increaſe the quantity of your dung.

As to the buying of fat cattle, milch-cows, or lean cattle, experience, and the advice of ſuch perſons as underſtand them are the beſt inſtructors.

For the feeding of land, you may do it with beaſts and horſes together, or with beaſts firſt, and horſes afterwards; and after both put in ſheep. But let not your graſs be too rank before you feed it; for if you do it will be ſour, and your cattle will eat the tops only, ſo that the other part will lie untouched, and rot upon the ground, as hardly any beaſt will eat ſour graſs, till the froſt hath taken it, except Welch heifers. Obſerve alſo, where you have incloſures, to be often changing of your cattle from one paſture to another; for by that means you will give your land an opportunity of getting a freſh head, freſh graſs being a great help to the feeding of cattle. *Mortimer's Huſbandry, vol.* I. *p.* 231.

Cattle are frequently well fed in the winter with rye-ſtraw, mixed with a little hay; with the ſtraw or halm of buck wheat; with the leaves of white beet; with turnips, the turnip-cabbage, carrots, cabbages, burnet, and the bruiſed tops of furze; as may be ſeen under each article. They are alſo well fed and fatted with the cakes of lin-ſeed and rape-ſeed, or cole-ſeed. *See the articles* Cole-Seed *and* Lin-Seed.

It is really ſurprizing that though plants have been conſtantly obvious to the eyes of every man, nothing has been delivered down to us in any book, concerning the kinds of plants proper for the different kinds of cattle; the conſequence of which inattention frequently is, that the farmer, by not diſtinguiſhing and ſelecting the ſeeds of proper graſſes, fills his paſtures with weeds, or, which is here equivalent to them, with bad graſſes, unfit for the nouriſhment of the animal he intends to rear.

The illuſtrious Linnæus in his journey through Dalecarlia in the year 1734, made the firſt attempt to lay down rules for the farmer's direction in this intereſting ſubject. In this journey he obſerved, that the horſes eaſily diſtinguiſhed wholeſome from noxious food; for, being very hungry, they devoured all ſorts of plants, except the meadow-ſweet, valerian, lilly of the valley, angelica, looſe-ſtrife, marſh-cinquefoil, crane's-bill, hellebore, monkſhood, and ſeveral ſhrubs. This gave him a hint to recommend to the curious to apply themſelves to examine what plants ſuch animals as live on vegetables will not touch.

The ingenious author of the Swediſh Pan, in order to encourage inquiries of this kind, very properly obſerves, that we admire the wiſdom of the Creator, which has made ſome vegetables abſolutely diſagreeable to ſome animals, while they are agreeable to others; and plants, which are poiſonous to ſome, are wholeſome to others. This did not happen by chance; it was ordained for wiſe purpoſes: for if the Author of nature had made all plants equally grateful to all kinds of quadrupeds, it muſt neceſſarily have happened, that one ſpecies of them having remarkably increaſed, another ſpecies muſt have periſhed by hunger, before it could have got into better paſture. In like manner we find it contrived in relation to the plants themſelves, which do not all grow in the ſame country and climate; but every plant has its place, in which it grows more abundantly than elſewhere. From hence we may obſerve, that thoſe animals which live chiefly upon particular plants, abound moſt in certain places. Thus one animal leaves that which is poiſonous to itſelf, for another animal, which feeds upon it deliciouſly. Long-leaved water hemlock will kill a cow, whereas the goat browſes on it greedily. Monkſhood kills a goat, but will not hurt a horſe. Parſly is deadly to ſmall birds, while ſheep, hares, rabbits, and ſwine eat it ſafely; and pepper is mortal to ſwine, and wholeſome to poultry." Hunger will often drive animals to feed upon plants which nature never intended for them: but after this has happened once, they become more cautious for the future.

Perhaps many of the terrible diſeaſes to which cattle are ſubject, and which has ſwept away innumerable multitudes, may, in part at leaſt, be owing to the mixture of noxious plants among their food. The great Linnæus was of this opinion; and the following paſſage in the writings of that admired naturaliſt is too intereſting to be omitted in a work of this kind:

“ When I arrived, ſays he, at Tornea, the inhabitants complained of a terrible diſeaſe then raging among the horned cattle, which died by hundreds, ſoon after their being let into the paſtures in the ſpring. They deſired I would conſider this affair, and give them my advice what was to be done, in order to put a ſtop to this evil. After a proper examination, I thought the following circumſtances worth obſerving:

“ 1. That the cattle died as ſoon as they left off winter fodder, and returned to grazing.

“ 2. That the diſeaſe diminiſhed as the ſummer came on; at which time, as well as in the autumn, few died.

“ 3. That this diſtemper was propagated irregularly, and not by contagion.

“ 4. That in the ſpring, the cows were driven into a meadow near the city, and that they chiefly died there.

“ 5. That the ſymptoms varied much, yet agreed in this; that the cattle, in grazing indiſcriminately on all ſorts of herbs, had their bellies ſwelled, were ſeized with convulſions, and in a few days expired with dreadful bellowings.

“ 6. That no man dared to flea the recent carcaſſes; as they found by experience, that not only the hands of ſuch as attempted it, but their faces too, had been inflamed and mortified, and that death had enſued.

“ 7. The people enquired of me, whether there were any kind of poiſonous ſpiders in that meadow; or whether the water, which had a yellowiſh tint, was not noxious.

“ 8. That it was not a murrain was clear, becauſe the diſtemper was not contagious, and becauſe that diſtemper is not peculiar to the ſpring. I ſaw no ſpiders but what are common all over Sweden; and as to the water, the ſediment at the bottom, which cauſed the yellowneſs, was nothing but what came from iron.

“ 9. I was hardly got out of the boat which carried me over the river into the meadow, before I gueſſed the real cauſe of the diſeaſe; for I there beheld the long-leaved water hemlock. My reaſons for gueſſing this were the following:

“ 10. Becauſe in that meadow where the cattle firſt fell ill, this poiſonous plant grows in great plenty, chiefly near the banks of the river. In other places it was ſcarce.

“ 11. The leaſt attention will convince us, that brutes ſhun whatever is hurtful to them, and diſtinguiſh poiſonous plants from thoſe which are ſalutary, by natural inſtinct; ſo that this plant is not eaten by them in the ſummer and autumn, which is the reaſon that few cattle died in theſe ſeaſons; thoſe only which eat of it by accident, or were driven to it by extreme hunger.

“ 12. But when they are let into the paſtures in the ſpring, partly from their greedineſs after freſh herbs, and partly from the hunger they had undergone during the winter, they devour every green thing that comes in their way. It alſo happens that herbs, at this ſeaſon, are ſmall, and ſcarcely ſupply food in ſufficient quantity. They are beſides more juicy, are covered with water, and ſmell leſs ſtrong; ſo that what is noxious is not eaſily diſcerned from what is wholeſome. I obſerved likewiſe, that the radical leaves were always bitter, and the others not, which confirms what I have juſt ſaid.

“ 13. I ſaw this plant in an adjoining meadow mowed along with graſs for winter fodder; and therefore it is no wonder, that ſome cattle, though but a few, ſhould die of it in the winter.

“ 14. After I left Tornea, I ſaw no more of this plant, till I came to the vaſt meadows near Limmingen, where it appeared along the ſides of the road; and when I got into the town I heard the ſame complaints as at Tornea, of the annual loſs of cattle, with the ſame circumſtances.

“ 15. It would therefore be worth while to eradicate carefully theſe plants, which might eaſily be done, as they grow on marſhy grounds, and generally by the ſides of pools and rivers. But if this cannot be performed, the cattle ſhould not be ſuffered to go into ſuch places, at leaſt during the ſpring: for I am perſuaded that later in the year they can diſtinguiſh this plant by the ſmell alone.” *Lin. Flora Lapponica.*

Were experiments carefully and judiciouſly made on the above beneficial plan, we ſhould ſoon know with certainty what ſpecies of animals any paſture affords the beſt nouriſhment for. We ſee, for example, heifers fall away in encloſures, where the meadow-ſweet grows in abundance, and covers the ground ſo that they can hardly make their way through it: while the country people, imagining that the paſture is too rich for them, are quite amazed, and never dream that the meadow-ſweet affords them no nouriſhment: whereas the goat, which ſtands bleating on the other ſide of the hedge, is not ſuffered to go in, though he longs to be browzing upon this plant, which is to him a moſt delicate and nouriſhing food. Long experience has taught us, that ſheep take up poiſon in marſhy grounds, though no one till lately knew what the particular poiſon was: yet the ſpider-wort, the mouſe-ear ſcorpion graſs, the mercury, the ſun-dew, the hairywood-graſs, the leſſer ſpearwort, and the butterwort, have evidently ſuſpicious marks.

Hence we ſee, that what makes low grounds ſo noxious to ſheep is not wholly the moiſture, but the plants which grow there; for it is remarked by ſhepherds, that the great danger to ſheep is immediately after a freſh ſpring of graſs, when it is natural to think they lick up the young and tender ſhoots of poiſonous plants along with their proper food, not being then able to diſtinguiſh the one from the other.

From obſervations of this kind the huſbandman may form a right judgment of his meadows, and turn into each the animals beſt adapted to the nature of the paſture.

“ The induſtrious farmer, ſays the author of the Swediſh Pan, may judge from hence, when he ſows his meadows with hay-ſeeds for paſture, that it is not indifferent what kind of ſeeds he chooſes, as the vulgar inadvertently think: for ſome are fit for horſes, other for cows, &c. Horſes are nicer in chooſing than any of our cattle. Plants, whoſe ſeeds grow in pods, are particularly reliſhed by them. Goats feed upon a greater variety of plants than any other cattle; but then they chiefly hunt after the extremities and flowers. Sheep, on the contrary, paſs by the flowers, and eat the leaves. And again, different animals have different diſpoſitions as to grazing more or leſs near to the ground. The huſbandman, who underſtands theſe things, and who, in conſequence thereof, knows how to lay out his lands, ſo as to aſſign to each ſort of cattle its proper food, will neceſſarily have his flocks and herds healthier and fatter, than he who is unacquainted with theſe principles. The good manager will alſo obſerve the ſame precautions in the making of his hay: for although many herbs are eaten when dry, which would be refuſed while green, it does not from thence follow, that they yield good nouriſhment. Much might be added concerning the propenſity of cattle to this or that plant: for example, that ſheep delight above all things in the feſcue graſs, and grow fatter upon it, than on any other kind of graſs; that goats prefer certain plants, but, being led by an inſtinct peculiar to themſelves, they ſearch more after variety, and do not willingly ſtick long to any one kind of food; that geeſe are particularly fond of the ſeeds of feſcue graſs; that ſwine hunt greedily after the roots of bullruſh, while they are freſh, but will not touch them when they are dry.” *N. Haſſelgren. Amœnit. Academ. Suec. tom.* II.

If a farmer, ſays the intelligent Mr. Liſle, intends to graze cattle in a hill country farm, theſe three things are eſpecially to be regarded; firſt, to raiſe a good quantity of French graſs for hay and aftermaths. Secondly, to turn a good quantity of hill country meadow into rich paſture, by feeding it, dunging it, and laying on it other manure, to make it fit for raiſing the bullock or heifer in the ſpring, when he comes firſt from hay into graſs-leaſe, and to receive him with a vigorous aftermath, when other graſſes, as clovers, and French graſs aftermath, goes off. Thirdly, to have hovels in your bartons, incloſed with cloſe court-walls, to ſhelter your cattle in the winter from wind and rain. All theſe three things are neceſſary and uniform, correſponding with one another; without them, grazing muſt be carried on very defectively, and to little profit, by the hill country farmer.

By the methods here preſcribed, in order to the fattening of cattle, plenty of French graſs hay will enable the grazier to purchaſe barren beaſts before the ſpring graſs comes, when it is moſt likely they will be cheap, and may be bought to the beſt advantage, allowing the value of the hay they may eat in conſideration with the purchaſe; and if by winter-hayning ſome meadow ground (after it has been kept high in heart, by feeding and ſoiling it) you can early in the ſpring, by April, or ſooner, have a bite to take off ſuch grazing beaſts from hay to graſs, it will be very advantageous before clovers can be ready, which are ſeldom ſo, in the hill country, till a week or fortnight in May; and by hayning up ſuch meads for an aftermath, which towards the end of ſummer are in very good heart, you will ſupport your bullock, and carry him on when the ſpirit of other graſſes fail. Then ſuch cattle as are unfiniſhed being brought to French graſs hay, and tied up under hovels or coverings, and within court-walls, will proceed in thriving by being ſecured from the wind and rain, and the tedious hill country rimes, that often continue whole winter days, all which makes cattle brought from graſs to pitch, and maſhes them out. Beſides, if you have not plenty of French graſs hay, you cannot make the beſt of a milch-cow that warps, or of a cow that towards the latter end of winter you may perceive proves barren, or of a fat cow that caſts her calf before you kill her. The neceſſity of French graſs hay only, and not of clover hay, is mentioned here, becauſe it is ſuppoſed that the hill country farmer, who provides ſtore of French graſs hay, will be wiſe enough not to mow his clover, to feed them, in order to improve his lands; for the hill country farmers have generally ſo much land for their money, that all they can do is little enough to keep their arable land in ſuch heart as it ought to be in for their profit.

If the foregoing cautions are not obſerved, the ill conſequences that will follow muſt be ſuch as theſe: if the firſt of the three foregoing cautions be diſregarded, your cattle cannot at any time of the year be made fat, as they ought to be, and then you muſt be under the neceſſity of ſelling them half fat, of which neceſſity the buyer never fails to take the advantage; and ſell them you muſt, notwithſtanding there be ever ſo fair a proſpect of prices riſing in a month or two; and you will commonly find, that you have nothing for the meat they have eat whilſt they have been fattening. In the ſecond place, we will ſuppoſe that very few will be ſo unwiſe, as to begin to fat a beaſt in October with hay, and ſo to keep him upon hay during the winter: but we may reaſonably ſuppoſe, that warping beaſts, barren heifers, &c. may, and commonly are begun to be fatted with hay from Chriſtmas, in which caſe, though hay be plenty, yet if an early ſpring graſs be wanting, ſuch cattle muſt be kept on it, at leaſt, till the middle of May; for till then, in the hill country, it will not give a beaſt a bite, and then commonly, where the maſter is at a loſs and diſappointed, the cattle evidently ſuffer before he can make the moſt of them, and, in this caſe, he will find a beaſt plainly pitch before he can find a purchaſer for him. Again, if early ſpring graſs be wanting, you cannot begin ſummer fattening of cattle, nor buy a barren heifer till towards the middle of May, and then they are commonly very dear; and, in the hill country, from ſo late a beginning, the ſummer graſs will hardly fat a beaſt, the ground falling early off its ſtrength, being generally poor. And then, if you have not a quick growing aftermath treaſured up, by keeping ſuch ground as was formerly meadow in good heart for that purpoſe, it is plain you muſt again run into the firſt evil; and, if you have ſuch an aftermath, you may again often want hay in November and December, to finiſh ſummer fatted beaſts: ſo that plenty of hay is always neceſſary, &c. And, laſtly, though you have both hay and graſs, if you want winter ſhelter, the cattle muſt ſuffer.

All fattening cattle, whether lambs, ſheep, barren cows, or oxen, require a proportionable progreſſion from coarſer to better food, as they grow more and more into good fleſh; otherwiſe when half fat they will go back, and you will not without great difficulty raiſe them again, which will be a great loſs; nor will ſuch beef ſpend kindly.

A gentleman, who would make a good hill country grazier, ought, againſt the time he buys in his heifers, to take care to be provided with an overplus ſtock of middling good hay, or of winter vetches, or of barley ſtraw, and autumn graſs, mixed together, layer and layer of each. Be it what it will, it ought to be at leaſt better than barley ſtraw; for he is to ſuppoſe he has bought barren heifers, which have been kept all the winter upon ſtraw: if they have been kept better, for inſtance, on ſtraw and rowet, there is ſtill the greater reaſon for him to mend their keeping; and he is, from the time of buying, to conſider, that he ought to begin to raiſe them in fleſh; for the better caſe they are in when turned to ſpring graſs, they will take to fattening the kinder, and bear their firſt ſcouring the better. If he could turn them into the field, for an hour or two in the day, where there is a little rowet, it would do well, and to have change of the above dry meats would keep them the better to their ſtomachs.

Oxen are turned off to fattening at two ſeaſons of the year, which, in ſeveral reſpects, are very convenient. The firſt is about May-day, when the labour of the ox is pretty well over for the ſpring ſeaſon, the ſpring corn being then generally all ſown. The ſecond is the beginning of winter, namely, from the firſt of October, to the middle of November, when the wheat and winter vetches are generally all ſown, and the ploughman's hurry relaxes.

Oxen turned out at May-day will hardly get fat before Chriſtmas, and if not turned out till June, will not be fat till March, April, or May; which again falls out very fortunately, becauſe from Chriſtmas till the latter end of May cow-beef is very ſcarce, and is generally ſupplied with ox-beef; but then it is obvious, when an ox gets half, or three quarters fat by or before winter, he muſt be ſupported and carried on by a great quantity of hay, and that very good, for the beaſt will then grow nice.

Thoſe that are turned from the plough in October and November, ordinary food will ſerve for ſome time; for ſhould you lay the beſt hay before ſuch an ox, then hungry and poor, he will devour more than the profit. The moſt you can propoſe by this method is to get him fat by July, inſtead of September or October; during all which interval of time, heifer-beef will be plenty, and ſink the price of ox-beef; ſo chargeable a method therefore will not quit coſts.

What the grazier ought to do in this caſe is to bring his ox eaſily and gently into good fleſh by a rowet; for which purpoſe he ought to have hayned up his grounds, and of which rowet he ſhould give him the worſt firſt, except it be of ſo ſour a kind as to want the correction of the winter froſts before he will eat it, of which kind ſtubble rowet commonly is, and in ſuch caſe that food muſt be reſerved till then, or rather for young beaſts and milch-cows. He ought to give him variety of dry meat along with his rowet, in which he ſhould conſult his tooth, by flinging before him, alternately, every ſort of good ſtraw, giving now and then a lock of winter vetches, or coarſe hay, but of every thing good in its kind, *i. e.* ſweet and well made; and thus the ox ought to be carried on throughout the winter. About the beginning of March he ought to have better hay; not only becauſe the rowet may be ſuppoſed to be all gone, but alſo becauſe the ox, mending in fleſh, grows nicer, and will be weary of dry meat, through the tediousneſs of being foddered ſo much with it during the winter; therefore his hay muſt be mended, for not proceeding is going back. Againſt April, if poſſible, a ſhort head of graſs ſhould be got for him in your paſture grounds for cow-cattle, by hayning the paſture in February, that he may have graſs along with his hay, as was before obſerved in the fattening of barren heifers; and againſt May a head of hop clover muſt be in readineſs, in the hill country, to receive him into his firſt full grazing; for it is not to be ſuppoſed that the meadows of the hill country, which according to this ſcheme are to be converted into paſture, can be fit before the firſt of June to entertain a grazing ox; and it is alſo to be noted, that in the hill country, in the month of May, hop-clover will not afford a good bite for an ox or cow, unleſs the autumnal bud be hayned, and preſerved by being fed by ſheep: in the month of May, if it ſhould prove a dry ſpring, the fattening oxen and cows muſt alſo have good hay given them, with their hop-clover, if it be ſhort.

Fattening in the hill country, eſpecially if you give your cattle hay in the winter, is more chargeable than in the vale; not only becauſe hay is dearer there, but alſo becauſe the winter ſeaſon begins a month ſooner, and continues a month later in the former than in the latter. The farmer in the hill country muſt likewiſe, by forcing nature as it were, provide rowet and ſeveral ſorts of graſſes in their due order, exactly accommodated to the ſeaſon of the year, beſides winter meat, &c. Whereas all may be procured by the latter in the natural courſe, with very little care and trouble.

It will be neceſſary to obſerve, that every hill country grazier goes to work without his tools, who does not lay down from fifty to an hundred acres of land proper for it, with French graſſes, not only on account of making up the deficiency of the meadows not laid down to paſture, being converted to other uſes, but alſo to anſwer many other demands. *Liſle's Obſervations in Huſbandry, vol.* II. *pag.* 18.

A ſtalled ox in the winter, if he be kept to hay only, will eat at leaſt a load every two months. *Ibid. p.* 5.

Fourteen pounds weight of hay is the conſtant allowance on the road to every fat beaſt that is drove to London; they that entertain cattle fling fourteen pounds of hay for each beaſt into the rack in the evening when they come into the inn, which is to ſerve alſo next morning for their breakfaſt; ſo that half a tod, or ſeven pounds of hay, is ſuppoſed ſufficient for a fat ox's bait at night, and the ſame in the morning. *Ibid. pag.* 9.

For the manner of feeding and fattening cattle with cabbages, carrots, turnips, turnip-cabbages, &c. *See the articles* CABBAGE, CARROTS, *&c.*

CAULIFLOWER, or COLLIFLOWER, a ſpecies of cabbage, lately ſo far improved in England, as to exceed in goodneſs and magnitude thoſe produced in moſt parts of Europe.

Having procured a parcel of good ſeed, you muſt ſow it about the twenty-firſt of Auguſt, upon an old cucumber or melon-bed, ſifting a little earth over the ſeeds, about a quarter of an inch thick; and if the weather ſhould prove extreme hot and dry, you ſhould ſhade the bed with mats to prevent the earth from drying too faſt, and give it gentle waterings, as you may ſee occaſion. In about a month's time after ſowing, your plants will be fit to prick out; you ſhould therefore put ſome freſh earth upon your cucumber or melon-beds, or, where theſe are not to be had, ſome beds ſhould be made with a little new dung, which ſhould be trodden down cloſe, to prevent the worms from getting through it; but it ſhould not be hot dung, which would be hurtful to the plants at this ſeaſon, eſpecially if it proves hot; into this bed you ſhould prick your young plants, at about two inches ſquare, obſerving to ſhade and water them at firſt planting; but do not water them too much after they are growing, nor ſuffer them to receive too much rain, if the ſeaſon ſhould prove wet, which would be apt to make them black ſhanked, as the gardeners term it, which is no leſs than a rottenneſs in their ſtems, and is the deſtruction of the plants ſo affected.

In this bed they ſhould continue till about the thirtieth of October, when they muſt be removed into the place where they are to remain during the winter ſeaſon, which, for the firſt ſowing, is commonly under bell or hand-glaſſes, to have early cauliflowers, and theſe ſhould be of an early kind; but in order to have a ſucceſſion during the ſeaſon, you ſhould be provided with another more late kind, which ſhould be ſown four or five days after the other, and managed as was directed for them.

In order to have very early cauliflowers, you ſhould make choice of a good rich ſpot of ground, that is well defended from the north, eaſt, and weſt winds, with hedges, pales, or walls; but the firſt is to be preferred, if made with reeds, becauſe the winds will fall dead in theſe, and not reverberate as by pales, or walls. This ground ſhould be well trenched, burying therein a good quantity of rotten dung; then level your ground; and if it be naturally a wet ſoil, you ſhould raiſe it up in beds about two feet and a half, or three feet broad, and four inches above the level of the ground: but if your ground is moderately dry, you need not raiſe it at all: then plant your plants, allowing about two feet ſix inches diſtance from glaſs to glaſs, in the rows, always putting two good plants under each glaſs, which may be at about four inches from each other; and if you deſign them for a full crop, they may be three feet and a half, row from row: but if you intend to make ridges for cucumbers between the rows of cauliflower plants, as is generally practiſed by the gardeners near London, you muſt then make your rows eight feet aſunder.

When you have planted your plants, if the ground is very dry, you ſhould give them a little water, and then ſet your glaſſes over them, which may remain cloſe down over them, until they have taken root, which will be in about a week or ten day's time, unleſs there ſhould be a kindly ſhower of rain; in which caſe you may ſet off the glaſſes, that the plants may receive the benefit of it; and in about ten days after planting, you ſhould be provided with a parcel of forked ſticks or bricks, with which you ſhould raiſe your glaſſes about three or four inches on the ſide towards the ſouth, that your plants may have free air: in this manner your glaſſes ſhould remain over the plants, night and day, unleſs in froſty weather, when you ſhould ſet them down as cloſe as poſſible: or if the weather ſhould prove very warm, which many times happens in November, and ſometimes in December; in this caſe, you ſhould keep your glaſſes off in the day time, and put them on only in the night, leſt, by keeping the glaſſes over them too much, you ſhould draw them into flower at that ſeaſon; which is many times the caſe in mild winters, eſpecially if unſkilfully managed.

Towards the latter end of February, if the weather proves mild, you ſhould prepare another good ſpot of ground, to remove ſome of the plants into, from under the glaſſes, which ſhould be well dunged and trenched, as before; then ſet off your glaſſes, and, after making choice of one of the moſt promiſing plants under each glaſs, which ſhould remain for good, take away the other plant, by raiſing it up with a trowel, &c. ſo as to preſerve as much earth to the root as poſſible; but have a great regard to the plant that is to remain, not to diſturb or prejudice its roots: then plant the plants which you have taken out, at the diſtance before directed, viz. if for a full crop, three feet and an half, row from row; but if for ridges of cucumbers between them, eight feet, and two feet four inches diſtance in the rows: then, with a ſmall hoe, draw the earth up to the ſtems of the plants which were left under the glaſſes, taking great care not to let the earth fall into their hearts; and ſet your glaſſes over them again, raiſing your props an inch or two higher than before, to give them more air, obſerving to take them off whenever there may be ſome gentle ſhowers, which will greatly refreſh the plants.

In a little time after, if you find your plants grow ſo faſt as to fill the glaſſes with their leaves, you ſhould then ſlightly dig about the plants, and raiſe the ground about them in a bed broad enough for the glaſſes to ſtand, about four inches high, which will give your plants a great deal of room by raiſing the glaſſes ſo much higher, when they are ſet over them; and by this means they may be kept covered until April, which otherwiſe they could not, without prejudice to the leaves of the plants: and this is a great advantage to them; for many times we have returns of ſevere froſts at the latter end of March, which prove very hurtful to theſe plants, if expoſed thereto, eſpecially after having been nurſed up under glaſſes.

After you have finiſhed your beds, you may ſet your glaſſes over your plants again, obſerving to raiſe your props pretty high, eſpecially if the weather be mild, that they may have free air to ſtrengthen them, and in mild ſoft weather ſet off your glaſſes, as alſo in gentle ſhowers of rain: and now you muſt begin to harden them by degrees to endure the open air; however, it is adviſable to let your glaſſes remain over them as long as poſſible, if the nights ſhould be froſty, which will greatly forward your plants: but be ſure do not let your glaſſes remain in very hot ſun-ſhine, eſpecially if their leaves preſs againſt the ſides of the glaſſes; for I have often obſerved, in ſuch caſes, that the moiſture which hath riſen from the ground, together with the perſpiration of the plants, which, by the glaſſes remaining over them, hath been detained upon the leaves of the plants, and when the ſun hath ſhone hot upon the ſides of the glaſſes, hath acquired ſuch a powerful heat from the beams thereof, as to ſcald all their larger leaves, to the no ſmall prejudice of the plants: nay, ſometimes I have ſeen large quantities of plants ſo affected therewith, as never to be worth any thing after.

If your plants have ſucceeded well, towards the end of April ſome of them will begin to fruit; you muſt therefore look over them carefully every other day, and when you ſee the flower plainly appear, you muſt break down ſome of the inner leaves over it to guard it from the ſun, which would make the flower yellow and unſightly, if expoſed thereto; and when you find your flower at its full bigneſs, which you may know by its outſide parting, as if it would run, you muſt then draw it out of the ground, and not cut them off, leaving the ſtalk in the ground, as is by ſome practiſed; and if they are deſigned for preſent uſe, you may cut them out of their leaves; but if deſigned to keep, you ſhould preſerve their leaves about them, and put them into a cool place: the beſt time for pulling them is in a morning, before the ſun hath exhaled the moiſture; for cauliflowers, pulled in the heat of the day, loſe that firmneſs which they naturally have, and become tough.

But to return to our ſecond crop, the plants being raiſed and managed as was directed for the early crop, until the end of October, you muſt then prepare ſome beds, either to be covered with glaſs frames, or arched over with hoops, to be covered with mats, &c. Theſe beds ſhould have ſome dung laid at the bottom, about ſix inches or a foot thick, according to the ſize of your plants; for if they are ſmall, the bed ſhould be thicker of dung, to bring them forward; and ſo *vice verſa*. This dung ſhould be beat down cloſe with a fork, in order to prevent the worms from finding their way through it; then lay ſome good freſh earth about four or five inches thick thereon, in which you ſhould plant your plants about two inches and a half ſquare, obſerving to ſhade and water them until they have taken new root; but be ſure do not keep your coverings cloſe, for the warmth of the dung will occaſion a large damp in the bed, which, if pent in, will greatly injure the plants.

When your plants have taken root, you muſt give them as much free open air as poſſible, by keeping the glaſſes off in the day time, as much as the weather will permit; and in the night, or at ſuch times as the glaſſes require to be kept on, raiſe them up with props to let in freſh air, unleſs in froſty weather; at which time the glaſſes ſhould be covered with mats, ſtraw, or peaſe haulm, &c. but this is not to be done but in very hard froſts. You muſt alſo obſerve to guard them againſt great rain, which in winter time is very hurtful to them; but in mild weather, if the glaſſes are kept on, they ſhould be propped to admit freſh air; and if the under leaves grow yellow, and decay, be ſure to pick them off; for if the weather ſhould prove very bad in winter, ſo that you ſhould be obliged to keep them alſo covered for two or three days together, as it ſometimes happens, theſe decayed leaves will render the incloſed air very noxious; and the plants, perſpiring pretty much at that time, are often deſtroyed in vaſt quantities.

In the beginning of February, if the weather be mild, you muſt begin to harden your plants by degrees, that they may be prepared for tranſplantation. The ground where you intend to plant your cauliflowers out for good, which ſhould be quite open from trees, &c. and rather moiſt than dry, having been well dunged and dug, ſhould be ſown with radiſhes a week or a fortnight before you intend to plant your cauliflowers. The reaſon why I mention the ſowing of radiſhes particularly, is this, viz. that if there are not ſome radiſhes amongſt them, and the month of May ſhould prove hot and dry, as it ſometimes happens, the fly will ſeize your cauliflowers, and eat their leaves full of holes, to their prejudice, and ſometimes their deſtruction; whereas, if there are radiſhes upon the ſpot, the flies will take to them, and never meddle with the cauliflowers ſo long as they laſt. Indeed, the gardeners near London mix ſpinage with their radiſh-ſeed, and ſo have a double crop; which is an advantage where ground is dear, or where perſons are ſtraitened for room: otherwiſe it is very well to have only one crop amongſt the cauliflowers, that the ground may be cleared in time.

Your ground being ready, and the ſeaſon good, about the middle of February you may begin to plant your cauliflowers. The diſtance which is generally allowed by the gardeners near London (who plant other crops between their cauliflowers to ſucceed them, as cucumbers, for pickling, and winter cabbages) is every other row, four feet and a half a part, and the intermediate rows two feet and a half, and two feet ten inches diſtance in the rows; ſo that in the latter end of May, or the beginning of June, when the radiſhes and ſpinage are cleared off, they put in ſeeds of cucumbers for pickling, in the middle of the wide rows, at three feet and a half apart; and in the narrow rows, plant cabbages for winter uſe, at two feet two inches diſtance; ſo that theſe ſtand each of them exactly in the middle of the ſquare between four cauliflower plants, and theſe, after the cauliflowers are gone off, will have full room to grow, the crop, by that means, continuing in a ſucceſſion thro' the whole ſeaſon.

There are many people who are very fond of watering cauliflower plants in ſummer; but the gardeners near London have almoſt wholly laid aſide this practice, as finding a deal of trouble and charge to little purpoſe; for if the ground be ſo very dry, as not to produce tolerably good cauliflowers without water, it ſeldom happens, that watering of them renders them much better; and when once they have been watered, if it be not conſtantly continued, it had been much better for them if they had never had any; as alſo, if it be given them in the middle of the day, it rather helps to ſcald them; ſo that upon the whole, if care be taken to keep the earth looſe and drawn up to their ſtems, and every thing be cleared away that grows near them, that they may have a free open air, you will find that they will ſucceed better without than with water, where any of theſe cautions are not ſtrictly obſerved.

But in order to have a third crop of cauliflowers, you ſhould make a ſlender hot-bed in February, in which you ſhould ſow the ſeeds, covering them a quarter of an inch with light mould, and covering the bed with glaſs frames. When the plants are come up, and have gotten four or five leaves, you ſhould prepare another hot-bed to prick them into, at about two inches aſunder every way; and in the beginning of April harden them by degrees, to fit them for tranſplantation, which ſhould be done the middle of that month, at the diſtance directed for the ſecond crop, and muſt be managed accordingly. Theſe, if the ſoil be moiſt where they are planted, or the ſeaſon be cold and moiſt, will produce good cauliflowers about a month after the ſecond crop is gone, whereby their ſeaſon will be greatly prolonged.

There is alſo a fourth crop of cauliflowers, which is raiſed by ſowing the ſeed about the twenty-third of May; and being tranſplanted, as before directed, will produce good cauliflowers in a kindly ſeaſon and good ſoil, after Michaelmas, and continue through October and November, and, if the ſeaſon permit, often a great part of December. *Miller's Gard. Dict.*

CAUTERY, a name given to a red hot iron, uſed by farriers, to deſtroy fungous fleſh, &c.

CAUTING-IRON, an iron with which farriers ſear thoſe parts of a horſe that require burning.

CELERIAC, a ſpecies of celery which ſhould be ſown at two or three different times, in order to have, during the whole ſeaſon, a ſucceſſion of plants which do not run up to ſeed. The firſt ſowing may be in the beginning of March, in which caſe it ſhould be upon a gentle hot-bed, on account of the rawneſs of the weather at that ſeaſon. The ſecond may be at the end of the ſame month, in an open ſpot of fine rich moiſt and light earth, fully expoſed to the warmth of the ſun: and the third ſhould be by the latter end of April, or the beginning of May, likewiſe on a rich and moiſt ſoil, diſtant from the drip of trees. If this ground be expoſed to the morning ſun only, it will be ſo much the better. Theſe ſeeds muſt be watered frequently, if the weather be dry, for otherwiſe they will not grow; but with this care they will put forth plants in about three weeks or a month, and theſe will be fit to tranſplant in five or ſix weeks after their coming up.

When this is done, they ſhould be pricked out at the diſtance of three inches ſquare from one another, in well prepared, and warmly ſituated beds of moiſt rich earth; and if the ſeaſon ſhould prove cold, theſe beds muſt be covered with mats, to defend the young plants from the morning froſts, which would greatly check their growth, or, perhaps, even kill many of them. In drawing them out of the ſeed-bed, care ſhould be taken to thin them, where they grow too thick, and to leave the ſmalleſt to get more ſtrength before they are removed. By this means the ſame ſeed-bed will afford three different plantings, which will ſucceed each other for uſe.

By the middle of May, ſome of the firſt tranſplanted plants will be fit to remove again for blanching; and in this particular only the culture of celeriac differs from that of celery, the latter being tranſplanted into trenches, and there earthed up, whereas celeriac, which ſeldom grows above eight or ten inches high, and therefore requires but little earthing up, ſhould be planted in level ground, or in very ſhallow drills, its great excellency conſiſting in the ſize of its root, which often grows as big as an ordinary turnip, even in the common way of ſetting theſe plants only ſix or eight inches aſunder in rows, fixteen inches apart, and earthing them up but once. It is therefore highly reaſonable to think, that if the ſuperior method of culture uſed in the new huſbandry was applied to this plant, both the taſte and ſize of the roots would be greatly improved.

CELERY, or Celeri, the name of a well known plant, much uſed in ſoups, and other culinary uſes.

It requires exactly the ſame treatment as celeriac, laid down in the preceding article, till it is tranſplanted for the ſecond time, in order to be blanched. The uſual way of performing this, is to dig a trench by a line, about ten inches wide, and eight or nine inches deep, in a moiſt, rich, and light ſoil; and to looſen and lay level the earth at the bottom of this trench, and to throw up on each ſide a ridge of the mould taken out, that it may be in readineſs there for earthing the celery. Theſe trenches are generally three feet aſunder, which is a ſufficient ſpace for digging between them after they are filled up. When the young plants have been trimmed, and the tops of their longeſt leaves cut off, they are ſet in one ſtrait row in the middle of the bottom of the trench, at about four or five inches diſtance from one another; their roots are then covered with mould trodden down cloſe to them; and care is taken to water them plentifully, till they have ſtruck out new roots. As theſe plants advance in height, freſh earth is drawn in cloſe to them on each ſide, but with great caution not to bury their hearts, or even to do this in wet weather, leſt it ſhould make them rot.

When the plants are grown conſiderably above the trenches, and all the ridges have been employed in earthing them up, a ſpade is uſed to dig up more earth from between their rows, and this is continued, at proper intervals of time, till they are fit for uſe.

The celery firſt planted out will be fit for uſe about the end of July. This will be ſucceeded by the after plantations; and the later ſowings, if rightly managed, will yield a conſtant ſupply of it till April. The laſt crop ſhould be planted in a drier ſoil than any of the preceding; and to prevent its being rotted by much wet in winter, it will be right to cover the ridges, eſpecially if there be any danger of hard froſt, with peas-haulm, or ſome other light covering, which will not ſmother the plants: for covering them too cloſe would alſo make them rot. However, this will be ſufficient to keep the froſt out of the ground, ſo that the celery may be taken up whenever it is wanted; which cannot be done when the earth around it is hard frozen. But this covering muſt be taken off as early in the ſpring as the weather will permit, leſt it ſhould make the plants run to ſeed.

Celery will not continue good above three weeks or a month after it is fully blanched, but will then grow hollow, or rot. A ſucceſſion of ſix or ſeven different plantings is therefore neceſſary for thoſe who would have a conſtant and regular ſupply.

CELLS, the ſmall diviſions in honey-combs, which, geometers have obſerved, to be always regular hexagons.

Cells, alſo denote the hollow places between the partitions in the pods, huſks, and other ſeed-veſſels of plants.

CENTAURY, the name of a weed abounding in arable lands, and generally called blue-bottle. *See* Blue-Bottle.

CERES, a pagan deity, the inventor, or goddeſs of corn.

CERT-MONEY, a fine paid yearly by the reſidents of ſeveral manors to the lord thereof, and ſometimes to the hundred, for the certain keeping of the leet.

CHAFF, the huſks of corn that are ſeparated by thraſhing and winnowing. *See the articles* Thrashing *and* Winnowing.

Chaff alſo ſignifies the rind of corn: thus, barley that has a thick rind is ſaid to be thick chaffed.

Chaff, likewiſe implies ſtraw, &c. cut ſmall, and given to horſes and other cattle, mixed with corn. *See the article* Cutting-Box.

CHALK, the Engliſh name of the white dry marl, with a duſky ſurface, found in hard maſſes.

Chalk is a laſting manure for ſuch lands as it agrees with, which are particularly thoſe of a cold ſour nature, and ſtiff untractable clays. Pliny tells us, it was the cuſtom of the ancient Britons to chalk their lands, by which they received a great and laſting improvement.

Farmers are apt not to diſtinguiſh ſufficiently between the different kinds of chalk. The hard, dry, and firm, is much the fitteſt for burning into lime; but the fat unctuous chalk is by far the beſt to be uſed crude. This oily, viſcous ſort of chalk, is uſed in many places inſtead of marl, to which it is nearly allied, though of an inferior quality. It is even called marl in the Iſle of Wight, where their chalk is of a remarkably fat ſoapy nature; and they ſometimes lay twenty-five waggon-loads of it upon an acre of ground. *Liſle's Huſbandry, vol.* I. *p.* 66.

A correſpondent of the editors of the Muſeum Ruſticum ſtrongly recommends chalk as a manure for clay lands; but adds, it ſhould be laid on rough, in large clods, whereby the land will gradually receive the greater benefit by it. The ſalts in the air will penetrate, and crumble the clods; and the land, on which the chalk is laid, will ſoon be brought into a ſtate of fermentation, reduced and pulverized in a ſpecial manner, inſomuch, that afterwards, one ploughing will go as far towards bringing it into tilth as two before.

The quantity of chalk ſhould be proportioned to the ſtubbornneſs of the ſoil; from fifteen to thirty tumbril-loads on an acre.

The virtues of this manure are not exhauſted under, at leaſt, twenty years; nor are they much perceived till the third year; but for twelve or fourteen years the farmer will have reaſon to thank thoſe who adviſed him to the ſtep of chalking his clay lands: and happy is he who can afford to do it, provided he has a long leaſe; for lands not worth five ſhillings an acre have, by this means been, in a year or two, worth twenty. *Muſeum Ruſticum, vol.* II. *p.* 305.

An old experienced farmer in the hundreds of Eſſex has, in the ſame work, given an excellent account of the benefits reſulting from chalk laid on clay lands, where, he juſtly obſerves, it inſinuates itſelf into the ſmall pores, and, raiſing a fermentation, expoſes the clay more to the operations of the froſts, rain, ſun, and air, by which means its too coherent particles are looſened, and it is reduced to a ſtate of pulverization.

“ We all know, adds this intelligent huſbandman, that clay, when reduced, either by fermentation or attrition, into ſmall and minute particles, is an excellent ſoil for affording plenty of nouriſhment to almoſt every kind of vegetable: it is therefore natural to us, when poſſeſſed of a ſtiff clay, to go in ſearch of means for producing theſe deſirable effects.

“ Chalk has been long allowed the palm in this reſpect: our anceſtors, the ancient Britons, uſed it with great ſucceſs; and the practice, as warranted by conſtant experience, has been handed down to the preſent age: is it not then a pity but a cuſtom ſo profitable ſhould not be made known to every part of his majeſty's dominions?

“ The chalk we uſe in Eſſex is moſtly brought from Kent: it agrees well with our clays, and many fine fortunes have been made in this country by chalking farms: yet what may appear very ſtrange, but is not leſs true, this ſame chalk, when laid on the clayey lands in Kent near the pits, does by no means anſwer the farmer's expectation.

“ It has been a common ſaying among farmers, that chalk laſts only for a certain number of years, after which it leaves the land in a worſe ſtate than that in which it found it: but this is probably a miſtake, owing to prejudice, negligence, or ignorance.

“ When land has been chalked, under a notion it cannot be hurt by cropping, they generally keep it in almoſt conſtant tillage, and it pays well for the ploughings; but then the ſoil being, by ſuch conſtant working, reduced to a pulverized ſtate, the chalk eſcapes through the now-enlarged pores of the clay, and forms a cruſt under the looſe ſtratum on the ſurface of the hard clay beneath, being waſhed down by the rains.

“ The particles of clay, being now deprived of their coatings of chalk, adhere one to the other, enlarge their ſurfaces, and become at length a coherent maſs of ſtiff ſoil, like what it was before the land was chalked at all, not worſe in quality, but nearly in the ſame ſtate. Probably the chief reaſon which induces farmers to think the land impoveriſhed by chalk is, becauſe they have, whilſt the manure acted with its full vigour, been for many years uſed to great crops, forgetting, or perhaps never knowing, what crops the land yielded before any chalk was laid on it.

“ A great deal of care is requiſite in land after it is freſh chalked: if the large lumps are buried before they are ſtrongly impregnated with the influences of the atmoſphere, they will lie under ground undiſſolved, in a hard maſs, for a great number of years, without benefiting the land in the leaſt. For this reaſon, the farmer muſt not be in a hurry to bury his chalk: in fact, the longer it lies above ground the better, as it will then gradually be reduced into an impalpable powder, which, being mixed and incorporated with the clay, leſſens the coheſion of its parts, enlarges its pores, and diſpoſes it to yield that nouriſhment to vegetables, which, in its natural ſtate, it is too retentive of.

“ Clay is, by nature, poſſeſſed of a large ſtock of the food, whatever it be, which plants moſt delight in; but it is a ſtubborn ſoil, and will not, till compelled to it by ſome extraneous cauſe, give forth any of its riches. If it is pulverized by the inſtruments of huſbandry which act by attrition, it becomes a proper bed for the reception of the roots of vegetables; but this pulverization is not to be effected without great expence of time and trouble: and it was the difficulty of this operation that induced our anceſtors to ſearch for ſome eaſier and ſhorter method for reducing the ſolid particles of clay; they effected it by means of fermentation, and this fermentation was raiſed, for the moſt part, by rotten horſe-dung.

“ When this manure became ſcarce, and difficult to be procured, it was neceſſary to have recourſe to ſome other remedy to correct ſtiff ſoils. Chalk was found well adapted to the purpoſe: the uſe of it was after many years almoſt univerſally adopted, and experience has now, for many ages, juſtified the practice.

“ It has been already obſerved, that chalk improves clay, not by adding to it any vegetative quality, but by mixing intimately with its ſubſtance, and leſſening the coheſion of its parts.

“ Let us by way of illuſtration, ſuppoſe any given quantity of clay mixed and incorporated with a proper proportion of chalk, it will be found that the clay will poſſeſs a degree of lightneſs, which nature has denied it. Let this mixed earth be ſpread on a floor expoſed to the weather in winter time; let it be frequently ſprinkled with water, and be ſtirred about ſeveral times a day for ſome months: on an examination, it will then be found, that the chalk has ſubſided, and the clay become more compact than it was, but not ſo compact as it was before any chalk was mixed with it.

“ The ſubſided chalk will form a complete ſtratum under the bed of clay.

“ I have been the more particular in this account, becauſe on the principle of ſubſidence I have founded a practice, which I have experienced to be profitable to myſelf, and therefore I think it not totally improper to be recommended to the notice of others.

“ I had heard it long complained of, that the benefit reſulting from chalk ceaſed after a courſe of years. I always thought, and indeed found, that the chalk ſubſided: this made me form an opinion that the chalk, even after it had ſubſided, might, in part at leaſt, be retrieved; for the earth, which had been looſened to a certain depth, was, at the bottom of the looſe mould, a hard compact body, which the chalk could not penetrate: here therefore it muſt, of courſe, reſt in its ſubſidence, forming a thin coat on this hard body.

“ About forty years ago I chalked the greater part of my farm in the manner preſcribed by the cuſtom of this country. For about fourteen years I enjoyed very good crops; but at the end of that time they began to fail a little. As neceſſity is the mother of invention, I came to a reſolution of trying an experiment on a field of twenty acres: accordingly, when the time came in which it was to receive a whole year's fallow for a crop of wheat, I cauſed the whole of it, ſoon after harveſt, to be ploughed twice in a place, one plough following another in the ſame furrow.

“ By theſe means I turned up an entire new earth, on which I immediately laid in the proportion of about three loads of chalk an acre, ſuffering it to lie rough all the winter.

“ In the ſpring I gave it a ſecond ploughing, and beſtowed on it three more ploughings before Chriſtmas, when I again left it rough for the winter.

“ I muſt not, however, fail obſerving, that in all the ploughings after the firſt, the ſhare went only the ordinary depth.

“ In the ſecond ſpring I raiſed as fine a mould as I could, by various operations, and ſowed the field with barley, of which I had, at harveſt, a crop to my entire ſatisfaction: my next crop was wheat, on which I ſprinkled ſome clover-ſeed, which brought the land into the uſual courſe of huſbandry.

“ The reaſon why my land begins to fail, in about fourteen years after chalking is, becauſe I allow more ploughings to each crop than any of my neighbours, and theſe frequent ſtirrings cauſe the calk, as I imagine, to ſubſide ſooner.

“ My method anſwered ſo well, that I managed all my chalked land in the ſame manner with good ſucceſs; and had, in conſequence, a ſucceſſion of good crops for ten years more.

“ When the ten years were expired, I gave my land another trench-ploughing, which never failing to recover the chalk, I renew it at regular intervals, but lay no freſh chalk on it after the firſt trench-ploughing, being in all the reſt content with what is already in the land.

“ This method has ſtood the teſt of many years experience, and I have not the leaſt reaſon to aſcribe it to any thing peculiar in the quality of my ſoil: why, therefore, ſhould it not ſucceed as well with others as it has done with me?

“ Let me perſuade ſuch of your readers, as it may any ways ſuit, to make the experiment; it cannot be any great expence, and the reſult may turn out very greatly to their advantage.

“ This doctrine of the ſubſidence of chalk is certainly founded on reaſon: the predominant natural ſoil will always precipitate that which is only adventitious, and in ſmaller quantity; for the ſame obſervation holds good when clay is laid on chalk.

“ This ſubſidence may alſo be obſerved when clay is laid on ſand, or ſand on clay, as a manure; and might, perhaps, be extended to many other articles, ſo as to be deemed a general principle.

“ Few know the benefits reſulting, on ſome occaſions, from deep ploughing: but in this, as well as in every other matter, diſcretion is to be the grand guide; and I would, by all means, adviſe the farmer to examine into the depth of his ſoil, by remarking what is thrown out of his ditches, or by the help of a borer. Let him judge by this, and he cannot well go aſtray.

“ I muſt alſo give another caution to my honeſt brethren the farmers, which is, not to be in too great a hurry to crop a field after it has had a trench-ploughing; for the ſoil turned up from any conſiderable depth will be ſomewhat crude in its nature, till it is meliorated by the influences of the ſun and air.

“ I have generally found that one whole year's fallow is ſufficient to effect this; but two winters and a ſummer I never knew to fail: it is chiefly froſt which contributes to pulverize the chalk, and ſweeten the ſoil; not but that it receives great benefit from the rain and ſunſhine, and particularly from ſnow, which is ſtrongly impregnated with nitrous particles; all I mean to inſinuate is, that one day's froſt, contributes more to ſweeten a ſtiff, rough, ſoil, than two day's ſunſhine, rain, or ſnow.

“ Let me in this place hazard a conjecture, which may, however, prove a fact: the reaſon why froſt ſo much contributes to diſunite the particles of clay may be owing to its ſwelling the clods, and increaſing their ſurface: the cavities occaſioned by this ſwelling are filled with ice: when a thaw comes on, wherever the ice was, is a vacuum, and the particles of which the clay is compoſed, being ſeparated one from the other, crumble and fall in pieces: when they are in this ſtate, and the land has been chalked, a ſingle ploughing, well-timed, will cover their ſurfaces with the chalk-powder, and prevent them from ſpeedily adhering one to the other.

“ Your readers, who have been in countries where there are quarries of ſtone, muſt have obſerved, that, whilſt in the quarry, it works better than after it has been expoſed to the ſun; for it hardens conſiderably after it has been out of the quarry ſome time. It is the ſame with chalk, which is apt to be hardened by lying a ſummer in the ſun: for this reaſon, it is adviſable, that the chalk intended for manure ſhould be dug as ſoon as the winter ſets in, and laid preſently on the land. This method and time of chalking may occaſion ſome increaſe in the expence; but the farmer will be well paid for it in the end, and he will, by this management, ſooner reap the benefit of his labours.

“ Let it not be imagined from any thing I have ſaid here, that I truſt ſolely to chalk for bringing me good crops; no, I always beſtow, once in a courſe of three or four years, a reaſonable coat of compoſt dung. I do not lay on the chalk with any intention that it ſhould enrich the clay: my deſire is, that it ſhould bring it to the nature of a loam, as the dung will then take effect, and enſure the farmer a large crop, provided he guards himſelf againſt the depredations of weeds, which are too apt to have their ſeeds mixed with the dung made of long ſtraw, and often grow faſter than the corn, with which the land ſhould be cropped. Dung, when prudently applied, is, like many other things, of great uſe; but it is dangerous in the hands of an ignorant land-holder. The expence of procuring it in quantity will ruin him, and his crops will go near to be choaked by the encroaching weeds." *Muſeum Ruſticum*, *vol.* III. *page* 198.

" If chalk, ſays Mr. Liſle, be laid on clay, it will in time be loſt, and the ground again return to its clay; and if the clay be laid on chalk, in time the clay will be loſt, and the ground return again to its chalky ſubſtance. Many people think the land, on which the other is laid for a manure, being predominant, converts the manure into its own ſoil; but I conceive, in both caſes, the chalk and clay is filtrated through the land, on which it is laid, by time, and, being ſoluble by rains into ſmall corpuſcles, is waſhed through the land on which it is laid; for neither of theſe manures is able to unite, in its fineſt corpuſcles with the corpuſcles of the land on which it is laid, ſo as to form ſo ſtrict an union and texture with it as the land doth with itſelf, and is therefore liable to be borne downwards with rains, till no ſign of it be left.

" It is ſaid to be a common practice with many tenants in Hampſhire, three or four years before they leave their farms, to chalk their meadows; by which means they will for three or four years fling out a great crop of graſs, but that they will be much the worſe for it ever after. This ſeems to carry ſome reaſon with it; for the chalk ſo mellows and opens the pores of the meadow, that it enables the land to exhauſt its ſtrength in all parts: for chalk does not carry ſo much fatneſs as dung does to the land it is laid on; but it diſpoſes the land to bear ſuch crops by its ſweetneſs, and well diſpoſing of, and correcting an ill quality the land had before: but ſtill I do not ſee that this is any objection to the chalking of meadows, provided, whilſt, by virtue of the chalk, they are bearing ſuch burthens, you take care to refreſh them with dung.

" Though chalk laid on meadows enables them to give a great crop for three or four years, and will then impoveriſh them, yet I take it to hold quite contrary in paſture; for the graſs being thereby ſo much ſweetened and increaſed, keeps conſtantly ſo much the more ſtock, by which it is maintained always in the ſame vigour.

" It is probable, that chalk ſpread on ſandy, or woodſeary ground, laid up for paſture, may waſh and ſink in, and fill up the interſtices, and thereby conſolidate and mend the texture of ſuch ground, and ſweeten it, as it is a great alkali; and though in time moſt of the chalk may be waſhed downwards, ſo that the ground may loſe its virtue, yet I do ſuppoſe the ſtrength of the ground may ſtill continue much better, by reaſon that ſuch manure having made the ſward of the graſs come thicker and ſweeter, the good paſturage on both accounts enlarges the quantity, and betters the quality of the dung the cattle leave on it, which, in return, maintains a better coat and ſurface to the ground: and as chalk fills up the vacuities of ſandy, or wood-ſeary ground, ſo, on the contrary, it inſinuates its particles into obſtinate clayey and ſtrong land, and divides it, by making in a manner, a ſciſſure, thereby hollowing and mellowing it; ſo that the two contrary extremes are cured by chalk.

Chalk laid on hop-clover and rye-graſs is a mighty ſweetener and improver of theſe graſſes, being laid upon it after harveſt, at the beginning of winter, or whenſoever one can beſt tend it; the benefit will be ſoon conſpicuous, eſpecially if the ground be a four clay, and apt to run to coarſe graſs. *Liſle's Huſbandry*, *vol.* I. *p.* 66.

CHALKEY *Lands*, are thoſe which are impregnated with chalk, and from their white colour, are in ſome counties, called white lands.

The beſt produce of corn in chalky lands, is barley and wheat; oats will do well on them. Their natural produce for weeds is poppies, May-weed, &c. For graſs-ſeed, ſaintfoin, trefoil, and, if rich, clover. The beſt manure for theſe lands is rags, dung, folding of ſheep, &c. Theſe land, if rain happens to fall on them juſt after ſowing, before the corn gets up, will cauſe the earth to bind ſo hard, that the corn cannot get through it; but may be much helped by a light harrowing.

In Hertfordſhire they manage theſe lands for corn in the ſame manner as they do their clay lands. In Oxfordſhire they commonly manure theſe lands with half rotten dung, which, they ſay, prevents the binding of it, and ſome mix it with ſand, which cauſes it to work ſhort, eſpecially if any thing dry; they commonly ſow them there with wheat, miſlen, and barley; only after wheat they ſow peaſe or vetches: in the ſowing of which they are obliged particularly to take care to have fine weather, becauſe of the land's binding; but if they have only two nights dry weather, they will do well enough. *Mortimer's Huſbandry*, *vol.* I. *pag.* 68.

CHAMOMILE, a very common plant, growing wild upon commons and other waſte lands in many parts of England, particularly in moiſt and ſhady places, which it moſt delights in.

It is a trailing perennial plant, which puts forth roots from the joints of its branches as they lie on the ground, and by that means ſpreads and multiplies exceedingly; ſo that whoever would cultivate it, need only procure a few ſlips of it in the ſpring, and plant them about a foot aſunder, that they may have room to ſpread; they will ſoon cover the ground.

Chamomile walks were formerly a ſort of faſhion in gardens; and indeed they looked pretty enough for ſome time after they were mowed and rolled: but they are now entirely out of uſe, becauſe this plant is very apt to decay in large patches, which then become diſagreeable to the eye.

The chamomile flowers for medicinal uſes ſhould be of the ſingle kind; but the market people generally ſell the double, becauſe they are the largeſt.

The double flowered ſort of chamomile is as hardy as the ſingle, and may be propagated in the ſame manner.

CHANFRIN, the fore-part of a horſe's head from one hand to the other.

CHANGE *of crops*, a very judicious part of huſbandry, conſiſting in a change of different ſpecies of grain on the ſame ſoil.

Experience ſoon taught men, that even the moſt fruitful ſoil cannot conſtantly yield the ſame grain; and this of courſe laid them under a neceſſity of ſeeking for means to remedy the defect. They found the plough the moſt ready, and perhaps the moſt effectual: and hence all the ancient writers ſo highly commend a thorough ploughing. At the ſame time the apparent loſs of the produce of the ground during the year of fallow, put them upon enquiring how this inconvenience might be prevented, conſiſtently with keeping the land in good heart. Repeated obſervations convinced the Romans, the moſt attentive of all nations to every thing relative to huſbandry, that, beſides the alternate reſting of the land, wheat may, as Pliny obſerves, be ſown after lupines, vetches, beans, or any other plant which has the quality of fertilizing and enriching the ſoil. This, ſays Mr. Liſle, deſerves to be well noticed, becauſe our farmers imagine they cannot make their rent, if they pay twelve ſhillings an acre, without ſowing their land every year; nor will they be perſuaded to lay it down to graſs.

The moſt rational change of crops hitherto pointed out by any writer, is the following, planned by Camillo Tarello, and which he preſented to the ſenate of Venice in the year 1566.

" Let the ploughings hitherto given to corn land divided into two portions (each of which being reſted every alternate year, receives four ploughings that year) be transferred to the half of one of thoſe portions, ſo that it be ploughed eight times, including the ſeed ploughing; I mean, that every farm in tillage be divided into four equal parts, and that only one of theſe parts, taking them alternately, be ſowed with corn in any one year, after it has been ploughed eight times. Two of the other parts ſhould be laid down to graſs; and the fourth ſhould be fallowed a year, during which it ſhould receive the above-mentioned number of ploughings.

“ He, therefore, who has now, for example, ten acres under corn, ſhould for the future ſow only five, and ſo in proportion for a larger or leſſer extent; and all the manure and labour formerly beſtowed upon his ten acres ſhould be appropriated to the five only; that is, he ſhould plough them eight times, unleſs the ſoil be extremely light.

“ The huſbandman ſhould begin to plough in October or November, about ten months before he ſows, or ſooner if he can; but always in dry weather. He ſhould lay on his dung before the laſt ploughing; and ſhould not ſow more than two thirds of the quantity of ſeed hitherto commonly uſed, and that ſeed ſhould be of the growth of the country.

“ Whoever follows this method may always depend upon reaping the following advantages:

“ 1. This way of cultivating land leſſens the expence and labour; it being eaſier to plough one acre eight times, than to plough two acres four times each: becauſe, after the third time, an acre and a half, at leaſt, may be ploughed as ſoon as an acre could have been before; and if he begins his work in October or November, while the land is in good condition for ploughing, he may continue it the following year, at ſuch times as he will have little more urgent buſineſs, ſo as to have four ploughings done about the end of May. By this means the four ſummer ploughings will not require ſuch ſtrong ploughs as ſome people now uſe, to the great hurt of their cattle, and fatigue of the ploughman, becauſe the ground will be already well looſened.

“ 2. Theſe repeated ploughings will deſtroy the ſeeds and roots of weeds, which rob the corn of its food, choak it, and hinder it from growing.

“ 3. A field reſted, and then prepared in this manner, will yield more than double the produce of two equal ſpaces of land cultivated in the common manner, as I have often experienced. This is more than doubling one's income.

“ 4. Over and above this great advantage, we likewiſe ſave two thirds of the quantity of ſeed hitherto commonly uſed: for, by ſowing only a quarter inſtead of half of the land in tillage, there is an immediate ſaving of half the ſeed formerly required; and by ſowing only two thirds of the uſual quantity upon that quarter, we again ſave two twelfths, that is one ſixth of all the former ſeed: now half and one ſixth makes two thirds, to be deducted from the former uſual quantity.

“ 5. We ſhall have a ſufficiency of ſtraw of every kind for all our uſes, eſpecially for litter and dung, ſo indiſpenſably uſeful.

“ 6. We ſhall have hay and fodder enough to keep many cattle; becauſe we may, and ſhould ſow one half of our ground with graſſes, which will thrive extremely well, while the land is thus reſted for two years, in order to be afterwards broken up, ploughed, and ſowed with corn in its turn: for I again adviſe ſowing only a quarter part of the whole farm with corn, and breaking up another quarter immediately after ſeed-time, before winter: and, on the contrary, neither of the other quarters ſhould be ploughed during two years. But as the earth is deſtined continually to yield productions of one kind or another, even while it reſts, we ſhall do well in following the path pointed out by nature, by helping it to produce clover, and other plants fit for fodder, which are of ſingular ſervice to us, not only on account of the hay we reap from them, but alſo becauſe their roots greatly improve the ſoil. In the country about Breſcia, plentiful crops of the fineſt flax are reaped from fields where a quantity of clover has been lately mowed; and lands are let there for a great price, not only becauſe the ſoil is rich, and can be watered, but alſo becauſe it has juſt been under clover. If ſuch value is ſet upon land intended only for flax or millet, how much more would good wheat land juſtly deſerve?

“ 7. A ſeventh advantage will be, that land reſted regularly for two years (I ſay, with Virgil, that it reſts when it is not ploughed) being well conditioned, afterwards well prepared, ploughed, enriched by the roots of the graſſes, and kept clear of weeds, will yield crops more than twice as great as any we now reap; a truth which I have practically experienced, which the moſt ſenſible and moſt judicious huſbandmen that ever lived have long told us, and of which a trial will ſoon convince the moſt incredulous.

“ 8. One of the moſt conſiderable advantages attending this method, is the eaſe with which a great number of cattle may be reared, by means of the increaſed quantity of hay and green fodder. We ſhall conſequently have more horſes, more oxen, more cows, more ſheep, and more poultry. Every one knows of what infinite ſervice all theſe are, to feed us, to cloath us, and to help us in our work. He, therefore, who has hitherto been obliged to have two yoke of oxen will, in this method, want only one, and may, inſtead of the other, feed two or three cows: for as the labour is hereby leſſened, and the quantity of good fodder increaſed, two oxen will be ſufficient to plough the land, eſpecially as the ſoil will, by theſe means, be brought daily into better and better tilth.

“ 9. From hence naturally ariſes a ninth advantage, which is, the quantity of manure produced by the increaſe of cattle and of fodder; an advantage which no good huſbandman will neglect to purchaſe, if the means of doing it are but pointed out to him.

“ The 10th and laſt of the advantages which I ſhall here enumerate, as reſulting from this new method of culture, is, that poor and barren lands are hereby rendered, by degrees, good and fertile: for ſuch is the conſtitution of the earth, that ploughing and manuring alter its very nature, and improve it more and more, as experience repeatedly demonſtrates. Valerius Maximus inſtances the ſtriking example of Maſiniſſa, king of Numidia, who made agriculture flouriſh ſo much, that he left his country, which he found barren and deſolate, ſtored with riches and every good thing. It is in our power to do the ſame. On the contrary, it is not leſs true, that even though the earth be rich and good, it will yield but little fruit, if it be not well cultivated; reſembling therein the capacity of the human mind, which, according to Cicero's fine compariſon, is enlarged only by ſtudy and exerciſe. Induſtrious labour will not only procure us the neceſſaries, nay, the ſuperfluities of life, but will even change a barren country into a kind of garden. *Ricordo d'Agricultura di Tarello.*

M. Duhamel, after obſerving that the French farmers, in general, change their crops, not on any principle dictated by reaſon, but merely becauſe it was the cuſtom of their forefathers, or they themſelves perhaps have occaſion for ſome particular growth, draws a parallel between the practice of dividing arable land into three parts, or into two, in order to their being alternately ſown, and reſted. “ I have, ſays he, ſome acquaintance with the methods of practice in Guienne, and in part of Normandy; and am obliged to M. le Baron de Sournia, governor of Querebus, for enabling me to give an account of the methods uſed in the neighbourhood of Perpignan, where his eſtate lies.

“ In this hot climate they ſow their lands in September, and begin to cut wheat about the twelfth of June; ſo that their harveſt is generally finiſhed by Midſummer.

“ They divide their lands into two portions only; ſo that in one year they ſow wheat, and the other the land ſhould be ſuffered to reſt. But, on ſuch part of their lands as are moſt valued, they have ſeveral crops during the year of reſt: this impoveriſhes their lands, and they are obliged to ſow their wheat too late, which leſſens the crop. We ſhall mention an inſtance given by M. Sournia.

“ In land they can water, they ſow clover immediately after wheat-harveſt, ſcattering the clover-ſeed among the ſtubble. The land is then immediately watered, and is afterwards ſeveral times repeated during the ſummer: in the winter they feed it with ſheep and lambs. Such as have no flocks ſell their paſture to the upland farmers, who have flocks, but no winter fodder, their land being covered with ſnow: this paſture therefore fetches a very high price.

“ In ſpring, when the green fodder has been eaten down by cattle, they water the land, and by that means the clover ſprouts apace ; when it is in bloſſom they mow it, make it into hay, and lay it up with the reſt.

“ Immediately after this crop, they dung the land ; and ſuch as are not afraid of exhauſting it, plough it, and ſow either kidney-beans, or ſmall millet : but as they cannot plough for wheat till theſe crops are off the ground, there is not time ſufficient for giving the land proper tillage ; the ſowing is retarded, and the rich particles of the dung are partly conſumed by theſe crops, while the manure might be more uſefully employed on lands they cannot water. M. de Sournia is, by repeated experience, convinced, that, to have good crops of wheat, they muſt be contented with the crop of clover, and only ſow kidney-beans, millet, &c. in ſmall quantities for the uſe of the family.

“ In Guienne, as well as in Anjoumois, they raiſe a crop of maize, which is a great impoveriſher of the ground, during the year of fallow.

“ The good huſbandmen alſo think, that in the rich lands, which they cannot water, it is beſt, in a farm of three hundred acres, to be content with having one hundred and fifty acres of wheat, and to be careful to give proper tillage to the one hundred and fifty acres that ſhould be in fallow, to make them proper for the reception of wheat. This is alſo the practice of ſome diſtricts of Normandy, where the climate being colder, and the ſoil more backward, they have ſcarcely an opportunity of having any crop but wheat. However, when the land has been well dunged and tilled for maize, as they beſtow three ploughings on that plant, there is commonly the next year a very good crop of wheat.

“ It is evident, that by dividing a farm, that has three hundred acres in tillage, into two equal portions, which are ſown alternately every other year, the tenant, during a nine years leaſe, will reap one thouſand three hundred and fifty acres of wheat : whereas, if the land be divided into three portions, it will amount to nine hundred acres only. But, in the latter caſe, the former has nine hundred acres of ſpring corn, which being eſtimated at half the value of the wheat, make it juſt equal to one thouſand three hundred and fifty acres of wheat. It follows therefore, that in grazing countries, where they plough with oxen, and uſe but few oats, it is moſt advantageous to divide the land into two portions ; but that this is not to be done in farms that are tilled with horſes, becauſe the neceſſary purchaſe of oats would amount to the value of the four hundred and fifty acres of wheat extraordinary.

“ The farmers about Bayeux, in Lower Normandy, have two methods of changing their crops.

“ According to one of thoſe methods, 1. They ſow buck-wheat towards the end of June ; 2. When the roots and ſtems of this plant are dead and withered, which is about All-ſaints day, they plough, and immediately ſow wheat : the wheat is therefore ſown on one ſingle furrow. Theſe lands have indeed been ploughed for buck-wheat, and even thoroughly dunged ; and plenty of manure can ſupply the place of good tillage, and the latter can ſupply the place of the former. 3. After reaping the wheat, they plough in the ſtubble as ſoon as poſſible ; and, after giving the land a ſecond ploughing in February or March, they ſow it with oats ; or a third ploughing is beſtowed upon it, in order to crop it with barley : 4. They plough in the barley ſtubble in winter, and after giving the land one ſpring ploughing, ſow either peas or tares : 5. Immediately after this crop is off, they turn down the land, that it may receive two ploughings before October, when it is ſowed with wheat. 6. The following year they ſow oats mixed with a little clover-ſeed ; after which it is laid down in paſture for three or four years. It would be needleſs to mention that the farmer varies the order of his ſucceſſive crops, according to the nature of the ſoil, and his own occaſions ; but by this method, ſix crops are reaped in ſix years ; two of wheat, two of oats, one of buck-wheat, and one of peas or turnips ; and the field is then left in clover to be fed for four years.

“ According to the other method, they ſow no buck-wheat on the land they break up ; it is left in fallow from February or March, when it is turned up, till October ; and during this interval they manure it, and give it ſeveral ploughings to prepare it for wheat. In this caſe the crop is generally more plentiful, than when buck-wheat has been ſown. In other reſpects, the change of crops is the ſame as was mentioned before.” *Culture des Terres, tom.* VI. *p.* 34.

The changing of crops, upon rational principles, though of infinite conſequence in agriculture, ſeems to have been neglected, and even forgotten, after the time of the ancient Romans, till Camillo Tarello pointed out its great importance, as we have already obſerved in this article : nor do we, ſince him, find much attention paid to this eſſential part of huſbandry, till very lately, when the culture of turnips probably gave the uſeful hint ; the farmer obſerving, that his land, inſtead of being impoveriſhed by that root, was enriched, and prepared to yield a better crop of barley in the ſpring. This might naturally ſuggeſt to him, that other ſucculent plants, which cover the earth with their leaves, might have the ſame effect. The ſucceſs has anſwered his utmoſt expectation : for it is now found that a fallow does not become neceſſary in ſeveral years ; the ground being kept in heart by a variety of crops when rightly timed, and properly managed. The Society for the Improvement of Agriculture in Scotland, from whom we ſhall borrow the following judicious inſtructions, have the honour of ſetting this diſcovery in its proper light.

They obſerve, “ That ſome crops, as peas, beans, clover, and all plants of the pulſe kind, are enrichers and cleaners of the earth ; while wheat, oats, barley, and the whole tribe of vegetables, whoſe roots are fibrous, and ſpread far, impoveriſh and rob the ground. The latter are alſo foulers of it, by giving way to weeds and graſs, which, being the natural product of every ſoil, are more readily nouriſhed by it, than any plant which it does not ſpontaneouſly produce ; and if the earth be fed with any ſort of manure, it will, while the weeds and graſs remain undeſtroyed, like a tender mother, cheriſh and nouriſh them in proportion to the food ſhe receives.

“ Wheat and oats are great robbers of ſoils. Wheat remains a long time in the ground, during which the land untils itſelf, coaleſces, and becomes of the nature of uncultivated earth ; while the weeds, meeting with no oppoſition, ripen, and ſhed their ſeeds. Oats do not continue ſo long : but they bind the ſoil by their ſtrong roots, and give many weeds time to ripen. Barley, as it ſtands only a few months, and ſeveral ploughings are given for it, binds the earth leſs than either wheat or oats. Peas, beans, tares, &c. are ſuppoſed to draw much of their nouriſhment from the atmoſphere, and that in proportion to the ſucculency of their ſtems and leaves, whereby it is probable their roots diſcharge a moiſture under ground ; and their leaves, covering the ſurface of the earth, return the moiſture and dews deſcending through them, which mellow and rot them into a kind of manure.” *Maxwell's Collection, p.* 219.

From the above obſervations, the farmer will be able to vary his crops in ſuch a manner as always to keep his ground in heart, and free from weeds ; particulars which cannot fail of producing very great advantages.

CHANNEL, of a horſe, is the hollow between the two bars of the under jaw bone, in which the tongue is lodged.

CHARCOAL, a ſort of fuel, conſiſting of wood charred, or half burnt.

The duſt of charcoal has been found, by repeated experience, to be of great benefit to land, eſpecially to ſuch as is ſtiff and ſour. It is to be uſed in the ſame manner as ſoot and wood-aſhes. *See the articles* ASHES *and* SOOT.

CHARDS *of artichokes*, the leaves of artichoke plants, tied and wrapped up in ſtraw, except the top, during the autumn and winter; by which means they will be blanched, and loſe great part of their bitterneſs.

Chards *of beets*, are white beets covered over with dry dung, during the winter-ſeaſon, when they will produce large tops, with a downy cotton ſhoot, which is the true chard, uſed in broths, &c.

CHARLOCK, called alſo *Chadlock*, *Catlock*, *Carlock*, and *White-Rape*, is a weed too generally known to need a particular deſcription, the figure we have given of it on Plate V. Fig. 32. will be abundantly ſufficient. Almoſt the whole plant is covered with bent pellucid hairs.

There are two ſorts of charlock, one bearing white, and the other yellow flowers, but they ſeem to be only varieties of the ſame plant. The young plants of charlock ſo nearly reſemble thoſe of turnips, that they are not eaſily diſtinguiſhed but by the taſte; the charlock being hot and bitter, and the turnip mild. Farmers ſhould therefore be very careful in weeding their turnips, leſt they miſtake them for charlock.

Mr. Liſle obſerves, that cold wet lands are always more ſubject to charlock than white or chalky lands; becauſe the charlock-ſeed being very oily, reſiſts putrefaction, and is not eaſily opened or penetrated by moiſture, whereas white and light earth is ſoon dry after rain, and the water does not continue long enough on it to make ſuch ſeed germinate ſo effectually as in the other. By an experiment which he made in ſowing charlock-ſeed and turnip-ſeed at the ſame time, he found that the turnips will appear in three days, but the charlock in not leſs than ten. A hint that may prove very uſeful to the huſbandman. *Liſle's Huſbandry*, *vol.* II. *pag.* 297.

Mr. Mortimer, after remarking that both the white and yellow charlock are very prejudicial to corn, and that ſome lands are very ſubject to it, eſpecially if manured with cow-dung alone, which he thinks increaſes it more than any other manure, unleſs it be mixed with horſe-dung, or ſome other hot manure, mentions his being told that a perſon who had vaſt quantities of this weed in a field of barley, mowed the whole when the charlock was in flower, and ready to ſeed, which is commonly about the middle of May, as low as he could, without taking off more than juſt the tops of the blades of the barley; and that this gave the corn an opportunity to get above it, in ſuch a manner, that he had four quarters of barley on an acre. He adds, that where a fallow is full of charlock, it will be right to turn in ſheep, which will eat it very readily. *Mortimer's Huſbandry*, *vol.* I. *p.* 311.

CHASE, a word uſed in ſome counties to ſignify a row or rank. Thus in the planting of quickſets, a ſingle chaſe implies a ſingle row; a double chaſe, means another row planted below the firſt, not immediately underneath the upper plants, but under the middle of the intermediate ſpaces. *Liſle's Huſbandry*, *vol.* II. *pag.* 405.

CHATS, the keys of trees, ſuch as the aſh, ſycomore, &c.

CHEDDER-CHEESE, a name given to a very large kind of cheeſe made at Chedder, a village near Mendip-hills in Somerſetſhire, famous for its paſtures. It is common in this place for three or four dairies to join their milk, to make one great cheeſe, which generally weighs from one hundred and fifty to two hundred weight; and which they often ſell at ſix-pence per pound on the ſpot.

CHEESE, a well-known ſpecies of food, prepared from curdled milk, preſſed from the whey, and afterwards dried for uſe. *See the article* Dairy.

CHEESE-LIP, a bag in which the dairy-women prepare and keep their runnet for making cheeſe. *See* Runnet.

CHEESE-PRESS, a preſs uſed in dairies for ſqueezing the whey out of the cheeſe, We have given a drawing of the common cheeſe-preſs, on Plate VI. Fig. 1. where A B is the preſs, C E, and F G, are levers moveable about the points D, E, F, G, by applying the hand at C; S is the ſtone or weight; and H the cheeſe to be preſſed.

CHEESE-RENNET. *See* Yellow Ladies Bedstraw.

CHERRY-TREE, the name of a well-known genus of fruit-trees, and of which there are ſeveral ſpecies, cultivated in gardens and orchards.

The cherry-tree, it is ſaid, is a native of Pontus, a province of Aſia Minor, from whence it was brought into Italy by Lucullus, the Roman, Anno Rom. 680; and about one hundred years after was introduced into England, where there are various ſorts cultivated at preſent, ſuch as the Flemiſh-cherry, Kentiſh-cherry, May-duke, arch-duke, red-heart, white-heart, black-heart, amber-heart, ox-heart, bleeding-heart, carnation, morello, and ſome others.

The ſeveral ſorts of cherries are propagated by budding or grafting the different kinds into ſtocks of the black or wild red cherries, they being ſuppoſed to be of longer duration than the garden ſorts.

Cherry-trees are raiſed in great quantities in the nurſery gardens, both ſtandards and dwarfs: the ſtandards for planting orchards, particularly in Kent, where there are large plantations. The uſual diſtance allowed for their ſtanding is about forty feet each way. Theſe ſtandard trees ſhould be planted in a ſituation defended as much as poſſible from the eaſt and weſtern winds; the one being likely to deſtroy their bloſſoms in the ſpring, and the other by its violence is very apt to break their tender branches: this occaſions their gumming, and is very prejudicial to them. The ſorts beſt approved of for an orchard are the Kentiſh, Flemiſh, duke, and common red cherry.

Cherry-trees may alſo be planted againſt walls in any expoſure: the May-duke being generally planted againſt a ſouth aſpected wall, though it is not amiſs to have ſome againſt a north wall, which will continue their ſeaſon the longer; and the ſame may be done with the other ſorts. The morello-cherry is generally planted againſt walls fronting the north. This fruit is commonly uſed in preſerving: yet where they are planted to a better aſpect, and ſuffered to hang on the trees till they are thoroughly ripe, they are not a bad fruit for the table; for by long hanging, it loſes moſt of its acidity or ſourneſs.

The leſs cherries are pruned, the better they like it; but, however, where weak or luxuriant branches happen, they muſt be governed by the knife. When cherry-trees take to bearing very early, and grow but little, it is beſt to pull off moſt of the bloom, and ſhorten the branches, which will cauſe the tree to ſhoot with freſh vigour.

The black cherry is ſuppoſed to be a native of England, it being frequently found in the woods; it grows large, and the timber is uſed by turners and other artificers in wood. From this ſort the black-coroon-cherry is ſuppoſed to have been produced.

Cherry-trees thrive beſt in a dry hazely loam. In a gravelly ſoil they are very ſubject to blights, and ſeldom ſtand long good.

The wood of the cherry-tree is of great uſe to cabinet-makers, chair-makers, &c. as it is very durable, not liable to ſplit, and looks nearly as well as the ordinary ſort of mahogany.

Cherry-Tree *with double flowers*, is a ſpecies of the former, and propagated for the beauty of its flowers, which are extremely fine. Theſe are produced in large bunches, which renders the tree one of the moſt beautiful ornaments of a garden in the ſpring.

CHERRY-WINE, a very cooling and pleaſant drink, made from the juice of cherries, properly fermented. The chief care neceſſary in making it, is to let the cherries hang upon the trees till they are thoroughly ripe, by which means their juice, which they yield in great abundance, will be the better perfected and enriched by the ſun; to gather them in dry weather; preſs out their juice, and add a quantity of ſugar proportioned to the ſtrength you deſire in the wine; for the more ſugar there is added to the natural juice of the cherries, the ſtronger and richer the wine will prove, when of a proper age. When this is done the whole muſt be regularly fermented, according to the method laid down under the article fermentation. *See* FERMENTATION.

CHERVIL, the name of an annual plant raiſed only from its ſeeds, which are black, very ſmall, longiſh, and ſtreaked lengthwiſe.

It will thrive in any ſoil or ſituation, and may be ſown either in drills or broad-caſt; but the former method is the beſt, becauſe it greatly facilitates the weeding and cutting of the plants, whoſe culture is, in all reſpects, the ſame with the common parſley. *See* PARSLEY.

The beſt time to ſow chervil is in the autumn, ſoon after its ſeeds are ripe; for they grow beſt then, and the plants, which riſe in that ſeaſon, continue green all the winter; whereas thoſe which are ſown in the ſpring ſeldom come up at all; or, if they do, their plants generally wither and decay, as ſoon as the warm weather ſets in. The plants ſown in autumn flower in April, perfect their ſeeds ſoon after, and then die away. To ſave theſe ſeeds properly, their ſtalks ſhould be cut down when they begin to grow yellow.

Thoſe who are fond of this plant, as many are in ſoups during the winter and ſpring ſeaſons, may have a ſucceſſion of it very young, by ſowing it monthly during the ſeaſon: but whoever uſes it ſhould be careful to diſtinguiſh it from a poiſonous plant that nearly reſembles it, and called wild myrrh and cow-parſley. *See* COW-PARSLEY.

CHEST, the breaſt, or that part of an animal's body which contains the heart, lungs, &c.

CHEST-FOUNDER, a diſtemper incident to horſes, and occaſioned by an improper treatment of an inflammation between the ribs. For if the inflammation be not diſperſed in time, and the viſcid blood and juices ſo attenuated by internal medicines, that a free circulation is obtained, ſuch a ſtiffneſs and inactivity will remain on thoſe parts as will not eaſily be removed; and this ſtiffneſs is generally called cheſt-founder.

The ſigns of this inflammation, are a ſtiffneſs of the body, ſhoulders, and fore-legs; attended ſometimes with a ſhort dry cough, &c. a ſhrinking when handled in thoſe parts.

Bleeding, ſoft pectorals, attenuants, and gentle purges, are the internal remedies; and externally the parts affected may be bathed with equal parts of ſpirit of ſal ammoniac, and ointment of marſhmallows, or oil of chamomile.

Theſe outward inflammations frequently fall into the inſide of the fore-leg, and ſometimes near the ſhoulder; forming abſceſſes there, which terminate the diſorder. *Bartlet's Farriery, pag.* 57.

CHESNUT-TREE, the name of a tree, which well deſerves the planter's care, affording excellent timber, and a very agreeable ſhade. It will grow to a very great ſize, and ſpread its branches finely on every ſide where it has room.

The leaves are large, and of a lucid green, and continue late in the autumn; nor are they ſo liable to be eaten by inſects, as thoſe of the oak; nor is there any better food for deer, and many other animals, than the fruit of this tree.

Cheſnut-trees are propagated by planting the nuts in February, in beds of freſh undunged earth. The beſt nuts for ſowing, are ſuch as are brought from Portugal and Spain, provided they are not kiln dried, which is generally the caſe of thoſe brought from abroad, to prevent their ſprouting during their paſſage; if they cannot, therefore, be procured freſh from the tree, it will be much better to uſe thoſe of the growth of England, which are full as good to ſow for timber or beauty, as any of the foreign nuts, though their fruit is much ſmaller. The nuts ſhould be preſerved in ſand, until the ſeaſon for ſowing, otherwiſe the mice and other vermin will ſoon deſtroy them. Before you ſet the nuts it will be proper to put them into water, to try their goodneſs, which is known by their weight; ſuch of them as ſwim upon the ſurface of the water ſhould be rejected as good for nothing; but ſuch as ſink to the bottom, you may be ſure are good.

In ſetting theſe nuts, the beſt way is to make a drill with a hoe, about four inches deep, in which you ſhould place the nuts at about four inches diſtance, with their eye uppermoſt; then draw the earth over them with a rake, and make a ſecond drill at about a foot diſtance from the former, proceeding as before, allowing three or four rows in a bed, with an alley between, three feet broad, in order to clear the beds, &c. When you have finiſhed your plantation, you muſt be careful that it is not deſtroyed by mice, or other vermin; which is very often the caſe, if they are not prevented by traps, or other means.

In April theſe nuts will appear above ground; you muſt, therefore, obſerve to keep them clear from weeds, eſpecially while young: in theſe beds they may remain for two years, when you ſhould remove them into a nurſery at a wider diſtance. The beſt ſeaſon for tranſplanting theſe trees, is either in October, or the latter end of February; but October ſhould be preferred. The diſtance theſe trees ſhould have in the nurſery, is three feet row from row, and one foot in the rows. If theſe trees have a downright tap-root, it ſhould be cut off, eſpecially if they are intended to be removed again; this will occaſion their putting out lateral roots, and render them leſs ſubject to miſcarry when they are removed for good.

The time generally allowed them in the nurſery is three or four years, according to their growth; but the younger they are tranſplanted, the better they will ſucceed. Young trees of this ſort are very apt to have crooked ſtems; but when they are tranſplanted out, and have room to grow, they will, as they increaſe in bulk, grow more upright, and their ſtems will become ſtrait.

After they have remained three or four years in the nurſery, they will be fit for tranſplanting where they are to remain; for the younger they are planted out the better they will ſucceed. But if they are propagated for timber, it is by much the better method to ſow them in furrows, and let them remain unmoved; for theſe trees are apt to have a downright tap-root, which, being hurt by tranſplanting, often checks their upright growth, and cauſes them to ſhoot out into lateral branches.

If you deſign a large plantation of theſe trees for timber, after having two or three times ploughed the ground, the better to deſtroy the roots of weeds, you ſhould make your furrows about ſix feet diſtance from one another; in which you ſhould lay the nuts about ten inches apart, covering them with earth about two inches deep; and when they come up, you muſt carefully clear them from weeds. The diſtance allowed between each row is for the uſe of the horſe-hoeing plough, which will diſpatch a great deal of this work in a ſhort time; but it ſhould be performed with great care, ſo as not to injure the young plants; therefore the middle of the ſpaces only ſhould be cleaned with this inſtrument, and a hand-hoe uſed to clean between the plants in the rows, and alſo on each ſide, where it will be unſafe for the plough to be drawn; and in hand-hoeing great care muſt be taken not to cut the tender rind of the plant. But for the two firſt years after ſowing, it will be adviſable to dig the ground each winter; becauſe the plants will be too ſmall to admit the hoeing plough, and in ſummer to hand-hoe the ground.

When theſe have remained three or four years, you will, if the nuts have ſucceeded well, have many of theſe trees to remove; which ſhould be done at the ſeaſons before directed, leaving the trees at about three feet diſtance in the rows; at which diſtance they may remain for three or four years more, when you ſhould remove every other tree, to make room for the remaining, which will reduce the whole plantation to ſix feet ſquare; which will be ſufficient for them, till they are large enough for poles, when you may fell every other tree, within a foot of the ground, in order to make ſtools for poles, which, in eight or ten year's time will be ſtrong enough for making hoops, hop-poles, &c. for which purpoſes they are preferable to moſt other trees; ſo that every tenth year here will be a freſh crop, which will pay the rent of the land, and all other incidental charges, and, at the ſame time, a full crop of growing timber left upon the ground.

Cheſnut-trees were formerly much cultivated in England, and doubtleſs produced good profit to the owners;

for the wood of this tree is equal in value to the beſt oak, and, for many purpoſes, far better; particularly for making veſſels to hold all kinds of liquor, it having the property, when once thoroughly ſeaſoned, of maintaining its bulk conſtantly; and is not, like other timber, apt to ſhrink or ſwell; and hence all the large caſks, tuns, &c. for wines in Italy, are made of this timber, as being preferred by the inhabitants to any other timber whatſoever. It is alſo very valuable for pipes to convey water under ground, as enduring longer than the elm, or any other wood. In Italy it is planted for coppice wood, and is much cultivated in ſtools, to make ſtakes for ſupporting their vines, as it will endure ſeven years, which is near double the time any other ſtakes will do. *Millar's Gard. Dict.*

CHEWING-BALLS, the name of a medicine adapted to reſtore a loſt appetite, an infirmity which horſes are often ſubject to, proceeding from a ſalt humour, and a bitter phlegm, which obſtructs the paſſage of the throat, and makes them loath their food.

Theſe balls are made in the following manner: Take a pound of aſſa fœtida, as much liver of antimony; half a pound of the wood of a bay-tree; an equal quantity of juniper-wood; and two ounces of pellitory of Spain: pound all theſe ingredients apart into a groſs powder, in order to which the woods muſt be previouſly well dried. Then put them all together into a mortar, and incorporate them with a ſufficient quantity of good verjuice, well clarified, pouring it in by degrees, till the whole is reduced to an uniform maſs. Make the whole into balls of an ounce and a half each, and dry them in the ſun. Wrap one of theſe balls in a linen cloth, and faſtening a thread thereto, make the horſe chew it for two hours in the morning, and he will eat as ſoon as you take off the bridle; do the ſame at night, and continue this method till the horſe recovers his appetite. When one ball is conſumed, put in another.

Theſe balls may be uſed on the road, as you travel, being faſtened to the bit of the bridle.

CHICKLING-*vetch*, called by gardeners, the common everlaſting pea, and by C. Bauhine, *lathyrus latifoliis*, a perennial plant, growing naturally in many parts of England.

A correſpondent of the editors of the Muſeum Ruſticum recommends this plant as well deſerving cultivation for the food of cattle, as the root, which will grow in almoſt any ſoil, yields every year a great burden of excellent provender.

" I ſowed, ſays this gentleman, three years ago, a rood of land, light, and but poor in quality, with this ſeed: the work was done early in the ſpring, the land being prepared as for barley.

" I ſowed it not in the broad-caſt way, as I ſhould have found it much more difficult to keep down the weeds; but I cauſed a ſlight furrow to be drawn the length of the land, with a light plough; and when the ſeed was thinly ſprained, or rather dropped into this, another was drawn at a foot diſtance, in which the ſeed was dropped in the ſame manner.

" An interval, or fallow ſpace, was then left at leaſt two feet wide; and then two more rows of the vetches, till the whole land was ſown. I muſt obſerve, that I covered the ſeed by means of a light harrow with wooden tines, drawn backward and forward acroſs the land.

" When the plants came up, I had them well hoed to clear the ground of weeds; and when they grew a little ſtrong, they were ſet out with the hoe to about a foot diſtance in the rows, that they might have room to ſpread and branch.

" The firſt year they yielded no great quantity of fodder, but they have ſince made me ample amends.

" The ſecond ſpring they came up very ſtrong and vigorous, branching out much; and when I turned a couple of horſes in to feed, they were very fond of it, eating it very greedily, though they were taken out of a good natural upland-paſture.

" The laſt ſummer the land was almoſt entirely covered, and it yielded a great deal of ſeed indeed: for experiment ſake, I cauſed a few roods to be mowed juſt before it flowered, and it made good hay, ſweet, and without being ſticky.

" I therefore think, from my little experience in the matter, I have ſome foundation for recommending this plant to the notice of the public. I could wiſh, indeed, I had been more accurate in my experiment; but what is paſt cannot be recalled: and ſome other perſon may, perhaps, hereafter, give the public more uſeful information on this head."

CHICKWEED, called by botaniſts *cucubalus*, flowers early in the ſpring, and, if it be ſuffered to grow, ſeveral times in the courſe of the year. The way to deſtroy it is therefore to pluck it up from time to time, before it can ſhed its ſeed.

The berry-bearing ſort, which grows with ſmooth, erect ſtalks, globular empalements, and ſtamina longer than the petals, is the wild lychnis, or white behen of the ſhops. This is a very rambling weed, natural to moſt parts of England, and is frequently called ſpatling poppy. Its roots are perennial, and ſtrike ſo deep into the earth, that they are not eaſily deſtroyed by the plough; for which reaſon, bunches of this plant are too common among corn, in land which has not been perfectly well tilled. Summer fallows, and carefully harrowing out every part of the roots, which ſhould then be burnt, will here prove the beſt and moſt effectual remedy.

CHICKWEED is alſo the name of an annual weed, called by botaniſts *alſine*. This weed, though it periſhes every year, will ſoon become very troubleſome, if ſuffered to ſtand till it ſheds its ſeeds, which Mr. Liſle thinks it will do ſeveral times in the year; for he obſerved on the 23d of October, a great deal of this weed, the branches of which carried many buds of bloſſoms, many flowers full blown, and many pods with white ſeeds almoſt ripe; ſo that its increaſe may be the leſs guarded againſt by any ſort of huſbandry in the common way. The repeated horſe-hoeings in the new huſbandry muſt here be of ſingular advantage; and, at all events, particular care ſhould be taken, to prevent the feeding of this plant upon dung-hills, where it is too often ſuffered to grow unnoticed and undiſturbed: for its ſeeds ſcattered there, and intermixed with the dung, will ſoon give birth to a multitude of weeds in the land upon which it is ſpread; unleſs it be kept, as indeed all dung uſed for manure ought to be, till it is thoroughly rotted, and the ſeeds have loſt their vegetative power.

To CHISSUM, to put forth roots, to grow.

To CHITT, to ſprout out, to grow.

CHITTED, ſprouted, ſhot out, grown.

CHIZZLE, bran, the huſky parts of ground wheat.

CHOCKY, the ſame with chalky, reſembling chalk, mixed with chalk, or of the nature of chalk.

CHOLIC. *See* GRIPES.

CHURN, the name of the veſſel in which the cream is coagulated by agitation.

There are two ſorts of churns, one called the common, or Dutch churn, and the other the barrel churn.

The common churn is repreſented on Plate VI. Fig. 2, 3. where Fig. 2. is the arbor or ſtaff; and Fig. 3. the body of the churn. The lower end of the ſtaff is placed in the body of the churn, and being raiſed with a pretty quick motion by the hand on the upper part of the ſtaff, the cream in the body is agitated, and by that means coagulated into butter.

Fig. 4, 5, 6, 7. repreſents the ſeveral parts of the barrel-churn.

Fig. 4. is the arbor of the barrel-churn. Fig. 5. its bung, or cover. Fig. 6. the body of the churn. And Fig. 7. the ſtand on which it is placed. The arbor cannot be taken out of the body of the barrel-churn, without the help of the cooper; but is here repreſented by itſelf, to ſhew the manner in which it is made. In Fig. 6. the churn is repreſented with the arbor on it, but not placed on its ſtand, in order to ſhew the latter. When the utenſil is to be uſed, the churn is placed upon its ſtand; the cream poured into it through the bung-hole, and the hole cloſed with its bung. The arbor is then turned round pretty faſt, by which the four leaves of the arbor agitate the cream, and coagulate it into butter. *See the article* DAIRY.

CIBOULES, a ſort of ſmall onions propagated only by ſeeds, which, if ſown in March, will be ripe in

Auguſt; and theſe are reckoned the beſt for keeping; but they may be ſown in almoſt every ſeaſon. They differ from the onions, of which they are probably a degeneracy, in that they do not form bulbs at their roots, but ſhoot out ſeveral upright blades, and thoſe which produce the greateſt number of theſe, are reckoned the beſt.

Their culture is the ſame with that of onions, like which they muſt be thinned, and well weeded. They will increaſe greatly, even in very dry ſummers, if they have been tranſplanted into beds of good earth, and thoſe beds are kept well watered. The reddeſt, hardeſt, and mildeſt are the moſt eſteemed.

CIDER, or Cyder. *See the article* Cyder.

CIONS, the ſhoots, or grafts which are fixed into the ſtock, in order to improve its fruit. *See the article* Grafting.

CIVES, a well known ſpecies of pot-herb, cultivated in kitchen gardens. They thrive beſt in a light rich ground, and are propagated by parting their roots, which never become bulbs; the beſt time for which is in March, though they may be tranſplanted in autumn, for they are very hardy; and in this caſe, they will produce blades fit for uſe early in the ſpring. It is for theſe blades only, which ſeldom grow above ſix inches high, and are very ſmall and ſlender, that they are cultivated. They were formerly in great requeſt for mixing with ſallads in the ſpring, becauſe they are milder than the ciboule, or Welſh onion. In good ground they will laſt three or four years, without removing, or any other trouble beſides looſening the earth about them now and then, keeping them clear from weeds, and perhaps watering them a little in great droughts.

CLARY, the name of an herb cultivated in many kitchen gardens. The ſeeds ſhould be ſown during the ſpring, in good garden mould. When the plants are fit to remove, they ſhould be tranſplanted into beds, and there ſet at leaſt one foot aſunder. If they are planted in more rows than one, it ſhould be on an open ſpot of ground, at the ſame diſtance from one another, and with a ſpace of at leaſt two feet between the rows. After they have taken root, no farther care is neceſſary, except keeping them clear from weeds, and ſtirring the ground about them. In the winter and ſpring following, their leaves, which are the only part uſed, will be fit for gathering; and in the enſuing ſummer they will flower, ſeed, and decay; ſo that a ſucceſſion of young plants ſhould be raiſed every year.

CLASPERS, the threads or tendrils of creeping plants.

CLAVER, a word uſed in ſome counties of England for clover. *See* Clover.

CLAW, the foot of a beaſt or bird, armed with ſharp nails.

CLAY, an unctuous and tenacious earth, juſtly accounted the ſtiffeſt of all ſoils.

Clays are of different ſorts, and of as different colours. One kind of them is ſo obſtinate, that ſcarce any thing will ſubdue it; and another ſo hungry, as not to be ſatiated without uncommon pains, becauſe it abſorbs whatever is applied, and turns it to as bad a clay as itſelf. Some clays are fatter than others, ſome more ſlippery; all of them tenacious of water on the ſurface, where it ſtagnates, and chills the plants, without penetrating the ſoil; and in dry ſeaſons they harden with the ſun and wind, are very barren, and extremely untractable. The cloſeneſs of clay hinders plants from extending their roots to ſearch for their neceſſary food, and prevents the entrance of water, which would help to convey it to them.

The more unctuous and fat clay frequently lies upon the other, and has often a bed of chalk beneath it: but neither is this worth any thing till looſened, and fitted to admit the influence of the ſun, air, froſt, &c. The blue, white, and red clay, if ſtrong, are all unkind: the ſtony and looſer ſort is ſometimes tolerable; and the light brick-earth does very well with moſt fruit-trees.

Clay, in general, of whatever kind it be, is, of all earths, the very worſt for vegetation: yet even this, as well as any other untoward ſoil, may, with induſtry, and proper correctives, be made to produce roots and plants which require the lighteſt and hollowcſt mould.

Among all the manures for clay, ſea-ſand claims the preference, founded upon experience, as beſt ſuited to break its too great coheſion. Dr. Cox has given us a very accurate account of the ſea-ſand uſed by the farmers of Cornwall, by which their lands are greatly benefited, and their crops largely increaſed. Doubtleſs the huſbandmen of other parts of the kingdom, whoſe lands lie within a moderate diſtance of the ſea, might find the ſame advantage from uſing the ſame manure, which many of them are too apt to overlook.

"The ſea-ſand made uſe of in the agriculture of Cornwall, ſays that ingenious gentleman, lies commonly at or near the ſhore. To diſtinguiſh it from what is uſeleſs, it is proper to obſerve, that this ſand is formed by the grating of ſtones, ſhells, &c. rolled, and tumbled over by the waſh of the ſea. If the matter be ſhelfy, as it is called, that is, the particles formed by the rubbing of ſtones only, it is of ſmall value: but if it be notably ſhelly, it is the thing deſired. Of this ſhelſy ſand there are three colours. About Plymouth, and the ſouthern coaſt, it is bluiſh, or grey, like aſhes; which I conceive to be from the breaking of muſcles chiefly, and oiſter-ſhells mixed with it. Weſtward, near the land's-end, the ſand is very white; and in Scilly, glittering. This I think comes from the mouldering of moor-ſtones, or a kind of free-ſtone, mingled with the white ſhells of the ſcallop-fiſh. On the north-ſea, about Padſtow, and eaſtward of Lundy, the ſand is rich, of a reddiſh-brown colour tinged with yellow, and conſiſts cheifly of the broken ſhells of cockles; which I gueſs to be of that colour there, from the waſh of the Severn, which falls very dirty into the Severn-ſea.

"Beſides theſe differences in the colour of the ſand, there is alſo another in the bigneſs of the grain. The ſmall is reckoned beſt for the tenant, who takes to tillage only for four years; becauſe it works ſooneſt, and yields the moſt ſpeedy return. The larger grain is thought to be more profitable for the landlord, becauſe it abides longer in the ground, and make the paſture afterwards the richer.

"In Falmouth-haven, near St. Mawe's Caſtle, there is a ſort of ſand, or rather coralline, that lies about a foot under the ooze; which ooze being removed, and the bed opened, this ſand is taken up by a dredge, and is uſed about Truroe, Probus, &c.

"Weſt of the mount, in Portcuthnoe-cove, is a large ſhelly ſand. In White-ſand-bay, and about St. Ives, it is very white and ſmall.

"About Minver, Perinſand, and Lelant, the ſands are frequently blown up by the wind, and cover abundance of good land. Some houſes and even churches have been buried in it; nor has any method hitherto diſcovered been able to prevent its devaſtation.

"Of all theſe ſands, the beſt are accounted, as to colour, firſt the reddiſh, next the blue, then the white. As to kinds, the moſt ſhelly, and the coralline are the beſt, eſpecially if it be taken up from under the ſalt-water, either by dredges, or being left almoſt dry by the ebbing of the tide. The blown ſand is accounted of no uſe: and, in general, if ſand be only well drained of ſalt water, ſo that it can be conveniently carried, it is better than that which has lain long drying in the ſun and wind, which takes off much of its virtue.

"Theſe uſeful ſands are carried by lighters as far up into the country as the tides will ſerve for that purpoſe, and there they are caſt on ſhore. From thence they are fetched, in ſome places, by wheel-carriages; but in moſt, by reaſon of the hillineſs, narrowneſs, and badneſs of the ways, on horſe-back; one horſe carrying about thirteen or fourteen gallons. One man drives ſeven or eight of theſe horſes, tailed together, to the diſtance of nine or ten miles from the ſand-place; and each horſe-load comes to about eight-pence or nine-pence, in ſome places; though not ſo much in others: for where it is dredged out of the ſea, it coſts but twelve or thirteen ſhillings the lighter, containing ſixſcore horſe-loads, at the landing-quay, or ſand-place; and where it is loaded from the dry-beach, after the ebb, it is not above four ſhillings the lighter, excluſive of the land-carriage, which is computed at about thirty-two thouſand pounds a year, in the whole of that country.

"When this ſand is brought home, it is ſpread on the ground intended for wheat; or uſually in the firſt crop of four, whatever be the grain. For after four crops, the Corniſh farmers generally leave their land to paſture for ſix or ſeven years, before they till it again: and indeed the graſs is ſo good, immediately after tillage, that they commonly mow it the firſt year, and which they call mowing of gratten.

"The Corniſh acre contains eight-ſcore yards, of eighteen feet to the yard. On one of theſe acres, if near the ſand-place, good huſbandmen beſtow three hundred ſacks, or horſe-loads: if within the reach of three turns a day, two hundred; if within two turns, one hundred and fifty; where only one turn can be made, eighty or an hundred; and ſo in proportion at greater diſtances, even to twenty or thirty ſacks on an acre rather than none.

"The effect generally is, that where much ſand is uſed, the ſeed is as much as the ſtraw little. Land thus manured has produced barley, of which the ear has been as long has the ſtalk it grew on. But where leſs ſand is uſed, there is but little, and that little hungry grain." *Philoſoph. Tranſact. Numb.* 113.

Where this excellent manure is found, it is taken up by a large bag of the ſtrongeſt canvas, to the mouth of which is fixed an iron hoop, or frame, to keep it open, and ſink it to the bottom of the ſea, that it may take up the ſand and coral, as it is dragged along by the bargemen. The Rev. Mr. Borlace ſays, that a barge-load, which is uſually delivered for ten ſhillings, or leſs if near the place of dredging, will dreſs an acre, provided the land be tolerably good.

Large quantities of this ſhelly ſand lie neglected on moſt of the coaſts of England. The benefits ariſing from it, particularly when laid on clayey grounds, are indeed ſomewhat ſlow, but they are very laſting. The improvement is not the firſt or ſecond year; becauſe this manure conſiſts of hard bodies, ſuch as the ſand itſelf, ſhells, fragments of coral, and other calcarions ſubſtances, which require time to diſſolve them, and which afterwards enrich the land for many years. The beſt is that which is mixed with coral, and other hard ſubſtances of that kind. It gives the heat of lime, and the fatneſs of oil, to the land it is laid upon. Being more ſolid than ſhells, it contains a greater quantity of fermenting particles in an equal bulk; nor does it diſſolve in the ground ſo ſoon as ſhells, but decaying more gradually, continues longer to impart its warmth to the juices of the earth.

Similar to this is the practice in Ireland, in that part of the bay of Londonderry, called Loughfoil, towards the eaſtern ſide of which lie ſeveral banks, about the level of low-water. They are formed of the ſhells of ſeveral ſorts of ſea fiſh, particularly periwinckles, cockles, limpets, &c. The country people go thither with boats, and take loads of theſe ſhells, which they leave in heaps on the ſhore, till they are well drained, and thereby rendered lighter for farther carriage. They then carry them in boats as far as the river will allow, and afterwards in ſacks on horſes, ſix, ſeven, or more miles up in the country. They allow ſometimes forty, but more commonly eighty barrels to an acre. Theſe ſhells agree with boggy, heathy, clayey, wet, or ſtiff land, but not with ſandy. They ſeem to give the land a ſort of ferment, as yeaſt does to bread, opening and looſening the clods, and by that means making way for the roots to penetrate, and the moiſture to enter into the fibres of the roots. This manure continues ſo long, that the archbiſhop of Dublin, from whom this was communicated to the Royal Society, could not find any perſon able to determine the time of its duration.

The reaſon of its long continuance ſeems to be, that the ſhells melt every year a little, till they are all ſpent, which requires a conſiderable time; whereas lime, &c. operates, in a manner, at once. But it is to be obſerved, that, in ſix or ſeven years, the ground becomes ſo mellow, that the corn which grows on it cannot ſupport itſelf, and the land muſt be ſuffered to lie a year or two, that the ferment may be a little quieted, and the clods harden; after which it will bear as long again, and continue ſo to do, with the like intermiſſion, for twenty or thirty years.

The good and laſting effects of ſhelly-ſand, for the improvement of clay, afford a ſtrong preſumption that there is an acid in the clay, which the ſhells abſorb or correct: for when that acid is removed, the clay becomes more eaſily ſoluble, or miſcible with water, or, as the farmers term it, is rendered mellow. This is contrary to the opinion of a very ingenious gentleman, Dr. Home, who, becauſe he could not ſeparate an acid from clay, concluded that there was none in it. That the firſt object in the improvement of clay is the deſtroying of this acid, is pretty evident from the qualities of all the ſubſtances uſeful for this purpoſe; every one of them being of the calcarious kind. The tenacity of clay does not ſeem to be owing to the ſmallneſs and unctuous ſmoothneſs of its particles; for in this ſome marles exceed it, and yet are perfectly and eaſily ſoluble in water, probably becauſe they are of a calcarious nature: and if clay be rendered in ſome degree calcarious, by the addition of alcaline or calcarious ſubſtances, ſo long as it continues in that ſtate, it is ſaid to be mellow; that is, it is ſoluble like marle, and continues fit for the production of plants, till the acid in the air either neutralizes the alcali, or ſo far impregnates the calcarious ſubſtances, that they can no longer attract the acid. If this be fact, as it ſeems to be, common ſand can be of little uſe; becauſe the clay will cling as cloſe to a ſtone, or grain of ſand, as it would to part of itſelf, if the ſtone, or ſand, does not ſo far change the body of the clay, as to take off its tenacity; and therefore Dr. Cox ſeems to be very right in ſaying, that the ſand which is formed by the grating of ſtones only, is of little uſe as a manure. However, as ſome eminent writers on this ſubject ſtrongly recommend ſand in general, though they all agree in giving the preference to ſea-ſand, it may not be amiſs to hear what they have ſaid on the ſubject.

Columella, ſpeaking in general terms, ſays, that his uncle uſed to carry ſand on clay, and on the contrary, bring clay on ſandy grounds, with good ſucceſs.

Mr. Worlidge ſays, that the beſt ſand for fertility is that which is waſhed from hills or other ſandy places by the violence of rain; and that ſands which are dry have little fertility in them. *Syſtema Agriculturæ, page* 67.

Mr. Bradley, after dividing ſand into two general ſorts, as Dr. Liſter does, viz. the ſoft, round-grained ſand, ſuch as is found in bogs and hills; and the ſharp or rag-ſand, as it is commonly called, taken from the bottom of rivers, the ſides of highways, or the ſea; adviſes laying even the former on heavy ſoils, eſpecially if it happens to be mixed, as it ſometimes is, with rotted vegetable or animal ſubſtances: to which he adds, that its efficacy will be increaſed by the addition of ſand of a ſharper nature, about a load of which laſt, if uſed alone, ſhould be ſpread upon every rod of very ſtiff land: for a ſufficient quantity of it muſt be allowed, or elſe the clay will ſoon overcome it. *Complete Body of Huſbandry, page* 84.

"The uſe of ſand, ſays Mr. Miller, is to make the clayey earth fertile, and fit to feed vegetables, &c. for earth alone is apt to coaleſce, and gather into a hard coherent maſs, as is apparent in clay; and earth thus glued, as it were, together, is no way diſpoſed to nouriſh vegetables: but if ſand, &c. that is, hard cryſtals, which are not diſſolvable in water, and ſtill retain their figure, be intermixed with ſuch earth, they will keep its pores open, and the ſoil looſe and incompact, by which means the juices will circulate, and plants are nouriſhed thereby. By means of ſand, the earth is rendered, in a manner, organical; pores and interſtices being thereby maintained, ſomewhat analogous to veſſels, by which the juices may be conveyed, prepared, digeſted, circulated, and at length excerned, and thrown off into the roots of plants." *Miller's Gard. Dict.*

Small gritty gravel operates in nearly the ſame manner, as an opener of the earth, and is ſtrongly recommended by Mr. Evelyn, Mr. Worlidge, Mr. Bradley, and Mr. King. Good crops have been produced by very ſtiff and ſour land, after it has been manured with gravel, which, to fit it for this purpoſe, ſhould be ſkreeened, or ſifted, ſo as to leave among it as few ſtones as poſſible.

Shell-marle, or any marle, which makes a ſtrong effervеſcence when an acid is dropped upon it, is a particularly good manure for clay; becauſe diſſolving eaſily in water, it gives a ſufficiently free paſſage to this fluid, by which means the clay is kept dry even in winter: and if the ſoil be of a cold ſour nature, the abſorbent quality of the marle deſtroys that mineral acid, and keeps the ground warm.

The foſſile-ſhells which have been found in ſome countries at a great diſtance from the ſea, are a good manure, if they ſtill retain their quality of ſhells: but beſides their being generally petrified, they never are ſo ſerviceable as thoſe which are taken from the ſea-ſhore.

All animal and vegetable ſubſtances are likewiſe proper manures for clay. *See the article* MANURE.

The alcaline quality of the aſhes of all vegetables, and the calcarious quality of coal-aſhes, render them ſingularly beneficial to ſtiff and ſour land, for which purpoſe they are ſucceſsfully uſed in the neighbourhood of ſome great cities where coal is burnt for fuel. They open clayey grounds, and correct their bad qualities. The gardeners and farmers about London know their value, and make a very profitable uſe of them, particularly to bring into order thoſe grounds which have been dug for brick earth. After ſpreading theſe aſhes upon the clay bottom, they either ſow horſe-beans, or ſet the early Spaniſh, or, ſometimes, the Windſor-bean, in thoſe ſpots; or elſe they lay ſuch lands down with rye-graſs, which generally ſucceeds very well. Mr. Bradley, blaming the people of Staffordſhire, and the countries adjoining, where there are coal-pits, for not improving their many heavy grounds around thoſe pits, by manuring them with coal-aſhes, which might eaſily be burned out of the waſte coal, ſays, "That wherever there are plenty of coal-pits, there can be no want of good profitable land." On the ſame principle, we may account for the effects of the calcination of earth, commonly called, burn-baking, or Devonſhiring. *See the article* BURN-BAKING.

Lime, as it is generally uſed, is not found to be of ſo great ſervice in the improvement of clay, as a long eſtabliſhed practice might give room to think, or its qualities reaſon to expect; becauſe its particles are ſo extremely ſmall, that when ſeparated, or mixed with the clay, they ſoon become part of its body, and, being ſo much divided, are ſpeedily ſaturated by the acid, either in the clay, or in the air: the beſt method, therefore, of uſing lime as a manure for clay is, to ſpread the lime-ſtone unburnt; in which original ſtate acids effervеſce ſtrongly with it, and therefore it will be likely moſt effectually to mellow the clay. It is likewiſe, in this its natural ſtate, attended with the farther advantage of ſaving the expence of burning, and becomes a very laſting manure; nay, probably a perpetual one, if the ſtones are broke into ſmall pieces, which is the proper method of uſing it; as is practiſed at Horneton in Oxfordſhire, where they manure their land with a ſort of ſtone, common in thoſe parts; and about Devonſhire, where a kind of red rock, very tender, and eaſily broken into ſand, is found to be of extraordinary ſervice to clay, or other ſtiff ſoils: for any ſoft ſtone, broken ſmall, will be of advantage to cold lands, if laid upon them. We find by Pliny, that lime was uſed as a manure by the ancient Britons, whoſe lands were thereby rendered extremely fertile.

Mr. Evelyn adviſes uſing lime a little ſlacked for cold, wet grounds, and ſtiff clays; and obſerves, that it is apt to over-heat dry ſoils.

Chalk operates in nearly the ſame manner as lime: but, as Mr. Liſle juſtly remarks, if it be laid on clay, it will, in time be loſt, and the ground will return again to its former condition of clay; as we have already mentioned under the article chalk. *See* CHALK.

CLAYEY, mixed with clay, partaking of the nature of clay.

CLAY LANDS, ſuch as partake of the nature of clay. *See the article* CLAY.

The natural produce of clay lands, with regard to weeds, is gooſe-graſs, or wild tanſey, large daiſies, thiſtles, docks, May-weed, poppies, &c.

CLEARING, a term uſed in threſhing corn, to ſignify a heap large enough to winnow.

CLEDGY, ſtiff, ſtubborn, hard, tenacious, mixed with clay.

CLETCH, a brood, as of chickens, &c.

CLOD, a lump of earth or clay.

CLODDING-BEETLE, a large beetle uſed in ſome parts of England for breaking the clods. This operation may be much ſooner performed, and at far leſs expence, by the ſpikey-roller. *See the article* SPIKEY-ROLLER.

CLOVER, the name of a well known plant, and of which there are a great variety of ſpecies; but only three of them cultivated in the open fields for the food of cattle, viz. the red Dutch clover; the white Dutch clover; and the hop-clover.

The firſt ſort is ſufficiently known in England by the name of red clover, and therefore needs no deſcription. It is called by Linnæus, *Trifolium caule erecto, foliolis oblongo-ovatis integerrimis, ſpicis ovatis, calycibus ſetaceis.*

Since red clover has been cultivated in England, great improvements have been made in clay lands, which before produced little except rye-graſs, and other coarſe bents; but, being ſown with red clover, have produced more than ſix times the quantity of fodder they formerly did: whereby the farmers have been enabled to feed a much greater ſtock of cattle, than they could do before, with the ſame extent of ground, which has, at the ſame time, enriched the ſoil, and prepared it for corn; and hence it is now common, where the land is kept in tillage, to lay down their ground with clover, after having had two crops of corn; whereby there is a conſtant rotation of wheat, barley, clover, or turnips, on the ſame land. The clover-ſeed is generally ſown with the barley in the ſpring; and when the barley is taken off, the clover ſpreads and covers the ground; and this remains two years, after which the land is ploughed again for corn.

Clover is a biennial plant, whoſe roots decay after they have produced ſeeds; but by eating it down, or mowing it, when it begins to flower, it cauſes the roots to ſend out new ſhoots, whereby the plant is continued longer than it would naturally do. The common allowance of ſeed for an acre of ground is ten pounds. In the choice of the ſeed, that which is of a bright yellow colour, inclining to brown, ſhould be preferred; and the pale coloured thin ſeed ſhould be rejected. The clover ſeed ſhould be ſown after the barley is harrowed in, otherwiſe it will be buried too deep; and after the ſeeds are ſown, the ground ſhould be rolled, which will preſs the ſeeds into the ground; but this ſhould be done in dry weather, for moiſture will often cauſe the ſeeds to burſt; and when the ground is wet, the ſeeds will ſtick to the roller. The above is the method generally practiſed by moſt people, in ſowing this ſeed with corn: but it will be much better if ſown alone; for the corn prevents the growth of the plants till it is mowed and taken off the ground, ſo that one whole ſeaſon is loſt; and many times, if there be a great crop of corn upon the ground, it ſpoils the clover, ſo that it is hardly worth ſtanding; whereas, when it is ſown without any other ſeed, the plants will come up more equal, and come on much faſter than that which was ſown the ſpring before under corn.

It is therefore adviſable to ſow the ſeed in Auguſt, when there is a proſpect of rain ſoon after; for as the ground is, at that ſeaſon, warm, ſo the firſt ſhower of rain will bring up the plants, and theſe will have time enough to get ſtrength before winter: and if the clover be well rolled ſome time in October, when the ground is not too wet, it will preſs the ground cloſe to the roots, and cauſe the plants to ſend out more ſhoots: the ſame ſhould be repeated in March, which will be found very ſerviceable to the clover. The reaſon for preferring this ſeaſon rather than the ſpring, for ſowing the ſeeds, is, becauſe the ground is cold and wet in ſpring, and if much rain fall after the ſeeds are ſown, they will rot in the ground; and many times when the ſeed is ſown late in the ſpring, if the ſeaſon ſhould prove dry, the ſeeds will not grow. The other ſeaſon is therefore the ſureſt, and conſequently ſhould be preferred.

About the middle of May this graſs will be fit to cut, when the greateſt care ſhould be taken in the making it into hay; for it will require a great deal more labour and time to dry than common graſs, and will ſhrink into leſs compaſs; but if it be not too rank, it will make extraordinary rich food for cattle. The time for cutting is, when it begins to flower; for if it ſtands much longer, the lower part of the ſtems, and the under leaves will begin to dry, whereby it will afford a leſs quantity of hay, and that not ſo well flavoured.

Some people cut three crops in one year of this graſs; but the beſt way is to cut only one in the ſpring, and feed it the remaining part of the year, whereby the land will be enriched, and the graſs will grow muſt ſtronger.

One acre of this plant will feed as many cattle as four or five acres of common graſs; but great care ſhould be taken of the cattle when they are firſt put into it, leſt it fill them with wind and kill them, which is called their being hoven. *See the article* HOVEN.

In order to prevent this accident ſome turn them in for a few hours only at firſt, and ſo ſtint them as to quantity; and this by degrees, letting them at firſt feed one hour only in the middle of the day, when there is no moiſture upon the graſs, and ſo every day ſuffer them to remain a longer time, until they are fully ſeaſoned to it: but great care ſhould be taken never to turn them into this food in wet weather; or if they have for ſome time been accuſtomed to this food, it will be at leaſt proper to turn them out at nights in wet weather, and let them have hay, which will prevent the bad conſequences of the green clover. Others give their cattle ſtraw while they are feeding upon this graſs, to prevent the ill effects of it; but this muſt not be given them in the field, becauſe they will not eat it, where there is plenty of better food. There are others who ſow rye-graſs among their clover, which they let grow together, in order to prevent the ill conſequences of the cattle feeding wholly on clover; but this is not a commendable method, becauſe the rye-graſs will greatly injure the clover in its growth, and the ſeeds will ſcatter, and fill the ground with bent.

Where the ſeeds are intended to be ſaved, the firſt crop in the ſpring ſhould be permitted to ſtand until the ſeeds are ripe, which may be known by the ſtalks and heads changing to a brown colour, when it ſhould be cut in a dry time; and after being well dried, it may be houſed till winter, when the ſeeds ſhould be threſhed out; but if the ſeeds are wanted for immediate ſowing, it may be threſhed before it is houſed or ſtacked; but it muſt then be well dried in the field, otherwiſe the ſeeds will not quit their huſks.

It has been a common complaint among the farmers, that they could not threſh out theſe ſeeds, without great labour and difficulty; but this is chiefly owing to their cutting the ſpring crop, when it begins to flower, and leave the ſecond crop for ſeed; which ripening ſo late in autumn, there is not heat enough to dry the huſks ſufficiently; whereby they are tough, and the ſeeds rendered difficult to get out. This complaint may therefore be entirely removed by leaving the firſt crop for ſeed, as above directed; and then the ground will be ready to plough and prepare for wheat the ſame year, which is another advantage.

When cattle are fed with this hay, the beſt way is to put it in racks, otherwiſe they will tread a great deal of it down with their feet. This feed is better for moſt other cattle than milch cows, ſo that theſe ſhould have very little of it, leſt it ſhould prove hurtful to them; though it is not near ſo injurious to any ſort of cattle when dry, as it is when green.

The ſecond ſort, namely, the white Dutch clover, grows naturally in moſt of the paſtures in England, and is generally known among the country people, by the name of white honey-ſuckle. Linnæus calls it, *Trifolium capitalis umbellaribus leguminibus tetraſpermis, caule repente.*

This is an abiding plant, whoſe branches trail upon the ground, and ſend out roots from every joint, ſo that it thickens and makes the cloſeſt ſward of any of the ſown graſſes; and it is the ſweeteſt feed for all ſorts of cattle yet known: therefore when land is deſigned to be laid down for paſture, with intent to continue ſo, it ſhould be ſown with the ſeeds of this plant. The uſual allowance of this ſeed is eight pounds to one acre of land; but this ſhould never be ſown with corn, for if there is a crop of corn, the graſs will be ſo weak under it, as to be ſcarce worth ſtanding; but ſuch is the covetouſneſs of moſt farmers, that they will not be prevailed on to alter their old cuſtom of laying down their grounds with a crop of corn, though they loſe twice the value of their corn by the poorneſs of the graſs, which will never come to a good ſward, and one whole ſeaſon is alſo loſt; for if this ſeed is ſown in the ſpring without corn, there will be a crop of hay to mow by the middle, or latter end of July, and a much better after-feed for cattle the following autumn and winter, than the graſs which is ſown with corn will produce the ſecond year. The ſeed of this ſort may alſo be ſown in autumn, in the manner before directed for the common red clover; and this autumnal ſowing, if the ſeeds grow kindly, will afford a good early crop of hay the following ſpring; and if, after the hay is taken off the land, the ground be well rolled, it will cauſe the clover to mat cloſe upon the ground, and become a thick ſward.

The ſeeds of this white Dutch clover is annually imported from Flanders, by way of Holland, whence it received the name of Dutch clover; not that it is more a native of that country than of this, for it is very common in moiſt paſtures, in every county in England: but the ſeeds were never collected for ſowing in this country, till of late years; nor are there many perſons here, even now, who ſave this ſeed, though it may be done if the ſame method, as is practiſed for the red clover, be taken with this ſort; it ſhould therefore be recommended to every farmer, who is deſirous of improving his land, to ſow carefully an acre or two of this white clover for ſeed, which will ſave him the expence of buying for ſome years, when the price is great; and there will be a ſure market for any quantity he may have to ſpare.

The reader will find a farther account of this graſs under the article PASTURE.

The third ſort, namely hop-clover, called by ſome yellow meadow trefoil, and by botaniſts, *Trifolium ſpicis ovalibus imbricatis, vexillis deflexis perſiſtentibus, calycibus nudis, caule erecto*, grows naturally among the graſs in the upland paſtures of this country; but the ſeeds are frequently ſold in the ſhops, and are by many mixed with the other ſorts of clover and graſs-ſeeds, for laying down ground to paſture. This plant grows with upright branching ſtalks about a foot high, garniſhed with trifoliate leaves, whoſe lobes are oblong and heart-ſhaped, but reverſed, the narrow point joining the foot-ſtalks. The flowers, which are yellow, grow from the wings of the ſtalk, upon long foot-ſtalks, collected into oval imbricated heads, having naked impalements lying over each other like ſcales, ſomewhat like the flowers of hops, from whence the plant had the name of hop-clover. But there are two ſorts of this clover, which grow naturally in England. The other is a much ſmaller plant than this, and generally known by the name of noneſuch, or yellow hop-trefoil. *See the article* NONESUCH.

The hop-clover is ſtrongly recommended by the following circumſtances. 1. It not only grows, but flouriſhes on the moſt barren ſands, and therefore muſt be a very proper graſs to cultivate on ſuch unfertile ſoils, where any other graſs that is worth notice will not grow at all. 2. It is not apt to ſwell cattle, as the red clover does. 3. In good ground it will continue long, and bear a very good ſeed or crop, as Mr. Tull, though prejudiced againſt clovers, confeſſes; and, by its flouriſhing both on ſands and clay, which have not been ploughed for many years, it ſeems likely to continue long in any ſoil.

CLOUGH, a valley between two ſteep hills. It alſo ſignifies a cliff.

CLOUT, an iron plate on the axle-tree of a carriage.

CLUMP, a number of trees growing together without ſhape or order.

CLUNG, cloſed up, or ſtopped; ſpoken of hens when they do not lay. It is alſo applied to wood, or any other thing that is ſhrivelled, or ſhrunk up, when it is ſaid to be clung.

CLUSTER, a bunch, a number of things of the ſame kind growing or joined together. Alſo a number of animals, or a body of people, collected together.

M. de Chateauvieux has made a very remarkable experiment on ſowing corn in cluſters, which muſt not be omitted here.

"It is of great conſequence, ſays that ingenious and aſſiduous cultivator, to know which is the moſt profitable way of ſowing beds with corn; I mean, that by which they will be ſtocked with a proper number of plants; for when too much ſeed is ſown, the plants hurt one another; and when too little, the earth is not enabled to produce ſo much as it is capable of doing.

"The buſineſs, therefore, is to determine what number of plants would be moſt advantageous. Luckily the difference is wide enough between the too great, and the too ſmall number; and the produce of the crop cannot only be diminiſhed by an exceſs one way or the other.

"But whatever certainty we may acquire with reſpect to this intereſting point, we cannot flatter ourſelves that we ſhall be always able to keep it in our practice. The various accidents to which corn is liable, from the hour of its being ſown till it is reaped, will always fruſtrate the methodical arrangement which we may have intended to give the plants.

"The difficulty of ſucceeding in this enquiry ought not however to diſcourage us: for it would be attended with ſuch advantages, as would make very ample amends for all the labour beſtowed upon it. Let us then have recourſe to experiments. Thoſe that are made with this view can never be quite uſeleſs. If they do not lead us to the very thing we are in ſearch of, they may at leaſt diſcover to others what may be of ſervice.

"According to our principles, the diſtance between each plant ought to be equal throughout the whole length of the rows, that all of them may have an equal quantity of earth to draw their nouriſhment from.

"Several experiments have ſhewn, that ſix inches is not too great a diſtance for the plants to be at from one another. In this caſe it would be ſufficient to ſow one grain of wheat at every ſix inches diſtance. According to this diſpoſition, a field well prepared ought to produce the greateſt crop. The plants will commonly branch out ſo as to have twenty, thirty, or forty ſtalks: I have had ſome with upwards of eighty. It is pity that this exact diſtribution of the ſeed cannot ſubſiſt long. An accident I lately met with ſoon convinced me that it was neceſſary to increaſe the quantity of ſeed, and that very conſiderably.

"This does not, however, yet hinder me from thinking, that if any eaſy method could be found to have a plant of wheat exactly at every ſix inches diſtance in the rows, it would be the beſt way of ſowing lands. I have often conſidered how this could be reduced to practice, as well to ſatisfy my curioſity, as to enable me to proceed with more certainty in my operations. When a theory is known to be good, we are ſtrongly encouraged to draw all poſſible advantages from it for the practical part; we proceed with confidence and pleaſure.

"Experience having convinced me that it never would be poſſible to have a plant at every ſix inches in each row, by ſowing only a ſingle grain of wheat at thoſe diſtances, it naturally followed, that the way to have the ground better covered with plants was, to ſow more grains. The next queſtion was, how many grains ſhould or ought to be ſown in each place? Should it be two, three, or more? Experience only could anſwer this queſtion. I therefore tried the following experiment. I ſowed a different number of grains in cluſters, ſix inches diſtant from each other, putting one grain in the firſt, two in the ſecond, and ſo on to the ſixth, which had ſix grains: then I began again, and went on as before, till the whole length of the row was ſowed in this manner. The produce of each cluſter was to ſhew me whether it would be beſt to double, triple, or quadruple the ſeed; which it was plain had been ſown too thin, when a ſingle grain was dropt at every ſix inches.

"The winter of 1753 was already far advanced when theſe thoughts firſt occurred to me. It was then too late to try this experiment with wheat; but that I might not loſe a year, I did it in the ſpring with barley; not doubting but that corn, which is uſually ſown in March, might furniſh me with ſome future hints for the culture of that which remains longer in the ground.

"Accordingly on the ninth of April 1754, I ordered another bed to be ſowed with barley in my preſence, and in the manner I have juſt related. I counted all the grains of each cluſter myſelf. They were ſown in three rows. I varied the experiment in the rows next the ſouth, by ſowing no cluſters there of leſs than three, four, five, or ſix grains: which I continued the whole length of the row. At harveſt, all the cluſters in which ſeveral grains had been ſowed, were ſo thick, that they touched one another.

"What is of moſt conſequence to our culture is, to know the produce of each cluſter. But it will be neceſſary previouſly to obſerve, that the cluſters were ſown in rows extending forty feet in length, and that the beds were five feet wide.

"Reſults:

The *South row*

ſowed with 6, 5, 4, and 3 grains,
produced 661, 624, 447, and 493 ſtalks.
In all 2225 ſtalks.

"The *Middle row*,

ſowed with 1, 2, 3, 4, 5, and 6 grains,
produced 48, 72, 147, 204, 219, and 487 ſtalks.
In all 1177 ſtalks.

"The *North row*

ſowed with 6, 5, 4, 3, 2, and 1 grain,
produce 502, 372, 345, 276, 200, and 92 ſtalks.
In all 1787 ſtalks.

"Conſequently the whole number of ſtalks in the three rows was 5189. They yielded ſeventeen pounds of grain, beſides a very conſiderable quantity ſhed in cutting.

"On the footing of this crop, an arpent of thirty-ſeven ſquare toiſes (equal to about one acre and three quarters of a rood Engliſh) would contain at leaſt forty-four beds five feet wide, which was the breadth of the beds on which this experiment was made. The beds would be 222 feet long: the produce of one of them would be ninety-three pounds, eight ounces; and that of the forty-four, 4138 pounds, eight ounces: a very conſiderable crop, and which might be carried ſtill further by other experiments of the ſame kind.

"The following obſervations deſerve the reader's utmoſt attention. Firſt, by this experiment, I have very nearly effected what I aimed at, viz. to have two or more plants grow ſo cloſe together, as to ſeem but one; and that at ſix inches diſtance from each other. If the three rows had been joined together lengthways, they would have been 120 feet long, and ought to have contained 240 plants only: but the diſtances, which were marked by gueſs, not being exactly ſix inches each, ninety-ſix cluſters were ſown in each row, which made ſixteen cluſters over and above. By this means ſeveral of them were nearer than ſix inches to one another.

"Two hundred and eighty-eight cluſters were ſown, all of which produced plants, except twenty-five, which either did not ſprout, or the plants periſhed. This deficiency is not very conſiderable; but we muſt obſerve, 1. That almoſt all the places where this happened had been ſown with only one or two grains of corn. 2. That it was in the middle row that the greateſt number of plants was wanting. 3. That the ſouth row, in which the ſmalleſt quantity ſown for any one tuft, was three grains, furniſhed and retained its full number of plants: and laſtly, that almoſt all thoſe which were next to the vacant ſpaces, were ſtronger than the reſt, and thereby made amends for the loſs of the others.

“ Secondly, the whole number of the ſtalks amounted to 5189, which is after the rate of forty-three ſtalks and a quarter to a foot: but it is much more conſiderable in the ſouth row, which having produced in all 2225 ſtalks, the proportion is fifty-five and a half to a foot. The cauſe of this difference is eaſily ſeen. The expoſition of that row to the ſouth being more favourable than that of the others, may have contributed thereto; but it was very plain that it was chiefly owing to none of the cluſters in that row being ſown with ſo few as one or two grains.

“ Thirdly, we ſee that the increaſe of the ſtalks was, in general, in proportion to that of the ſeed; only the cluſters that were ſown in three grains in the ſouth row, produced forty-ſix ſtalks more than thoſe which were ſown with four grains; but ſtill the general reſult of the three rows was exactly in the ſame progreſſion, as appears by the following recapitulation:

Recapitulation.

Stalks produced by 1 grain	140
2 gr.	272
3 gr.	916
4 gr.	996
5 gr.	1215
6 gr.	1650
Total	5189

“ Fourthly, the ears were nearly equal, at leaſt in two thirds of the length of the rows: the other third ſurpaſſed the reſt very conſiderably.

“ Fifthly, the difference between the produce of the cluſters ſowed with one, and with ſix grains, is extremely great. The former produced but 140 ſtalks, the other multiplied to 1650. It is true the number of the cluſters of ſix grains is greateſt, which is ſome ſmall diminution of this difference.

“ Sixthly, I obſerved ſeveral ſtalks from which others had ſhot out, all as ſtrong, and as long, as thoſe from which they derived their origin. They proceeded from the firſt joint above the ſurface of the earth, generally at the height of three, four, or five inches, and were two, three, and ſometimes four in number. I never perceived this kind of multiplication before; but had till then always obſerved it to be at the neck, or point of ſeparation between the roots which deſcend, and the ſtalks which aſcend, that the ſtalks branched out.

“ Seventhly, I ſuſpected, in the ſummer, what was the cauſe of the great vigour of the plants of this experiment; but I ſaw it much plainer after harveſt: for, upon pulling up ſome of the tufts of ſtubble, I found their roots innumerable. This fact is ſtrictly true. I could not count them upon any one plant that had more than fifteen or twenty ſtalks. Theſe roots were in ſuch bundles, and ſo confuſedly interwoven one with another, that after counting ſeveral hundreds of them I was forced to give up the taſk. Their length and thickneſs was anſwerable to their number.

“ I muſt now remind the reader of what I ſaid before, that the ſeveral accidents which I met with in my firſt experiments, ſhewed me it was neceſſary to increaſe the quantity of the ſeed. I did ſo, by ſmall degrees, from year to year. It is equally important for the ſucceſs of the new huſbandry, not to run into another extreme, by loading the earth with more plants than it can nouriſh: the crop would be conſiderably diminiſhed thereby.

“ It appears from this experiment, that the plants of the cluſters that were ſowed with ſix grains, did not hurt one another: on the contrary, their being ſown in that manner proved an advantage, ſince they produced much more than the others; whence it follows, that we may, without danger, extend the quantity of ſeed beyond the limits of the new huſbandry. Its principles are not the leſs true; but they leave the farmer at liberty to uſe his own prudence in the application of them, according to the nature of the ſoil.

“ Thoſe principles, which ſuppoſe that every plant is to ſubſiſt till harveſt, reduce the ſeed to a very ſmall quantity: but numbers of accidents deſtroy many of them. Our reaſon ought therefore to tell us, that without deviating too much from the principles we adopt, we may, and ſhould, judiciouſly ſtock our land with a ſufficient number of plants, in order to guard againſt unavoidable accidents.

“ Still I may be aſked, what is the ſufficient quantity? I anſwer, that our experiment ſhews that ſowing ſix grains together in a cluſter, at the diſtance of ſix inches from each other, all the length of the rows, will not be found too thick. By following this rule, we may be almoſt certain that the whole ground will be ſtocked with a proper number of plants. This ought, however, to be looked upon only as a general propoſition, which it will be often proper to deviate from in the circumſtances we are going to mention,

“ When the ſowing ſeaſon is favourable.

“ When the land is well prepared.

“ In countries where the winter is ſeldom ſevere.

“ When the land is but little liable to inſects.

“ When the land is not in danger of being hurt by too much drought, or too much wet.

“ And laſtly,

“ When the land is good, and very fertile.

“ In all theſe and ſuch like caſes, leſs ſeed ſhould be ſowed; and, in the contrary caſes, more. Prudence, and a careful ſtudy of the nature of the ſoil, ought to be our guides. Two or three years experience will be ſufficient to ſhew us the practice that will be beſt to follow.

“ It will be right to repeat our laſt mentioned experiment, and even to vary it. In all probability it will afford us ſtill greater lights. It will be right, for example, to ſow the cluſters with a greater number of grains, beginning with ſix, the produce of which is known, and going on to ſeven, eight, or even more, always in cluſters, till we come to a number at which the crop ceaſes to yield an equal profit. By this means the two extremes may be known, either of too much, or too little ſeed; and the juſt proportion will then be eaſily determined.

“ Some farther alterations may likewiſe be made in this experiment. For example, I placed the grains in the earth ſo that they touched one another; they may be placed at ſome little diſtance, and ranged in a kind of circle of about three inches diameter. It is reaſonable to think, that the plants may then make a greater progreſs, as they will not all have one common center: ſome of them will be nearer the ploughed alley; their roots will reach it more eaſily than before, and will multiply there; which may render the plants more vigorous.” *Du Hamel's Culture des Terres, tom.* IV.

CLUSTER-GRAPE, the ſmall black grape, generally called the currant.

COAL, the common foſſile fuel.

COAL-ASHES. *See the article Coal-*Ashes.

COAL-BALLS, a compoſition of culm, or the duſt and refuſe of pit-coal, mixed up with mud, clay, &c. burnt as fuel.

About Briſtol, Briſlington, and other places in the weſt of England, they commonly make coal-balls of their culm, or ſmall refuſe-coal, which would not otherwiſe be ſaleable.

The method of making theſe balls is, to take a certain quantity of the culm, and an equal quantity of fleech, or mud left by the tide on the ſea-ſhore: theſe ingredients are firſt mixed groſsly with ſhovels, and then blended more perfectly with the hand: after which they are moulded into balls of about ſix inches diameter.

Theſe balls may either be burnt immediately as ſoon as they are made, or laid up and kept as long as the owner pleaſes, without ſuffering the leaſt damage.

The inhabitants of Croken-pill, near King Road, about ſeven miles below Briſtol, are ſuppoſed to make them in the greateſt perfection. They ſeldom uſe any other fuel, and find it anſwers extremely well, being much cheaper than coal, making as good a fire, and laſting longer.

They make it a rule to work as much culm into the ſleech with their hands, when they mould the balls, as they poſſibly can, without making them crumbly.

Theſe balls have not been uſed above thirty or forty years in the above parts; but are now greatly preferred, though they can have coals laid in at three-pence halfpenny the buſhel.

In Wales, where theſe coal-balls are alſo made, they uſe clay inſtead of the ſleech, allowing two parts of culm to one of clay, adding to the heap a ſufficient quantity of water, which they temper with it, in the ſame manner as if they were making mortar with lime and ſand. And after the culm and clay have been ſufficiently mixed and tempered together, they form the whole into balls, in the manner above related.

The balls made with clay are not ſo pleaſant a fuel as thoſe made about Briſtol with ſleech, becauſe the clay is apt to emit a ſtinking ſmoke, eſpecially if the balls are burnt before they are dry; but notwithſtanding this inconvenience, which the lower ſort of people little regard, they afford the poor a good and cheap fuel.

It is ſurprizing that ſome work of this kind is not undertaken in the neighbourhood of London, as it would greatly tend to leſſen the enormous expence to which the poor of the metropolis are every winter ſubject, for fuel; and could not fail of rewarding the undertaker for his trouble. Culm might be imported into the Thames very cheap, and nothing could be more ſuitable than the river mud to mix with it, in order to form the balls; it would, probably, do better than the ſleech, being of a richer, and more combuſtible nature.

COAL-SOOT, the ſoot collected in chimnies, &c. where coals are burnt. A correſpondent of the editors of the Muſeum Ruſticum has obliged the world with ſome uſeful obſervations on coal-ſoot as a manure. He obſerves that many farmers in ſome countries are at a great loſs to find a proper dreſſing for their meadows; and to ſuch he recommends the uſe of coal-ſoot, as highly profitable and advantageous; its effects will be very viſible for upwards of three years, during which time no other manure need be laid on the land.

“Coal-ſoot, ſays he, is of a very warm refreſhing nature: it cheriſhes, and gives nouriſhment to the graſs; it kills the noxious inſects that infeſt the crop, and protects it from the effects of froſts, ſnows, and chilling rains; and, what is ſtill of greater conſequence, it will kill the moſs that ſo often abounds in ſour meadows.

“I muſt not however fail noticing, that ſoot will not have theſe good effects if the meadow-land ſhould be ſo damp as to require draining: in this caſe, cuts muſt be made acroſs it, in proper directions, previous to the laying on the coal-ſoot, which would otherwiſe be of little ſervice.

“All rank weeds ſhould be carefully grubbed up from among the graſs, and that before they have perfected their ſeeds; without which precaution, in point of time, the work would be to do over again.

“The general quantity I lay on an acre of meadow-land is twenty-five looſe buſhels: more I find to be rather prejudicial, and leſs does not anſwer all the purpoſes we are to expect from this excellent manure.

“The beſt time for applying this dreſſing, I take to be the beginning of the ſpring: about February is the time I generally lay it on; the gentle rains which then, for the moſt part, enſue, waſh it into the land, and the following crop is greatly benefited by it. This is very ſoon viſible from the fine deep verdure which the graſs aſſumes.

“Some of my meadow-land is particularly ſubject to be damaged by froſts, ſnows, &c. on this I generally lay the proper quantity of ſoot in the beginning of November; and ſometimes, if the winter is likely to be ſevere, I venture to allow thirty buſhels to an acre, which in other caſes I never do.

“Having myſelf found great benefit by uſing this coal-ſoot as a manure for meadows, I am willing my brother farmers ſhould know it, that they may have it in their power to adopt the practice, if they approve of it.

“It will be well worth their while, provided they can have it at a reaſonable rate, which they may, if they do not live more than twenty miles from London, by land-carriage, and wherever there is a communication by water, though at almoſt ever ſo great a diſtance.

“Other great towns alſo, where ſea or pit-coal is burnt, may ſupply the farmers with it; but the misfortune is, that where it is in the greateſt plenty, they leaſt know the uſe of it.

“Great care however ſhould be taken to get it genuine and good, the merchant chimney-ſweepers, frequently to increaſe the bulk, mixing the fine ſifted coal-aſhes with it: this is a great fraud, but may eaſily enough, with proper care and circumſpection, be diſcovered; for the aſhes make the ſoot gritty, and increaſe its weight in a very ſenſible degree.

“Before I conclude, I muſt give my brother farmers a caution; which is, that they never lay the ſoot on their land in windy weather, as not only great part of it will be loſt and waſted, but the remainder will be ſo unequally diſpoſed, as to do rather more harm than good.” *Muſeum Ruſticum*, *vol.* I. *pag.* 218.

Coal-ſoot is alſo an excellent dreſſing for green wheat in February; it ſhould be ſown by hand, in quantity ſufficient to blacken the ground. This is frequently practiſed in Leiceſterſhire, and many other counties. It is of a warm nature, and therefore does moſt good on cold, moiſt, clayey ſoils.

COB, a wicker baſket to carry on the arm. Hence a ſeed-cob, or ſeed-lip, is a baſket for ſowing.

COCCIFEROUS *Plants*, ſuch as bear berries.

COCK, the male to the hen; alſo the male of any ſmall birds.

COCKEREL, a young cock.

COCKLE, the ſame with darnel-graſs. *See* Darnel-Grass.

COCKSCOMB, a very elegant ſpecies of the amaranthus, cultivated in curious gardens for its beauty. The culture of this beautiful plant is the ſame with that of the amaranthus. *See* Amaranthus.

CODLING, a well known ſpecies of apple. *See the article* Apple.

COFFIN, that part of the horn or hoof of a horſe which appears when he has his foot ſet on the ground.

COFFIN-BONE, that bone which lies within a horſe's hoof as in a coffin.

This bone is round upwards, where it receives the little paſtern, but grows broader and thinner towards its bottom; it is of a porous open contexture, like a piece of loaf ſugar, and is eaſily pierced, and often wounded when horſes happen to take up nails or other ſharp bodies in the ſtreets or roads: accidents to which they are often liable, and are more eaſily cured than they would have been, had the bone been hard and ſolid.

COFFIN-JOINT, that where the leſſer paſtern joins the foot.

When the coffin-joint is ſtrained, a horſe often continues a long time lame, without the owner's diſcovering where the lameneſs lies; becauſe a horſe does not, at firſt, ſavour it much on the bending of the foot, only in planting his foot upon the ground: but in time there will grow ſuch a ſtiffneſs in that joint, that he will only touch the ground with his toe, and it will be impoſſible to play the joint with one's hand. The only method of removing this ſtiffneſs is bliſtering and firing, which generally ſucceeds, unleſs the ſtiffneſs and contraction has been of long ſtanding. *Gibſon's Farriery*, *vol.* II. *pag.* 372.

COKE, pit-coal, or ſea-coal, charred. It is made by burning pit-coal in ovens conſtructed for that purpoſe, and extinguiſhing the fire in the ſame manner as is done for charcoal.

COLD, the name of a diſeaſe to which animals of almoſt every kind, particularly horſes, are very ſubject.

Colds are cauſed by an obſtruction of perſpiration: that is, the pores, or outlets of the ſkin, are ſo far ſhut up, that the ſteams of perſpirable matter are checked ſo that they cannot paſs off in their uſual manner. The conſequence of this is, they recoil on the blood, vitiate its quality, overfil the veſſels, and affect the head, the glands or kernels of the neck and throat, the lungs, and other principal parts.

It would be endleſs to enumerate the various cauſes of colds; the moſt uſual are, riding horſes till they are hot, and ſuffering them to ſtand in that condition, where the air is cold and piercing; removing a horſe from a hot ſtable to a cold one, and too ſuddenly changing his cloathing: hence it is that horſes catch ſevere colds after they come out of dealers hands; and by not being carefully rubbed down, when they come in hot, off journeys.

The ſigns of a horſe's catching cold, are a cough, heavineſs, and dulneſs, which affect him more or leſs in proportion to the ſeverity of it: the eyes are ſometimes moiſt and watery, the kernels about the ears, and under the jaws ſwell, the noſe gleets, and he rattles in his breathing; and when the cold is violent, the horſe will be feveriſh, his flanks work, and he will both loath his hot-meat, and refuſe his water. When theſe laſt ſymptoms are attended with a ſlimy mouth, ears and feet cold, and a great inward ſoreneſs, there is danger of a bad fever.

But when the horſe coughs ſtrong, ſnorts after it, is but little off his ſtomach, pricks up his ears, and moves briſkly in his ſtall, dungs and ſtales freely, his ſkin feels kindly, and his coat does not ſtare, he is in no danger, and there will be no occaſion for medicines of any kind; but you ſhould bleed him about two quarts, keep him warm, and give him feeds of ſcalded bran, with as much warm water as he will drink, in order to dilute his blood.

If the diſorder ſhould increaſe, the horſe fall hot, and refuſe his meat, bleed him, if a ſtrong one, two quarts more; and if you are not ſatisfied, without giving medicines, avoid, as you would poiſon, a farrier's drench; which is generally compoſed of ſome hot nauſeous powders, given in a quantity of ale: which too often increaſes the fever, by over-heating the blood, and palls the horſe's ſtomach by its loathſomeneſs. And inſtead of it, infuſe two ounces of anniſeeds, with a dram of ſaffron, in a pint and a half of boiling water; pour off the clear, and diſſolve in it four ounces of honey; to which may be added four ſpoonfuls of ſallad oil: this drink may be given every night; or one of the following balls, provided there is no fever; in which caſe, it always will be more eligible to give two or three ounces of nitre, or ſal prunella, every day in his feeds, or water, till it is removed; but ſhould the horſe be inclined to coſtiveneſs, remember that his body ſhould be kept open by emollient clyſters, or cream of tartar diſſolved in his water, to the quantity of three or four ounces a day.

Take of the freſh powders of anniſeed, elicampane, carraway, liquorice, turmeric, and flour of brimſtone, each three ounces; juice of liquorice four ounces, diſſolved in a ſufficient quantity of mountain; ſaffron powdered half an ounce, ſallad-oil and honey each half a pound, oil of anniſeed one ounce: mixed together with wheat-flour enough to make them into a paſte.

Or, Take the following from Dr. Brachen.

Take anniſeed, carraway-ſeed, and greater cardamoms, finely powdered, of each one ounce, flour of brimſtone two ounces, turmeric in fine powder one ounce and a half, ſaffron two drams, Spaniſh juice diſſolved in water, two ounces, oil of anniſeed half an ounce, liquorice-powder one ounce and a half, wheat-flour, a ſufficient quantity, to make into a ſtiff paſte, by beating all the ingredients well in a mortar.

Theſe balls conſiſt of warm opening ingredients; and, given in ſmall quantities, about the ſize of a pullet's egg, will encourage a free perſpiration; but, in caſe of a fever, ſhould be cautiouſly continued. They are much more efficacious, and in all caſes ſuperior to the farrier's drenches, if diſſolved in a pint of warm ale.

This ſimple method, with good nurſing and hot maſhes, warm water and cloathing, eſpecially about the head and throat, which promotes the running at the noſtrils, will anſwer in moſt ſudden colds; and when the horſe feeds heartily, and ſnorts after coughing, moderate exerciſe every day will haſten his recovery.

The ſcalded bran ſhould be put hot into the manger, for the ſteams conduce not a little to promote a running at the noſe, which is often very plentiful, and greatly forwards the cure. His manger ſhould be kept clean, by filling it with ſtraw; his hay well ſhook and ſprinkled with water, and given in ſmall quantities: for his breathing, at this time, taints the hay, and then he will not touch it.

To a horſe loaded with fleſh, a rowel may ſometimes be neceſſary, as may alſo a gentle purge or two, to ſome, when the diſtemper is gone off. *Bartlet's Farriery, pag.* 26.

COLD-CHARGE, the name of a medicine much uſed by farriers for curing ſtrains, &c. It conſiſts of vinegar, bole, and the whites of eggs, mixed together to the conſiſtence of a poultice, and ſpread over the part hurt.

COLE, *or* RAPE, the name of a plant greatly cultivated, both on account of its ſeed, being that from whence the rape-oil is drawn; and alſo for feeding cattle. The botaniſts call it *napus ſylveſtris*, or wild navew.

The marquis de Turbilli, who has done more ſervice to agriculture than any other foreign writer, has lately publiſhed a memoire on the culture of cole-ſeed, as practiſed by the Flemiſh farmers, to whom we are indebted for many valuable improvements in huſbandry.

In the piece above-mentioned, the marquis obſerves, that all ſorts of cole-ſeed are cultivated in the ſame manner; and that all grow more or leſs towards their natural perfection, yield more or leſs ſeed, and this ſeed is of a better or worſe quality, according to the nature of the ſoil on which the cole-ſeed is ſown, the good or bad huſbandry beſtowed on it, the favourableneſs of the ſeaſon, and the manner in which it eſcapes other accidents to which it is ſubject.

Cole-ſeed, he ſays, thrives beſt in deep kindly ſoils; but with plenty of manure, and deep ploughing, it will grow any where. He adds, that he has ſeen it yield good crops on a dry chalky ſoil, on which ſtreet dirt had been laid.

We muſt obſerve, that this is a very uſeful piece of knowledge to propagate, as we never yet heard of any farmer in England, who ventured to ſow it on ſuch a ſoil. This ſhould be attended to by the Bedfordſhire farmers about Dunſtable, &c.

Our noble huſbandman next remarks, that in Flanders cole-ſeed is ſown and tranſplanted like cabbages: they give two ploughings to the land before winter; and it is not of much conſequence what crop the land was laſt under.

In the month of May another deep ploughing is given; the land is harrowed two or three times, and then rolled, in order to make it fine. Towards the eighteenth or twenty-fourth of July, it is again ploughed, harrowed, and rolled till it is reduced to as fine a tilth as poſſible: the ſeed is then ſown, being ſcattered by the three fingers: the land is lightly harrowed, and afterwards rolled.

The marquis ſays, that twenty-four pounds of ſeed will ſow three acres, and the plants on theſe three acres will fill twelve others. Cole-ſeed is tranſplanted after any crop whatever.

The land intended to receive the cole-ſeed plants ſhould be twice ploughed as ſoon as the crop is carried off. About ten or fifteen days afterwards it is to be once or twice harrowed, and towards the end of September it ſhould have a very deep ploughing. In this laſt ploughing there ſhould be an open furrow or trench every five bouts. If the field does not lie level, it ſhould be ploughed obliquely, ſo that there may be an eaſy fall for the water.

The beſt and moſt promiſing plants being taken up, and tied in bunches, are carried to the field where they are to be tranſplanted, by the time the laſt ploughing is completed, and the workmen are ready for them.

There will always remain a number of plants in the land where they were ſown: theſe are generally fed off with cattle; for the farmers never let them ſtand to ripen their ſeeds, unleſs they intend to manure the land for the ſucceeding crop.

The ſeaſon in Flanders for tranſplanting cole-ſeed is the beginning of October. The plants are placed in rows acroſs the furrows. The rows are one foot aſunder,

der, and the plants in the rows about ſix inches diſtance one from the other. The manner in which this work is done is as follows. A certain number of men advance in a parallel line, each having a dibble, or ſpade-handle, with two large iron points to it, ſix inches aſunder: they drive this inſtrument into the ground; the women and children follow, who put a plant into every hole, and ſettle it at the ſame time; which is eaſy enough to do, and it ſaves ſome expence.

When all the cole-ſeed is planted, if the land to which it was removed was not dunged before it was ploughed, it muſt be ſown with pigeons dung reduced to powder: this, of all other manures whatever, has the moſt immediate and proper effect on the vegetation of this plant; ſixty buſhels are enough for two acres.

When this is done, the looſe earth in the trenches, or open furrows, is to be thrown with a ſhovel amongſt the plants in the rows. Early in the ſpring, a ſpit of earth out of the trenches is, in like manner, to be caſt amongſt the plants of cole-ſeed in the rows. This ſlight tillage gives vigour to the crop, choaks the weeds, and keeps the ſoil looſe.

The rows of cole-ſeed form a number of beds, and when it thrives well, the trenches are entirely covered, and the whole reſembles a thick copſe.

Here the marquis obſerves that cole-ſeed thrives perfectly well in new-encloſed lands.

The ſeed is fit to gather about the beginning of July. When it turns yellow, it is reaped like corn, and laid in pretty large gavels on the beds, where it remains three or four days; it is then carried in cloths, in order to prevent any of the ſeed from being loſt, for it is very ready to drop.

In one, or ſeveral parts of the field, in proportion to its extent, and to the quantity of cole-ſeed there is, the crop is formed into ſeveral ſtacks. The Flemiſh farmers never thatch theſe ſtacks; they know ſo well how to make them, that the rain does them no damage. The cole-ſeed heats in the mow, by that means yielding more oil than it would have done, if it had not been ſtacked.

In the month of September they make a kind of floor in the field, whereon they threſh and dreſs their cole-ſeed. If a farmer ſhould incline to threſh his cole-ſeed without ſtacking, it will be neceſſary for him to leave the gavels longer expoſed to the air on the beds. Cole-ſeed may be cut at any time of the day, provided it does not ſhed; if it does, it ſhould only be cut mornings and evenings. As a whole field does not all ripen at the ſame time, it ſhould be cut in different portions; being laid in gavels, or heaps, the changes of weather will not affect it. It may ſafely be ſtacked three or four hours after rain, provided it has previouſly been ſome time in gavels, and is judged ſufficiently dry.

In order to clean the ſeed, parchment ſieves are uſed, if there is any wind ſtirring; but if it be calm, they uſe wind-fans.

Cole-ſeed ſhould not be ſown on the ſame land above once in five or ſix years.

In the neighbourhood of Clermont, in Beauvoiſis, the marquis tells us, that they let the cole-ſeed ripen in the field where it was firſt ſown; but if they conſidered that cole-ſeed is not fond of moiſture, that it ſends forth large roots into the earth, and grows to a great height, with numerous wide extended branches, they would be ſenſible that the land, being covered with too many plants, muſt be impoveriſhed; and that plants, which ſtand ſo cloſe together, cannot attain their full ſize: thus, in this way, the land is impoveriſhed, the weeds are left to perfect and ſhed their ſeeds in it, and not only the crop of cole-ſeed is very indifferent, but alſo the crops which ſucceed it. In order to reſtore ſuch land to a good condition, it ſhould be well manured and fallowed.

Cole-ſeed extracts ſuch a quantity of ſalts from the earth, that the Flemiſh farmers tranſplant it, as well to divide betwixt two pieces of land the loſſes in point of quality it occaſions to the ſoil, as to procure better crops. For both theſe reaſons, they alſo ſometimes tranſplant their cole-ſeed on land newly broke up.

In the country of Amiens they tranſplant their cole-ſeed after the plough in cloſe furrows: this method is better than that above-mentioned; but it is greatly inferior to the Flemiſh method; for the rows are diſordered, and the plants cruſhed by the horſes feet; and having, beſides, no freſh earth laid on them, they cannot grow to ſuch fine plants; and, on the other hand, the earth, which is not kept ſtirring, cannot receive any conſiderable benefit from the influences of the air.

The marquis obſerves, that there is, however, a caſe in which this method muſt be reſorted to; which is, when the plants are grown ſo tall, and have ſuch long roots, that proper holes cannot well be made for them with a dibble, they ſhould be laid in the furrows after the plough, and open furrows, or trenches, ſhould be left at the diſtances already mentioned; but the earth from theſe trenches is with greater difficulty thrown on the beds, becauſe the cole-ſeed, in this method, is planted lengthwiſe, whereas, in the other method of tranſplanting, the plants croſs the beds.

In this eſſay the marquis de Turbilli relates a very curious fact, which we ſhall inſert in his own words:

“ In the year 1755, I ſaw, in the neighbourhood of Guiſe, in France, ſome cole-ſeed tranſplanted into a field, containing about eighteen acres, which had always borne fine corn, but had no great depth of ſoil.

“ At the depth of ſeven or eight inches from the ſurface lay a bed of red clay, which the farmers are ſo much afraid of mixing with their good earth. This land was firſt well dunged, and when the cole-ſeed was tranſplanted, the red earth out of the trenches was thrown on the beds.

“ All the inhabitants of the country flocked to ſee this work executed, which was under the direction of a Flemiſh farmer. They pretended that he ſpoiled the land, and that no corn would grow on it afterwards.

“ However, during the courſe of the winter, the red clay became mellow; the rains, which waſhed the dung, ran into the trenches, carrying with it a ſediment, and a portion of ſalts, improving the earth that was in the enſuing ſpring to be thrown on the beds amongſt the rows of cole-ſeed, which came on amazingly.

“ At the harveſting of the next crop, the inhabitants did not fail coming to ſee what ſort of corn ſucceeded the cole-ſeed; and being perfectly well convinced that it was much finer than the land was accuſtomed to bear, they laid aſide their prejudices, and adopted the planting of cole-ſeed. In the year 1761, there were in that ſingle quarter above one hundred acres of tranſplanted cole-ſeed.”

Muſt we not, on ſuch good authority, allow that the notion of the under-turf earth being poiſonous is ideal? If indiſcreetly laid over the ſurface of the land when it either is, or is to be ſown, under certain crops, it may be prejudicial, and ſo may the beſt practices in huſbandry, if injudiciouſly followed.

A correſpondent of the editors of the Muſeum Ruſticum has given us the following method of cultivating cole-ſeed in Eſſex. He begins with obſerving, that the great conſumption of rape-oil in that country in manufactures, together with the natural richneſs of their land, induces them often to ſow the cole-ſeed or rape-ſeed, which thrives there extremely well.

“ In moiſt ſoils, continues he, we ſow it on four-bout lands, the large furrows between the ridges ſerving to drain off the water.

“ We do not truſt to the richneſs of our land alone, for we almoſt always lay on a conſiderable quantity of manure; being of opinion that land cannot be in too good heart for this plant, which requires a great deal of nouriſhment, having a very luxuriant growth, and draining the land much: for this reaſon, it is in vain to attempt ſowing it on poor, hungry, dry ſoils, on which it will never thrive, nor turn to profit.

“ Land cannot be too mellow, nor too much pulverized, for the cole-ſeed plant; for it not only requires a rich ſoil, but alſo the land muſt be in excellent tilth: we allow land, on which it is to be ſown, ſometimes three or four ploughings, according to the nature of the ſoil; if ſtiff, it requires more tillage; if a looſe, rich, crumbly loom, leſs ploughing will do.

“ In July we harrow the field over, and afterwards ſow on it half a peck of ſeed to the acre broad-caſt. As ſoon as the plant gets out of its ſeed-leaf, I hoe it as I do my turnips, thinking this a better way than to let it grow rambling without after culture, as ſome of my neighbours do.

" This crop is, without care, very apt to be deſtroyed by ſlugs, whilſt the leaf is young and tender; but to prevent this, I always ſtrew over the young plants a mixture of ſlaked lime and wood-aſhes: about ten buſhels of ſlaked lime, and fifteen of the aſhes, will be quite ſufficient for an acre: this is the quantity I uſe.

" I find great benefit from this practice, as it not only burns up the ſlug, and deſtroys many pernicious inſects, but alſo greatly helps to forward the crop, inſomuch that it gets to a ſtrong head before winter, and yields me plenty of fodder for my cows, ſheep, &c.

" A part of my ground will ſometimes unaccountably fail; that is, the ſeeds will not come up; but as the cole-ſeed plant bears tranſplanting extremely well, I make my men remove ſome of the plants, where they ſtand too thick, to ſupply the deficiencies: theſe are ſure to take, eſpecially if rain enſues: if it does not, I cauſe them to be watered, which is ſoon done, as they ſeldom fail in great quantities.

" The cole-ſeed plant is ſo hardy, that it bears, without injury, the froſts of our ſevereſt winters; but the north-eaſterly winds, if very cold and piercing, will ſometimes greatly injure a crop, and there is no guarding againſt theſe.

" We ſometimes in this county ſow cole-ſeed merely for the ſake of the winter feed it affords our cattle; in which caſe we plough it up early in the ſpring, and are almoſt ſure of a good crop of ſound barley. This is not generally practiſed, becauſe it requires great care to clear the land of the cole-ſeed plant, which would otherwiſe grow up with the barley, and injure it; I, however, and ſome others, have often practiſed it to advantage.

" One thing I muſt obſerve before I conclude, which is, that cattle muſt be fed with this plant with great care, or it will have fatal effects: it is beſt to give them with it, at times, ſweet dry hay: this corrects the ſuperabundant moiſture of the plants, and ſerves to dry up the uncorrected and raw juices that would otherwiſe mix with the maſs of blood in the cattle: ſuckling ewes may feed on it heartily, however, with very little danger; and, in fact, experience will ſoon direct the young farmer in the management of his cattle in this reſpect.

" We reap, for the moſt part, our crops of cole-ſeed; and as it is very apt to ſhed, we prepare frames lined with threſhing cloths, each drawn by one horſe, to receive the heads of the plants as faſt as they are cut off.

" When this crop is properly managed, nothing pays better." *Muſeum Ruſticum, vol.* I. *pag.* 237.

Another correſpondent of the editors of the above work, gives us the following method of cultivating cole-ſeed in the fen countries.

He obſerves, that they make uſe of no muck or compoſt, but have recourſe to the method of burn-baking, which we have already deſcribed under that article. *See* BURN-BAKING.

As ſoon as the land is burnt, and the aſhes ſpread, it is immediately ploughed, and the ſeed is ſown as ſoon as poſſible.

" The quantity we ſow, continues he, on an acre is about half a peck, or rather leſs: it would be proper to draw a light hurdle, ſtuck with thorn ſpray, over it, by way of prevention againſt the fowls. We plough the lands about ten paces wide, that the furrows may carry the water off, where the land lies on a little deſcent.

" There is one thing to be obſerved in the ploughing, if the ſquare of the piece will admit of it: you ſhould plough for burning from eaſt to weſt, and when you plough for ſowing, then plough north and ſouth, for theſe reaſons: firſt, the land will break better for being croſs-ploughed; and then the land, when ſown, will lie as it were full face to the ſun; but this cannot always be done.

" As ſoon as the cole-ſeed begins to ſprout, it is often all deſtroyed with what we call a black fly; an inſect ſo ſmall, and being black, the ſame colour of the land, that it is almoſt impoſſible to ſee it, otherwiſe than as you walk among the ſeed, if you look ſteadily, you will perceive ſomething hop or fly off, like the hopping of a flea: I have very often endeavoured to diſcover what ſort of fly this is, but never could find one, though they will find the ſeed immediately on its firſt ſprouting.

" It has many more enemies as it advances in its growth: the next is what we call the black canker; it is a ſmall black worm, about a quarter of an inch long, or rather more: this takes poſſeſſion when it is about the ſize of a ſmall cabbage-plant, but windy and rainy weather are great helps to the deſtroying that inſect.

" There is yet another enemy, but he appears in a different dreſs: this is the green caterpillar, more than an inch long, but does not appear till about the latter end of September, and very often deſtroys a great deal of it; but the froſty mornings generally diſpatch him.

" I have now gone through the various ſteps of the culture of cole-ſeed to this particular period, with a ſuppoſition that we have eſcaped all thoſe dangers. I will now give you a ſhort ſketch how we proceed when we are attacked with thoſe enemies above-mentioned.

" If the ſmall fly eat the firſt ſprout, it is uſual to ſow the land again; but I would adviſe the farmer, before he ſows, to harrow the land with a light harrow with wooden teeth; for if the harrow be heavy, it will tear up the ſurrows: my deſign in this is to raiſe a freſh mould, by which means the ſeed will ſtrike much ſooner than if nothing was done to it.

" As to the black canker, the only method I can adviſe is, to let two men take a waggon-rope, each take one end, and draw it over the plant about twice in a place, by which means the canker will be beaten off the plant on to the ground, which ſeldom riſes again.

" As to the green caterpillar, the ſame expedient, I believe, would be of ſervice to that; but, as I have ſaid before, we are chiefly relieved from it by froſty mornings."

The writer then proceeds to give his readers an account of the uſes the cole-ſeed is put to in the fen countries, when the plant is arrived to its utmoſt perfection.

" We eat off, ſays he, with ſheep that are about half or three parts fat, to make them fit for the butcher; for cole-ſeed is the moſt fattening food for ſheep that is known in this part of the world, greatly exceeding turnips, as a ſheep will thrive more at cole-ſeed in one month than it will at turnips in two.

" The uſual time of putting them into the ſeed is about Michaelmas: however, that depends upon the farmer's own conveniency; but if the ſheep are poorer than as above deſcribed, they muſt be put in ſooner. We generally manage ſo as to have the ſeed eaten off by about Old Candlemas, for this reaſon; if the land be ſtout and good, there is a chance for the ſeed to ſtand for a crop.

" If the farmer finds the ſeed good enough to ſtand for a crop, I would adviſe him, if the ſtumps or ſtalks be left high, as where the cole-ſeed is ſtrong and good is moſtly three or four inches off the ground; otherwiſe he will find his crop will receive great damage by the ſtumps being left very ſhagged and torn, which lets in the wet, and rots abundance of them; and even thoſe that do grow have not the vigour as thoſe have that are mowed; for the former is, at it were, ſpread to the ſnow and rain, while the latter is wholly ſecured from them both, and will ſupport the ſprouts, that ſhoot out at the ſides, with ſtrength and vigour.

" Cole-ſeed is a plant that will ſhed or ſhale its ſeed very greatly, if it is not reaped in proper time; from which great loſſes have been known, where the farmer has thoughtleſsly let it ſtand too long before he begins to reap.

" If the ſeaſon has been kind, that the crop comes on all together, though we often ſee the contrary, the farmer is, in either of theſe caſes, as ſoon as he perceives any part of it to turn browniſh, to begin to cut, notwithſtanding the generality of the ſeed will be green; but if you let the whole ſtand till the laſt becomes brown, like the firſt, the firſt part will be entirely loſt.

" But it will perhaps be ſaid, ſhould not the latter part be as ripe as the firſt? My reply is, as cole-ſeed is a ſmall ſeed, and the ſtalks on which it grows are very large, the ſtalk will feed that part that is green, after it is reaped, ſo as that of the latter will be nearly equal to the firſt; by which means both are ſaved.

“ There is a particular method of laying it on the ground, when reaped, different from all other crops; for inſtance, ſuppoſe the people reaping a field from north to ſouth, every two men ſhould lay in his reaps, with the heads of the ſeed to each other, but not to touch, the heads and the ends of the ſtalks lying eaſt and weſt. We ſhall now proceed to the threſhing.

“ The diſtance of time between reaping and threſhing depends ſo entirely upon the weather, that it is impoſſible to give particular directions in that matter, otherwiſe than that when the ſeed has lain till the ſtalk or ſtraw is dead, and turned white, and the ſeed, ſome of it being rubbed out of the coſh, or pod, appears black and plump, and does readily come out, then is the time to begin to threſh.

“ Though the bottom of the reaps will be a little greeniſh, they muſt be not turned to weather the under ſide; if you do, it will bruſh out a great deal of the top ſide: and if the weather ſhould prove wet in the time it is threſhing, even in that caſe it muſt be turned, but raiſed up gently and laid lightly on the ſtubs; in that ſituation it will dry apace.

“ It is always threſhed in the field, upon a cloth about twenty yards long, and eighteen yards wide. To deſcribe each perſon's employment, I think, it is not to be done, ſo that a perſon that never ſaw it can have an idea of it; but as it is, I think, if every perſon concerned in a cole-ſeed ſale, for that is the name we give the cloth and people when at work, be clever in their places, a curious piece of mechaniſm, if I may be allowed the expreſſion, where men and women are made uſe of inſtead of wheels and pullies.

“ The number of people employed at a cole-ſeed ſale are, generally, about twenty: ſeven gatherers; theſe are women, great boys and girls: I have ſaid ſeven; but where the crop is thin, it requires more, ſometimes eight or ten, or more; but where the crop is thick, a leſs number may do; theſe people gather the reaps up with a ſickle, for, as their arms cannot reach round the reaps, they would ſqueeze it together, and bruſh a deal of ſeed out, if they had no ſickle: they put it into a ſheet called a bearing-ſheet, of which there are two belonging to every ſale; it is about ten feet long, and about ſeven feet wide, and has loops on each ſide, through which a light pole is put, and is carried, when filled, by two men to the cloth: theſe are called the bearers.

“ When the ſeed is lain on the cloth, there is a man called the layer-on: he with a ſickle lays it on a row, acroſs the cloth, for the threſhers, which are four, two on each ſide the row of ſeed. While the threſhers are threſhing the firſt row, or floor, the layer-on lays on another row at a proper diſtance from the other: when they have threſhed the ſecond once over, they turn to the firſt, and threſh it all a ſecond time: they have then done their parts: there are two men called ſhakers off, that immediately follow the threſhers: the firſt of them throws the cole-ſeed ſtraw up; the other ſtrikes it as it riſes, which helps to knock out what ſeed may be left: theſe two men, with wooden forks for that purpoſe, convey the ſtraw off the cloth, over the bolſter, to a perſon that takes it away; he is called the ſack-ſtraw.

“ After the ſhakers off, come two perſons, one of them a woman: they take off the coſhes or pods, and ſhort broken ſtraws, with rakes made for that purpoſe: theſe are called the before and behind cavers. The behind caver muſt be a perſon of ſtrength and activity, in order to do his work as it ought to be done; for upon him the ſaving or throwing away of a good deal of the ſeed depends; ſo that he ſhould be a nimble briſk fellow, and careful too, or he is by no means fit for that place.

“ If there be a good crop, and the plants yield well, the weather bright, and the ſeed threſh eaſy, thirty combs, or one hundred and twenty buſhels, may be threſhed in the day; but ſometimes not more than ten or twelve combs.

“ Early the next morning the four threſhers throw the ſeed upon the cloth, when the farmer comes with ſacks and a waggon, and takes it away, ſo that the cloth is cleared and ready againſt the people come to work.” *Muſeum Ruſticum*, *vol.* I. *p.* 418, *and vol.* II. *pag.* 79.

If this plant be ſown for the food of cattle, they will be large enough for feeding by the middle of November, when, if there be a ſcarcity of other fodder, this may be eat; but if there be not an immediate want of food, it had better be kept as a reſerve for hard weather, or ſpring feed, when there may be a ſcarcity of other green food. If the heads of theſe plants are cut off, they will ſhoot again early in the ſpring, and produce a good ſecond crop in April, which may be either uſed for cattle, or ſuffered to run to ſeed. It is ſo hardy as not to be deſtroyed by froſt, and therefore of great uſe in hard ſevere winters, for feeding of ewes: for when the ground is ſo hard frozen that turnips cannot be taken up, theſe plants may be eat for a conſtant ſupply. Mr. Miller ſays, he has found, in ſeveral places where he has ſowed this ſeed, that one acre of land planted with cole will produce nearly as much food as two acres of turnips; that this will afford late food after the turnips are run to ſeed; and that, if the plants are permitted to ſtand for ſeed, one acre will produce as much as, at a moderate computation, will ſell for five pounds, clear of charges.

Partridges, pheaſants, turkeys, and moſt other fowls, are ſo fond of theſe plants, that, if there be any of them in the neighbourhood of the field where they are cultivated, they will flock thither, and lie conſtantly among them.

The cakes of cole-ſeed, which remain after the oil is extracted, are exceeding good food for cattle, and will very ſoon fatten them. They are indeed apt to render the fat of ſuch beaſts yellow and rank; but this may be eaſily removed by feeding them with dry fodder a fortnight or three weeks before they are killed.

Cole, *Cale*, or *Keal*, ſignifies pottage in the northern parts of England and Scotland.

COLEWORT, or *Dorſetſhire-Kale*, is a ſpecies of cabbage, formerly much cultivated in gardens, but at preſent little known, cabbage-plants being ſubſtituted in its room. It is however a very uſeful plant for feeding milch-cattle in the ſpring, when there is a ſcarcity of herbage; for it is ſo hardy that no froſt will kill it.

The beſt method of cultivating this plant in the fields is, to ſow the ſeeds about the beginning of July, chooſing a moiſt ſeaſon, which will bring up the plants in about ten or fourteen days: the quantity of ſeed for an acre of land is nine pounds. When the plants have got five or ſix leaves, they ſhould be hoed in the ſame manner as turnips, cutting down all the weeds from among the plants, and alſo thinning the plants where they are too thick; but they ſhould be kept thicker than turnips, becauſe they are in more danger of being deſtroyed by the fly: this work ſhould be performed in dry weather, that the weeds may be killed. About ſix weeks after the plants ſhould have a ſecond hoeing, which, if carefully performed in dry weather, will entirely deſtroy the weeds, and make the ground clean, ſo that they will require no farther culture. In the ſpring they may either be drawn up, and carried out to feed the cattle, or the beaſts may be turned into the field to feed upon them as they ſtand; but the former method ſhould be preferred, becauſe there will then be little waſte; whereas, when the cattle are turned in among the plants, they will tread down and deſtroy more than they eat, eſpecially if they are not fenced off by hurdles. *Miller's Gard. Dict.*

COLLAR, the part of the harneſs that goes round a horſe's neck.

Collar *of brawn*, is the quantity of brawn bound up in one parcel.

COLLATERAL *Bee-Boxes*. *See the article* Bee.

COLLEY *Sheep*, ſuch ſheep as have black faces and legs. The wool of theſe ſheep is very harſh, with hairs, and not ſo white as that of other ſheep.

COLLIFLOWER. *See the article* Cauliflower.

COLONY, a number of people drawn from the mother country, to inhabit a diſtant place. And hence the ingenious Mr. White has applied the word to a ſtock of bees. *See* BEE.

COLT, a foal, or young horſe.

Foals are ſeparated from their dams after five, ſix, or at fartheſt ſeven months; experience having ſhewn, that ſuch as are ſuffered to ſuck ten or eleven months, though uſually larger and fuller of fleſh, are not equal, in other reſpects, to thoſe that are taken away ſooner. After living ſix or ſeven months on milk, they are habituated to a more ſolid nouriſhment, having bran given them twice a day, with a ſmall quantity of hay, which is increaſed as they advance in age, and in this manner they are kept in the ſtable, as long as they expreſs any deſire of returning to their dams: but when this uneaſineſs is over, they are turned into the fields, taking care never to do it faſting. An hour before they are turned to graſs, a feed of bran, and ſome water ſhould be given them; nor ſhould they be expoſed to either ſevere cold or rain: in this manner the firſt winter muſt be paſſed. In May following, they muſt not only be turned into the fields every day, but may lie in the open air till the end of October, taking care not to let them feed on the after-math; for by accuſtoming themſelves to this remarkably delicate and ſucculent graſs, they would contract a diſlike to hay, which, together with bran mixed with barley and oats ground, ſhould be their principal food during the ſecond winter. In this manner they are to be kept till their fourth year, ſpending the days only in the paſtures, during the winter; but both day and night in the ſummer. When they reach that age, they are to be taken from the paſtures, and fed with dry meat; but in this change of food ſome precautions are requiſite; as during the firſt week to feed them only with ſtraw, and give them proper medicines againſt worms, which often trouble them from bad digeſtions and too rank graſs.

At weaning young colts, they ſhould be kept in a clean ſtable, not over warm, which would render them tender, and too ſenſible of the impreſſions of the air. They muſt frequently have freſh litter, and be rubbed often with ſtraw; but not tied nor curried till they are three, or at leaſt two years and a half old; for the roughneſs of this friction would give them pain, and their ſkin being too tender to endure it, inſtead of thriving, they would fall away. The rack and manger ſhould not be too high, leſt the neceſſity of lifting up their heads to reach their food, ſhould occaſion them to carry their heads in that manner, which would ſpoil their cheſts. When they are a year, or a year and a half old, the hair on their tails ſhould be cut, as the ſucceeding growth will be ſtronger and thicker than the former. When they are two years old, they ſhould be ſeparated, and the ſtone colts kept with the horſes, and the fillies with the mares, otherwiſe the former would fruitleſsly weaken themſelves with the latter. At the age of three years, or three and a half, they ſhould be broke, and rendered docile. In order to this, a light eaſy ſaddle ſhould be put on their backs, and continue there three or four hours every day. They ſhould alſo be uſed to receive the bit of a ſmall bridle into their mouths, and ſuffer their feet to be taken up, and ſome ſtrokes given on the ſole, as if ſhoeing them. If they are deſigned for draught horſes, a harneſs ſhould be put on their bodies, and afterwards a ſnaffle bridle ſhould be added. They ſhould then be trotted on level ground, but without a rider, the perſon only holding the reins, and either the ſaddle or harneſs on their backs: and when the ſaddle-horſe eaſily turns, and freely comes up to him that holds the rein, he ſhould mount on his back, and diſmount again immediately, without riding him, till he is four years old, as before that time the weight would be too much for him: but at four years old he may be ridden, and trotted at ſmall intervals. *Buffon's Hiſtoire Naturelle, tom* IV.

COLT-EVIL, a diſtemper to which young horſes are ſubject, conſiſting of a ſwelling in the ſheath, occaſioned by their having full liberty with the mares before they are able to cover them.

This diſeaſe may be eaſily removed at the beginning, by the uſe of warm fomentations, made of emollient herbs, &c. but if the ſwelling be hard and inflamed, bleeding and purging are both neceſſary; and it may alſo be proper to tie his yard up to his belly, making a hole for his water to paſs free. *Gibſon's Farriery, vol.* II. *page* 168.

COLTS-FOOT, *fole-foot*, *horſe-hoof*, or *bull-foot*, the name of a very common weed, whoſe ſcaly ſtalks ariſe in February, bearing one yellow compound flower, which is ſucceeded by a hairy white down. The leaves come out later. They are ſhaped ſomewhat like a horſe's hoof, and are downy underneath.

This weed, which delights to grow by the ſide of rivers, increaſes ſo faſt by its ſeeds and rambling roots, every piece of which laſt will produce a new plant, though they have been broken by the plough, that it cannot be extirpated without much difficulty, and a conſiderable time. Carefully pulling up the roots every time the earth is ſtired, or the leaſt veſtige of the plant appears, and preventing its running to ſeed, are the moſt effectual means of deſtroying it in arable land; and this is beſt accompliſhed by the horſe-hoeing huſbandry: but totally to extirpate it, the ground muſt be laid down long to graſs. One of Mr. Liſle's neighbours almoſt deſtroyed it by two ſucceſſive crops of vetches; and he himſelf is clearly of opinion, that it may be killed by letting the land lie a ſufficient time under clover, or rye-graſs; becauſe, ſays he, the roots of the natural graſs matting more and more every year, will, in five or ſix years, ſo bind the ſurface of the ground, that the colts foot will not be able to pierce through it, and will therefore die for want of air. He ploughed up broad clover in the beginning of July, and turned up the roots of colt's-foot, in which he obſerved, between earth and air, many little buds, ſhot forth, of the bigneſs of the mid-ſummer buds in fruit-trees, probably to be the leaves or flowers of the next year; and at the depth of five, ſix, and even ſeven inches, he remarked here and there a ſhoot, of a callous body, like the root itſelf, from one to four inches long; perhaps deſtined to be future roots: he experienced that a winter's fallow will not deſtroy theſe roots, and that they cannot reſiſt the effect of ſummer fallows, in which they are turned up, and expoſed dry to the ſun. It is therefore neceſſary to pick them as clean as poſſible, and burn them: for it is not to be ſuppoſed, that all the roots which are turned up in a ſummer fallow will wither of themſelves: on the contrary, ſuch of the buds at the joints of theſe as are buried under ground, will ſhoot out again if much rain falls, or the ſeaſon be wet.

COMB, a meaſure of corn, conſiſting of four Wincheſter buſhels; but in the fen country the comb generally conſiſts of four buſhels, and each buſhel of eight gallons and a quart.

COMMON, an open piece of ground uſed equally by many perſons.

The marquis of Turbilli has treated the ſubject of breaking up commons and waſte grounds in ſo maſterly a manner, that it will be neceſſary to give the ſubſtance of what he has advanced on this intereſting ſubject, nearly in his own words.

"Upon the death of my father, ſays the marquis, which happened in the year 1737, I inherited the lands of Anjou, of which I am now going to ſpeak. They lie contiguous, and form a pretty conſiderable extent.

"Hills and vales render the country uneven in many places; though, in others, there are ſpacious plains, with ſeveral brooks, and a ſmall river. The ſoil is of three kinds, bad, middling, and good; but this laſt is leaſt frequent. Moſt of the lands, being of a middling quality, are fertilized only by dint of care and manure: wheat grows on one ſpot, meſlin on another, rye on a third; and ſometimes it is neceſſary to ſow theſe three different ſorts of grain in the ſame field; ſo much does the ſoil vary: but, in general, we ſow more ground with rye, than with any other corn. Buck-wheat, barley, oats, hemp, flax, and other equally uſeful productions are likewiſe cultivated in theſe parts. The vine proſpers here very well, eſpecially on the ſunny ſide of banks and higher grounds: our wine, both red and white, is good; our fruit trees thrive well; and ſo does the white mulberry, of which I made large plantations ſome years ago. The oak, the elm, the beech, and other foreſt trees, grow extremely well in theſe lands. Such is the ſoil of this diſtrict: the climate is mild and temperate, as is the reſt of Anjou.

“ Three ſides of this eſtate border upon immenſe tracts of uncultivated heaths, which ſpread through the greateſt part of the province, and belong, ſome of them to the king, and others to different lords, eccleſiaſtical and temporal. However, the ſituation of my houſe, and of the chief village, is advantageous, being nearly in the center of the whole, and within about ſix miles of three pretty towns.

“ Such was my eſtate when I took poſſeſſion of it: not a quarter part of the land was cultivated, and even that very badly: the reſt was either abandoned by the huſbandmen, or had not been cultivated at all. Moſt of the meadows along the brooks and rivulets were become marſhes, productive of ſcarce any thing but ruſhes. The vineyards were ruined, and the woods deſtroyed. A third part of the farms belonging to the principal pariſh where my ſeat is, were un-tenanted, for want of farmers to rent them. The inhabitants of this place were very poor, and did not, in general, raiſe corn enough of any kind to ſubſiſt them half the year: nay, ſuch was their indolence, that they choſe rather to ſtroll about and beg during the other half, than be at the pains of beſtowing proper culture upon their land, which, with that culture, would have maintained them decently.

“ This deplorable condition of my eſtate, which I have here repreſented fairly, without exaggerating any one particular, determined me, early in life, to read attentively all the moſt approved writers upon agriculture, and to obſerve carefully every improvement I met with in my travels. Even the campaigns in which I ſerved did not interrupt theſe inquiries; for agriculture and arms never were by any means incompatible. Under theſe circumſtances, I reſolved to execute upon my own property, deſigns which my knowledge of the place, concern for the unhappy ſituation of its inhabitants, and regret to ſee what ſmall returns were made by ſo large an extent of ground, naturally ſuggeſted.

“ I plainly foreſaw that this undertaking muſt be a work of time; neither my fortune, nor the number of hands I could procure in the country, allowing me to go beyond the clearing and improving of a certain ſpace every year. Some gentlemen of knowledge, judgment, and public ſpirit, to whom I communicated my thoughts, approved of them, commended my deſign, and exhorted me ſtrongly to carry it into execution; repreſenting, beſides the advantages which would neceſſarily accrue to me, the general benefit which ſuch an example might be of to my country, filled, as it is, with numerous tracts of uncultivated land. This laſt reflection animated me more and more.

“ My firſt care was, to endeavour to extirpate the ſpirit of indolence, and conſequent love of begging, which prevailed among my peaſants in general. To this end, I gave public notice of my intended improvements, with a declaration, that I would conſtantly employ every man, woman, or child above eight years of age, who might not have buſineſs of their own to do, on condition of their leaving off begging. At the ſame time I ordered an account to be taken of ſuch as were not able to work. Theſe I afterwards examined more particularly myſelf, and found among them ſeveral who, though they were not fit for hard labour, were capable of doing many uſeful things, in which I accordingly employed them. By this means, my liſt of really helpleſs people was reduced to a ſmall number, which I provided for, till their relations ſhould be able to keep them by means of what they earned from me. A few, and only a few, of theſe poor objects, who either had no relations, or ſuch as in truth could not help them, became a dead charge: though this ſoon leſſened, and is now inconſiderable.

“ An innumerable multitude of rabbits infeſted my land. Againſt theſe I declared open war; being determined abſolutely to deſtroy them. This has already been ſeveral years a-doing, and is not yet entirely completed. Some of them ſtill remain, ſheltered in their burrows at the foot of riſing grounds, and others make incurſions from the neighbouring woods and warrens. However, they do me no great miſchief now; and even then I drove them from the place where I wanted to work.

“ In the month of June 1737, I begun my improvements with clearing ſome of the land near my houſe. This ground was ſo poor that no farmer would even attempt to make any thing of it, ſerved only to feed a few ſtinted cows, and was over-run with briars, thiſtles, and broom, which, being cut up, and laid in heaps, from ſpace to ſpace, were burnt upon the ſpot, and yielded a conſiderable quantity of aſhes. Theſe were then ſpread, and immediately turned in by a ſingle plowing, leſt their virtue ſhould exhale. During the ſummer, this land was ploughed ſeveral times, different ways, in order to looſen it, and endeavour to deſtroy the weeds. I had bought for this purpoſe oxen, which are generally uſed for ploughing in Anjou; but my horſes helped them, eſpecially for harrowing. Here my poor peaſants, men, women, and children, were employed to break the clods and pick off the ſtones; and as I had more dung than my arable lands required, I ordered about half the quantity that is generally uſed in other places, to be laid upon this ground, which was afterwards ſowed at the uſual time. This firſt trial ſucceeded, and the crop was very good; though moſt of my neighbours were of opinion that all my labour would be loſt.

“ In 1738, I undertook another piece of ground, adjoining to the former, and of the ſame kind. I began in March, proceeded as before, dunged it, and had equal ſucceſs. The ſecond crop of the former ſpot was ſtill more plentiful. This ſummer I gave a thorough fallow to ten acres which had long been under corn, and ſowed part of them with hemp and flax, for a purpoſe which will be mentioned hereafter. I likewiſe recruited my vineyard, and drained my meadows. Numbers of day-labourers were employed in cleanſing the rivulet and brooks which run through them. In the winter of this year an accident happened, which had like to have overſet my whole undertaking. The oxen which I uſed for ploughing, and which were grown lean, it was ſuppoſed through labour and fatigue, were on a ſudden covered with vermin, which eat into their fleſh: ſeveral remedies were applied, but in vain, the vermin re-appearing in a few days. We knew not to what cauſe to aſcribe this diſorder, which was deſtroying animals without whoſe aſſiſtance I could not proceed: beſides which, the loſs would, in itſelf, have been conſiderable. They had hitherto been fed with hay only; though the cuſtom of the country was to mix it with an equal quantity of wheat-ſtraw. As I had not yet a ſufficiency of this laſt, I bought ſome, gave it to them mixed with hay, and allowed them oats from time to time when they had been hard worked. This mended them a little: but they did not recover entirely, or get rid of their vermin, till they fed on green graſs, and lay out of doors.

“ I begun this year to make new roads and cauſeys a-croſs my meadows, marſhes, and riſing grounds, for the eaſier conveyance to and from my fields; the old ways being often impaſſable in many places. This has been a very long and expenſive work; nor is it yet quite finiſhed. I alſo bought at this time a number of ſheep, which have ſince increaſed conſiderably: for, notwithſtanding the great extent of this uncultivated land, where many of them might eaſily have been fed, none were ever kept upon it before. The people of the country thought they could not thrive there, on account of the marſhes, and of a plant called white root, very prejudicial to them, found in ſeveral parts of the lay-grounds and commons. Moſt of theſe weeds was pulled up at a ſmall expence; and the ſheep, who are fond of this herb, eat up the reſt, which was ſo little that it could not do them much hurt, though ſome of them were ſick with it. The conſtant feeding of the ſheep, and their dung, afterwards completed the deſtruction of this noxious plant, and brought up good graſs in its ſtead. This ſhews how farmers may often get rid of any ſuch bad weed.

“ In 1739 I took the next contiguous land, going round my manſion: a method which I have always followed; ſo that my improvements have been, from year to year, more and more diſtant from my place of reſidence. The ſoil I now fell upon was tough, ſtrong, and only thin graſs grew upon it, with here and there a few brambles and other wild productions, which were ſoon cut up. This ground was broken up only with the plough: ſome dung was laid upon it, and I ſowed it directly with winter oats, which ſucceeded very well. My improvements of the two laſt years yielded plentiful crops, not only of corn, but alſo of hemp and flax. Theſe laſt were dreſſed, and given to the women and girls to ſpin; paying them different prices, according to the fineneſs of the thread. They applied themſelves to their work, and by degrees became perfect in it. By this means I accompliſhed my deſign of finding employment for theſe women and girls all the year round, and afforded them the means of procuring an honeſt livelihood, as well as to thoſe whom age or infirmities rendered incapable of working abroad.

“ The buſineſs ofthe field was always preferred in the ſeaſons proper for it, and when the weather permitted; keeping in my eye Cato's advice, never to work within doors, while there is any thing to be done without, nor to do that in fair weather, which may be done in wet. I have continued this ſpinning ever ſince; and have allotted for the growth of hemp and flax particular ſpots, which I have incloſed with hedges and ditches, and kept in good heart and fine tilth. They have yielded plentiful annual crops without being reſted; only dunging them every other year; for hemp does not impoveriſh the ground when it is properly cultivated. My vines, meadows, and ways were not neglected.

“ In the beginning of this winter I gave my oxen hay mixed with an equal quantity of rye-ſtraw, not having wheat-ſtraw enough to anſwer that purpoſe. This ſucceeded to my wiſh. My oxen continued in perfect health, free from the vermin I mentioned before, and in better plight than thoſe in the neighbourhood, which were fed with hay and wheat-ſtraw. I have continued to give them this food as long as they lie within doors, and find it anſwer extremely well. During this time they have no corn, even though they work; and I do not find that this ſuppreſſing of their otherwiſe uſual allowance of oats, renders them at all leſs hearty and vigorous. This quality of the rye-ſtraw may be of great advantage in countries where oxen are uſed for ploughing.

“ In the year 1740, I was obliged to make a conſiderable addition to my number of ſervants, and ſtock of cattle of all ſorts, in proportion to the increaſed extent of my improvements. It may perhaps be thought, that ſo many ſervants would eat me out of houſe and home. This I had guarded againſt from the beginning. All thoſe employed in my huſbandry lived by themſelves, in ſome of the out-houſes, where they had their own kitchen, and a certain ſtated allowance, ſuited to their uſual manner of life; ſo that they had no ſort of connection with the others, whoſe more immediate buſineſs it was to attend me.

“ The land which I improved this year was covered with heath, broom, and furze, which had grown very thick and high. In the ſpring, when the weather was dry, I ſet fire to this ſurface, after taking due precautions to hinder the flames from ſpreading too far. The whole burnt very well, and I was in hopes of being able to plough up this ground without paring off the turf, as I had done with my other land the year before. This would have been a conſiderable ſaving; eſpecially as the aſhes were ready ſpread. But I ſhould have conſidered that different lands require different treatment. Ploughs, ſtronger than uſual, were made on purpoſe for this work; but the roots of the furze and broom, which had reſiſted the fire, broke them; and though I doubled the number of my cattle for draught, ſeveral of the oxen were ruined by this hard work, in which I perſiſted with too much obſtinacy. In vain did I plough it over and over, and break every clod both before and after ſowing it; the broom and furze were not deſtroyed, but made new ſhoots every where: the land continued unkindly and ſour, and the oats which I ſowed in it yielded ſcarce any crop; in ſhort, repeated ploughings and dunging were neceſſary during three years, before it could be brought to a good tilth, or thoſe noxious plants be quite extirpated. I came badly off in this experiment: but my former improvements, which I had continued to manure and ſow, luckily produced an abundant crop: that of the laſt year yielded a good quantity of wheat, which kept up my eſtabliſhment, though it did not compenſate for the loſs I now ſuſtained. However, this diſappointment did not diſcourage me. It raiſed the laugh of the whole country at my expence; eſpecially of thoſe who had foretold from the beginning, that I ſhould not ſucceed. I gave them the hearing, and only reſolved not to fall a ſecond time into the ſame error.

“ This year I eſtabliſhed a nurſery of fruit-trees, and alſo of foreſt trees from other countries. This nurſery, which ſucceeded very well, was of great advantage to me afterwards, to fill up the different plantations which I made as my improvements extended. I likewiſe repaired my woods, which had formerly been deſtroyed by cattle and deer. I ſurrounded them with ditches planted with hedges, in order to bring them into regular yearly cuttings; to which end I grubbed up ſuch trees as were ſtinted in their growth, and filled every empty ſpace, either with young plants, or the ſeeds of others, according to the nature of the ground. By continuing to do this every year, my woods are now in excellent order, and afford regular cuttings, at the ſmall expence of keeping the fences in repair.

“ In 1741, I had the ſame kind of land to deal with as the year before; but took care not to commit the ſame fault. Each day's cutting of the heath, broom, &c. was burnt, with proper precautions, as the workmen advanced, and the whole ſurface was dug by hand as it was cleared. By this means, the aſhes of theſe plants preſerved their fertilizing quality, and their roots were pulled up. Women and children ſhook the earth from off theſe roots, and turned them, whilſt they were drying in the hot weather. Theſe were alſo laid in heaps from ſpace to ſpace, and burnt upon the ſpot, where they yielded ſome aſhes, which were ſpread, and immediately buried with one turn of the plough.

“ During the ſummer, this ground was ploughed ſeveral times; each time in a direction different from the former. My cattle were but little fatigued with this work; the heath, broom, &c. was almoſt entirely deſtroyed, and the ſourneſs of the land was in a great meaſure cured. I had then begun to make compoſts, which were mixed with the dung of the ſtall and ſtable, and proved of ſingular benefit. With their help, I was enabled to manure my newly broken up land ſufficiently; that is to ſay, to lay upon it half the quantity that is generally uſed of dung for the common run of lands. I ſowed this piece with rye, which yielded a plentiful crop. The crops from my former improvements, which I continued to ſow without reſting them, were likewiſe very good this year, excepting that of the laſt, which was alſo under rye, and yielded but a middling produce. My vineyards were now brought into as good order as any in the province; and I continued draining my meadows, and making roads and cauſeys.

“ The war then calling me into Bohemia and Bavaria, I foreſaw that I ſhould be abſent ſome time, and conſequently not able to ſpend part of the year in the country, as I had uſed to do; to give directions to my people, and ſee my orders executed. Under theſe circumſtances, that my improvements might not ſtop, I gave the direction of the whole to an intelligent ſervant, who had lived with me a long while, and was married to an excellent houſewife: and, to intereſt him the more in the future ſucceſs of the undertaking, I agreed to allow him half of the profits of every kind; ſubjecting him to this only reſtriction, that he ſhould not impoveriſh the ground by too many crops. In this ſtate things went on till the end of the year 1748.

“ In the mean time new pieces of land were broken up every year; but not ſo extenſive as the former; the expence of my campaigns not permitting me to lay out upon them ſo much money as before. I even ſtreightened myſelf, not to interrupt the progreſs of my improvements: which, in general, ſucceeded very well. I alſo revived an old method of breaking up land, by cutting off the ſurface with a paring mattock, and then burning it. *See the article* BURN-BAKING.

“ During the whole of this time, I was but two years together without viſiting my eſtate, where my preſence was then very neceſſary. In all the other years, I gladly accepted the leave which was given me to ſee how my works went on; though I ſometimes did not ſtay above a fortnight among them. However, this was enough to give an eye to every thing that was doing; which is of great conſequence in undertakings of this kind.

" Peace being reſtored, I reſumed the perſonal guidance of my affairs in the beginning of the year 1749, and placed my old ſervant in a farm which I had to let, where his profits ſat him down at his eaſe. Though he was extremely faithful, and my improvements were carried on very well, yet I found that, for want of due care and attention at certain times, the crops were not equal to what they had been under my immediate direction: a circumſtance which plainly ſhews, that a work like this never thrives ſo well as in the hands of the owner himſelf.

" I now reſolved to purſue my improvements as before the war, that is to ſay, to break up larger tracts of ground every year, than had been done of late. Moſt of my yet uncultivated lands were, and had been from time immemorial, thick covered with high broom, heath, fern, &c. and experience had taught me that theſe were not to be broken up with the plough alone.

" Of all the methods which I tried, none ſeemed to me, as I ſaid before, ſo good as the paring-mattock and burning. I therefore fixed upon this, and, in conſequence, ſent for the workmen I had formerly employed in trials of this kind: but their number not ſufficing for the extent of ground which I purpoſed to break up this year, I ſent for others from a diſtance, and was weak enough to let theſe laſt perſuade me to contract with them at a ſet price, for paring the whole ſurface. I agreed to give them even more than they ought to have had for doing the work ever ſo well; for I was not yet thoroughly acquainted with the nature of this buſineſs. They began it in March; and, to earn their money the more eaſily, or rather to rob me, only ſkimmed off the mere ſurface, without hardly touching the roots of the plants, which they ſhould have cut up. When this work was done, as they called it, for the burning part did not belong to them, they immediately came to me, and aſked for their money, which I ſimply gave them, not ſuſpecting the cheat, but only thinking they had earned it very ſoon. When the turf of their cutting was dry, I ordered it to be laid in heaps, and burnt. The ſmall quantity of aſhes which it yielded, made me ſuſpect the roguery: but when I found that the roots in the earth broke ſome of my ploughs, in cutting only a ſingle furrow to cover the ſeed, and that there was no clearing it of clods, I was thoroughly convinced that I had been the dupe of theſe people, and that this paring would be of little ſervice. The wheat ſowed in this ground roſe indeed pretty well, and looked tolerably during part of the winter; but not being able afterwards to ſtrike through the cruſt formed by the remaining matted roots of the plants, moſt of it died, and the little that remained ſcarcely returned the ſeed: nor could this land be recovered till the next year, even by ploughing, breaking the clods, and dunging.

" The bad ſucceſs of this experiment, upon which a great deal of money had been thrown away, tried my patience, but did not diſcourage me. My neighbours began anew to exclaim againſt my projects, as they called them; and numbers of thoſe people who are determined at all events to oppoſe every novelty, be it right or wrong, were pleaſed to vent their ſarcaſms at my expence. I let them talk on. The roguery of the people who had laſt pared my ground did not hinder me from ſtill thinking that this was the beſt way of breaking up new land, eſpecially heaths; and the event has ſhewed that I was right. This check, which was the laſt I received, made me reſolve to take my meaſures better for the future.

" The reſt of my improvement yielded very good crops this year, during which I continued to mend my roads and meadows. Theſe long winded works, for which only a certain ſpace of time, and a certain ſum of money, could be allotted every year, have been continued ever ſince, and indeed are not yet finiſhed. I likewiſe bought this year ſeveral hives of bees; though I had ſome before. Theſe uſeful creatures have multiplied exceedingly; eſpecially in a little garden, where my chief apiary is, ſituated between meadows and heaths, of the flowers of which they are remarkably fond. Though theſe induſtrious inſects thrive perfectly all over the country I am ſpeaking of, yet the inhabitants of theſe parts not only have not a tenth of the number they might keep, but ignorantly follow the old barbarous cuſtom of deſtroying the bees, when they want their honey, inſtead of only taking part *See the article* Bee.

" I did not agree by the piece for breaking up the land I intended to improve in the year 1750, left I ſhould ſhould be again deceived; but hired proper labourers by the day. They began their work in March, and finiſhed it about the middle of June; cutting all the way deep enough to go under the cruſt, or net-work, formed by the roots beneath the ſurface; for I took particular care to ſee that this was done. When the turf thus pared, to the thickneſs of about four inches, was dried, piled up, and burnt in heaps from ſpace to ſpace upon this ground, it yielded a conſiderable quantity of aſhes, which enriched the ſoil for a long time. Wheat was then ſowed, and the plough eaſily turned up the furrow which covered the ſeed. Women and children eaſily broke the clods of this ground, which was thereby at once brought into good order; the roots of all the wild plants having been effectually cut through, and their ſeeds deſtroyed by the fire. My wheat, by this means un-incumbered with noxious productions of any kind, flouriſhed well, and yielded an excellent crop; as alſo did ſuch other parts of my land as were under corn. The ſucceſs of this year revived my hopes. I now perfected my method of making artificial dung, which, as I have already obſerved, proved of infinite ſervice; and, for manuring my more diſtant lands, I built upon them perpetual kilns, which have always ſupplied me with a ſufficient quantity of aſhes.

" This year I began to plant white mulberries, in order to feed ſilk-worms, and make the inhabitants acquainted with the management of them. I have ſince continued to make plantations of this kind every year, and find them anſwer perfectly well, eſpecially in light ſoils. Several of them are an uſeful embelliſhment to proper parts of my improved lands, and I have alleys of them, which, though not ſuffered to run up high, form a very pleaſing proſpect.

" In 1751, I again ſucceeded perfectly well in my new method of paring and burning. All my cultivated lands now yielded very good crops; and that in particular which I had broke up laſt year, and ſince dunged properly, that is to ſay with half the quantity commonly uſed upon ground in general, produced more than any other equal ſpace had yet done. From this time I continued to dung all my grounds which were broken up in this manner, every alternate year.

" My improvements were now become ſo extenſive, that I was again obliged to increaſe the number of my ſervants, and of my ploughing cattle. The ſame thing happened more than once after this; but I ſhall not mention it any more. My cattle too, of different kinds, had multiplied ſo much, that I had no longer room for them in the old farm-yard, or buildings belonging to it; but plainly ſaw, that if my improvements were enlarged every year in the manner they had hitherto been, I ſhould ſoon want more yards, and more buildings, to keep them in. I accordingly marked out proper places for this purpoſe, and drew plans for more ſpacious buildings.

" As the cattle in this country are ſmall, I bought ſome of a larger ſize in Poictou (from whence we generally have our working beaſts), and particularly a fine bull, to try if I could mend our breed, and thereby have of my own oxen ſtrong enough for the plough; by which means I ſhould ſave the expence of buying them elſewhere. I have not yet ſucceeded in this, ſo far as I could wiſh; probably becauſe my paſture is not yet good enough. However, my bullocks, proceeding from this race, are much ſtronger and bigger than thoſe I had before, though not large enough to be yoked to the beam, but only before or with others.

" The ground which I broke up in 1752, was pared and burnt in the ſame manner as that of laſt year, and produced an equally good crop. My other corn lands did the ſame; and I have ſince continued, and ſtill continue, at the time of my writing this, to break up a parcel of heath, or other waſte-ground, every year. The ſucceſs has anſwered; ſo that my improved lands now yield me every kind of corn which this country produces. Turky-wheat, buck-wheat, and millet, have done extremely well in ſome parts of them; and ſo have flax, hemp, and other productions ſuited to the different qualities of the ſoil. In ſome places I have ſowed, at different times, ſeveral ſorts of trees, ſuch as the oak, the beech, the cheſnut, the fir, and others, all of which thrive wonderfully. I have likewiſe planted new vineyards, and find them anſwer perfectly well. All theſe trials convince me more and more, that the very beſt way of preparing land, is by burning it, as I have already ſaid more than once. Thoſe who were formerly the readieſt to blame my undertakings, now ſee their error, and commend them.

“ During this ſame year 1752, as well as in the courſe of the following, I drained ſeveral marſhes, and improved other pieces of uncultivated ground, which, not being of the heath kind, or proper for paring, were broken up, and fitted for their reſpective crops, whether of corn, or of other plants, as will be more fully related in the ſecond part of this account. I likewiſe ſowed in theſe, as I had done before in other places, trees of every kind, ſome of which have ſucceeded, and others failed, according to the ſoil, and the manner of preparing it. This alſo will be more fully noticed hereafter, when I ſhall ſpeak particularly of the different methods of raiſing trees from their ſeeds; and of the means of obviating the three chief difficulties, which muſt of neceſſity be guarded againſt or removed, before one can properly ſet about breaking up any ſort of ground; theſe are, water, ſtones, and large roots; each of which I have found it neceſſary to get rid of, before I could rightly begin any of my improvements.

“ I endeavoured this year to make ſome progreſs towards perfecting my inſtruments of huſbandry; my new buildings went on according to the plan I had laid down, and were extended from time to time, in proportion as the products of my enlarged improvements, and the increaſe of my ſtock of cattle, required more room. I likewiſe tried to mend the breed of horſes in this country, where their chief fault is, that they are too ſmall.

“ My ſheep were alſo of too ſmall a ſize, and yielded but little wool; which indeed is the caſe throughout all this province. I therefore got from Lower Poictou, in the year 1753, two fine rams, of the large kind, called Flemiſh; by which means my lambs are much ſtronger than any other in theſe parts. Several of the males are almoſt as large as their ſires, and I have given ſome of them to my neighbours for rams. They have produced a baſtard breed, which increaſes apace, and, though not ſo large as the Flemiſh, yields more and better wool than our former breed. I got rid of all my old ſheep by degrees, and have now a well-ſized flock: nor do I doubt but that if I could conveniently have purchaſed a whole flock of theſe large ſheep, their breed might have been preſerved without degenerating, and increaſed ſo as to ſupply the place of our preſent inferior ſpecies; for our uncultivated lands would feed a much greater number of ſheep than we even attempt to raiſe.

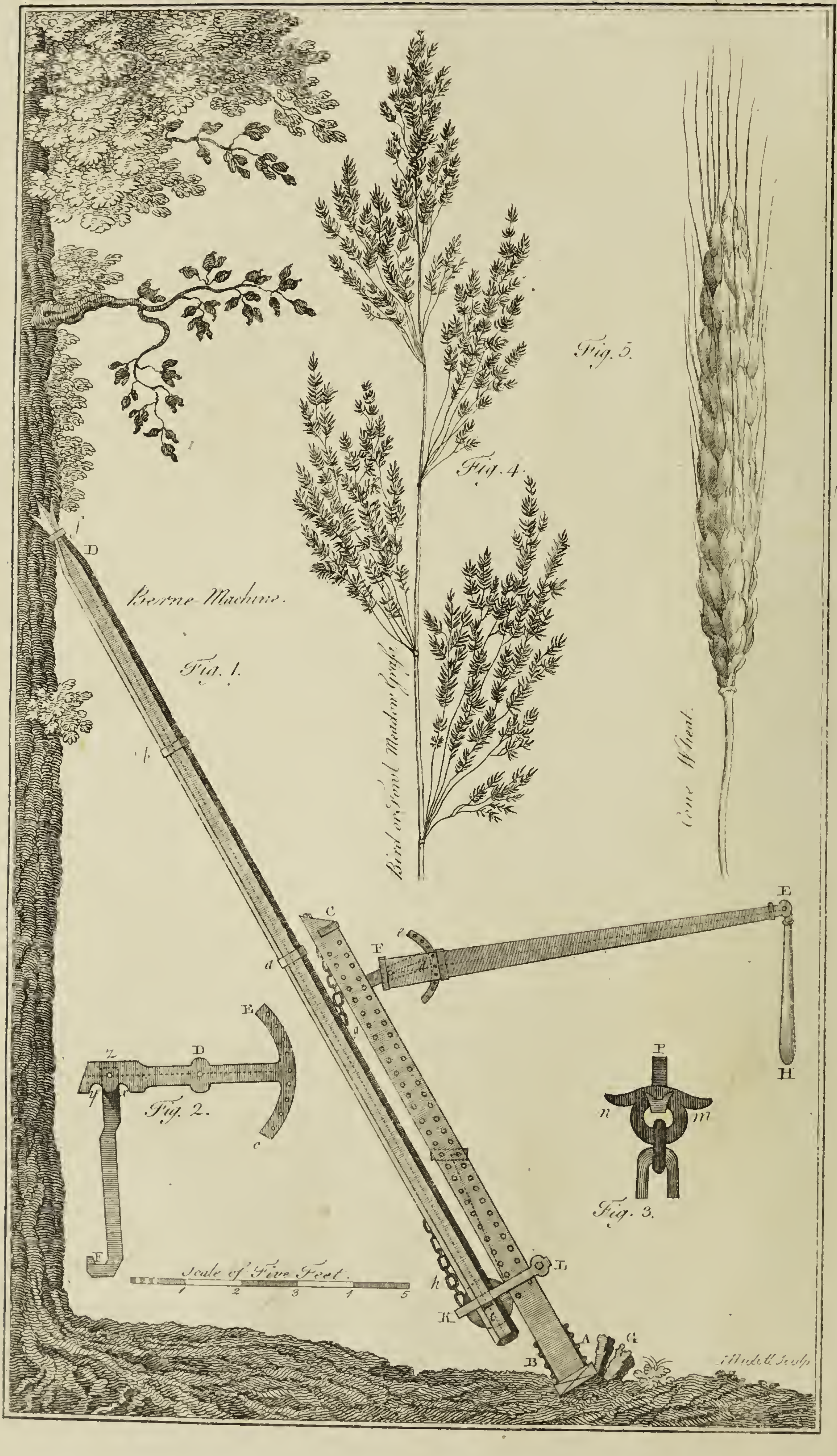
“ In 1755, I diſcovered lime-ſtone upon my own land. This proved a conſiderable ſaving; for I had hitherto been obliged to fetch my lime from a diſtance of near twelve miles. This ſtone, if properly ſearched for, may often be found in places where it it not ſuſpected to lie. It is eaſily known, by putting a piece of it into the fire till it be calcined, and then diſſolving it in water. This diſcovery, in conſequence of which I built a proper kiln, has enabled me to carry on my buildings with leſs expence than before, and is of ſignal ſervice in affording an excellent manure for my land.

“ I began this year to give premiums for agriculture to the inhabitants of my eſtate. They were inſtituted the year before; and I had long uſed my beſt endeavours to inculcate a general love of induſtry, and a reliſh for improvements. My ſucceſs had induced ſeveral others, both landlords and farmers, to follow my example, as well in amending their already cultivated lands, as in the breaking up of new grounds. I aſſiſted them in their undertakings, giving inſtructions to ſome, lending ſeeds to others, and money and tools to ſuch as were honeſt, and wanted them. The better to encourage them all, I had given rewards every year to thoſe who diſtinguiſhed themſelves moſt, and allowed my tenants ſixteen ſhillings for every acre of new ground broken up by them: a regulation which ſtill ſubſiſts.

“ To fix theſe people in the induſtrious diſpoſition to which I at length had brought them, no method ſeemed to me more proper than to take them on the weak ſide of almoſt all mankind, intereſt and vanity. Accordingly, I notified in the month of January 1754, that I would diſtribute every year, beginning on the next enſuing feſtival of the Aſſumption, two premiums for agriculture; one, to the perſon who ſhould raiſe the fineſt crop of wheat, and the other to him who ſhould have the beſt field of rye. Each of theſe premiums conſiſts in a ſum of money, not inconſiderable for the country where it is given, and a ſilver medal, engraved for the purpoſe, of the ſize and value of a crown piece. Theſe were, I believe, the firſt premiums ever propoſed in France for this moſt uſeful object; though many have been given for much leſs intereſting concerns. On one ſide of this medal is a ſheaf of corn, with two ſickles, a ſcythe, and a flail; over which are the words, *Premium for Agriculture*, and underneath the date. On the other ſide are my arms, with this inſcription round them: *To excite to Induſtry the Inhabitants of*, &c. I would not put the goddeſs Ceres of the ancients, or any emblematical figure upon this medal, becauſe, in the firſt place, the ignorant peaſants would not have underſtood its meaning, and in the next, ſome of them might perhaps, hereafter, take it for the repreſentation of a ſaint, and honour it as ſuch; by which means, what I intend only for an object of utility, would become a ſource of ſuperſtition or idolatry.

“ A candidate for theſe premiums muſt have at leaſt two acres of land ſowed with either wheat or rye: they are given to the fineſt crop as it ſtands, to avoid all tricks; and if two crops are deemed equally good, the worſt ſoil has the preference. When both the crops and the ſoils are alike, the largeſt extent of ground is entitled to the reward. The inhabitants of the place, in general, meet at the pariſh church on the day appointed; and, after divine ſervice, chooſe from among themſelves five who are not candidates, to inſpect all the fields of corn, and mark thoſe which they think the fineſt. On the next Sunday or holiday, they make their report to the ſame aſſembly. If any one complains that his corn has been unjuſtly paſſed over un-noticed, proper perſons are immediately ſent, to examine whether the complaint be juſt. The aſſembly then appoint the ſame five as before, or others if they pleaſe, to go and inſpect again, with the utmoſt care, the fields which they had marked, and to judge which two of them, one of wheat, and the other of rye, beſt deſerve the premiums. On the next Sunday or holiday they declare their opinions to a general aſſembly of the pariſhioners, as before; and, if no objection be made by any of thoſe whoſe corn has been marked, this aſſembly adjudges the premiums accordingly: but if any one of them appeals, other proper judges are immediately choſen, and directed to inſpect the ſpot. On the next Sunday or holiday, till which the deciſion of the premiums is, in this caſe, of courſe put off; theſe laſt examiners make their report, and the matter is then determined. All the people thus ſent by the aſſembly, are paid at my expence. In conſequence of the deciſion of the inhabitants, the premiums are delivered publickly on the feaſt of the Aſſumption, after the ſervice at church is over. Thoſe who win them, wear the medal, for a year only, faſtened with a green ribbon to a button-hole of their coat, and have, likewiſe for that time, a diſtinguiſhed ſeat in the pariſh church. Theſe marks of diſtinction ceaſe at the end of the year, when others ſucceed to them; but the medal remains the property of the perſon to whom it was adjudged. He may diſpoſe of it as he pleaſes: yet, though he is no longer allowed to wear it on the outſide of his cloaths, there has not been a ſingle inſtance of any one's ſelling his medal. They all keep it as a badge of honour.

PLATE IV. *Facing* Cone Wheat.



" Theſe rewards have been productive of ſo much good, and have raiſed ſo extraordinary an emulation among my tenants, that I cannot but adviſe every gentleman to practiſe the ſame method upon his eſtate. I intend to inſtitute ſome others, for different productions; and as I am far from having a ſufficient number of people to manage all my lands, if the whole of them was under culture, I have long thought of giving gratuities to ſuch as ſhall have a child within the firſt year of their marriage, to continue this allowance to them ſo long as they ſhall have a child from year to year, and to allot a pretty conſiderable ſum for the family which ſhall have moſt children. Some may, perhaps, think theſe encouragements for propagating the human ſpecies odd, and even ſuperfluous: but they will be of a different opinion when informed, as they may be by the miniſters of moſt country pariſhes, that many peaſants are unwilling to get children, or at leaſt do not chooſe to have more than a very ſmall number, when they might have a numerous offspring. If my abilities were equal to my will, I ſhould already have formed all theſe uſeful eſtabliſhments. It is generally allowed, and experience has particularly demonſtrated it upon my eſtate, that an increaſe of culture produces an increaſe of inhabitants; and that wherever there is room for two, with the means of ſubſiſting them, a marriage will enſue: but at the ſame time that this means of increaſing population is encouraged by a more extenſive culture of the earth, I ſee no reaſon why proper methods ſhould not be uſed to induce men likewiſe to concur in the ſame laudable end.

" Ever ſince the year 1756, I have continued all my undertakings, and with the ſame ſucceſs as before. Thoſe who ſaw the condition of my eſtate when I firſt came to it, in the year 1737, now ſcarcely know again a ſingle ſpot of it; ſo much is the face of the country changed. My manſion-houſe, which was formerly ſurrounded with dreary waſtes, vaſt commons, and unbounded heaths, now ſtands in the middle of well cultivated fields; my improvements are become conſiderable both for extent and value; producing all ſorts of grain, and natural as well as artificial graſſes. I have diſperſed in them all kinds of fruit-trees, and divided them into fields of proper ſizes, ſeparated by good ditches planted with quick hedges. Alleys of limes, poplars, white mulberries, cheſnuts, and various other trees, beſides being a conſiderable embelliſhment to the whole, afford convenient paſſes from one field to another, yield food to cattle, and are ſown from time to time. I turn every thing to profit; even my drieſt ſoils. Many of my marſhes are drained, and yield good crops. All my meadows, by reaſon of their great extent are not yet brought to the ſtate in which I wiſh to ſee them; though a great part of them now produces excellent hay. I have mowed ſome of them twice a year, and hope by and by to do the ſame to others; for I intend to water them all, by making dams and ſluices in the brooks and rivulet which paſs through them.

" My vineyards are in good order; and my woods, which are now in regular cuttings, thrive perfectly. Some of theſe, which I have raiſed from the ſeed, have grown ſo prodigiouſly, that a ſtranger would think them much older than they really are. I have made ſome large reſervoirs of water, and ſeveral ponds, intirely new, beſides repairing the old ones. All theſe have ſucceeded, and yield good fiſh. A quarry of mill-ſtones, formerly abandoned, now turns to good account, and I have diſcovered ſeveral quarries of free-ſtone.

" I have been obliged to make ſeveral bridges over the brooks and rivulet which divide my meadows and marſhy grounds, and have carried my roads as far as my improvements extend. Some of theſe roads lie over hills, which could not be avoided; though others have been cut through, at a great expence. Moſt of my out-houſes, which are pretty ſpacious for all my cattle and all the produce of my land, with proper buildings for poultry, barns, granaries, &c. are finiſhed; and I have built farm-houſes with the ſtones which it was neceſſary to take off the lands, in different parts of my improvements, and ſettled in them young men, who are now married, and have children. Though my barns are very large, and not few in number, I have the pleaſure to find that they would not contain all my laſt year's crop of corn: a ſatisfaction which I hope to enjoy ſtill more amply in the next and following years.

" Thus my eſtate, which formerly yielded ſcarce any thing, now affords every neceſſary for food and raiment. When there, I can, truly ſpeaking, keep a very good table, and be decently cloathed, with only the produce of my own improvements. I have no occaſion to buy any thing, except ſalt, ſugar, and ſpices. My farmers have followed my example, ſo far as their means, and the helps which I have given them, have permitted.

" Theſe improvements have, undoubtedly, coſt me a great deal of money; but my income from them will ſoon be proportionably increaſed: beſides which, it is proper to obſerve, that few lands will require ſo great an expence to break them up, as mine have done; owing to the uncommon ſtubbornneſs, inequality, and unkindlineſs of the ſoil: nor will it often be neceſſary to cut through hills in order to make roads, to lay cauſeys over quaking bogs, or to erect ſo many new buildings: though, even if all theſe difficulties ſhould occur, I would ſtill adviſe gentlemen to undertake the improvement. If they follow the directions here given, and profit by my errors, ſo as not to commit the like, I can aſſure them of ſucceſs, at a much leſs expence than it has coſt me, who have thoroughly paid for my apprenticeſhip. I can alſo promiſe, that they will lay their money out at better intereſt, and on better ſecurity, in this, than in any other way: beſides which, they will have the heart-felt ſatisfaction of contributing to the proſperity of their country, to the increaſe of population, and to the enriching of others, at the ſame time that they enrich themſelves.

" I have already ſaid, that when I began my improvements, two and twenty years ago, a third part of the farms in my pariſh were untenanted, for want of farmers who would rent them; that moſt of the inhabitants of my eſtate were very poor, and did not, in general, reap corn enough to ſupport them half the year; that they were grown ſo indolent, that rather than cultivate their ground, which would have afforded them a maintenance, they choſe to beg, like vagrants, in the neighbouring diſtricts. Now, their ſituation is very different, and they are no longer in that deplorable condition. They are become induſtrious, live by their labour, and beg no longer: they would even be at their eaſe (a happineſs which I ſhall do my utmoſt to procure them), were it not for obſtacles beyond my power to remedy. The pariſh now reaps more corn than it conſumes; ſo that the farmer here is enabled to ſell at the very markets where he uſed to buy. All my farms are tenanted; not a houſe on my eſtate is empty, and if I build a new one, it is immediately filled; in ſhort, the number of inhabitants in this pariſh, for I have an exact liſt of all of them, is double what it was in 1737. Such is the hiſtory of my improvements, and ſuch are the effects with which they have been attended." *Memoire ſur les Defrichemens, par.* II.

COMPOST, an uſeful ſort of manure, conſiſting of earth, dung, lime, clay, &c. according to the nature of the ſoil, well mixed and rotted together, till it forms one united maſs. *See* DUNG-HILLS.

CONE-WHEAT, a ſpecies of wheat, called in ſome parts of Somerſetſhire, blue-ball. Some of the ears of this wheat have awns, and others none. *See* Plate IV. Fig. 5.

CONIFEROUS, an epithet applied to ſuch trees as bear acones, as the fir, pine, cedar, &c.

CONSERVATORY, a place where fruits, &c. are preſerved. It is ſometimes uſed to ſignify a green-houſe. *See the article* GREEN-HOUSE.

CONSOUND, the ſame with bugle. *See the article* BUGLE.

CONSUMPTION, a diſeaſe incident to horſes, conſiſting in a waſte of muſcular fleſh, attended with a ſlow fever.

When a conſumption proceeds from a defect in a horſe's lungs, or any principal bowel, the eyes look dull; the ears and feet are moſtly hot; he coughs ſharply by fits; ſneezes much, and frequently groans with it; his flanks have a quick motion; he gleets often at the noſe, and ſometimes throws out a yellowiſh curdled matter, and he has little appetite to hay, but will eat corn, after which he generally grows hot.

As to the cure, one of the principal things is bleeding in ſmall quantities, a pint, or pint and half, for ſome horſes is ſufficient, which ſhould be repeated as often as the breath is more than ordinarily oppreſſed. Pectorals may be given to palliate preſent emergent ſymptoms; but as diſſections have diſcovered both the glands of the lungs, and meſentery to be ſwelled, and often indurated, the whole ſtreſs lies on mercurial purges, and the following ponderous alteratives, given intermediately.

Take native cinnabar, or cinnabar of antimony, one pound, powdered very fine, and add the ſame quantity of gum-guaiacum and nitre: give the horſe an ounce of this powder, twice a day, wetting his feeds.

The ſpring graſs is often extremely ſerviceable, but the ſalt-marſhes are to be preferred, and even to be more depended on than medicines; for great alterations are thereby made in the blood and juices, and no ſmall benefit ariſes from open air, and proper exerciſe.

But it may be worth obſerving, that a horſe frequently relapſes after appearances of amendment; when a yellowiſh gleet, or curdled matter, runs from his noſe, and he grows emaciated, is much addicted to ſweat, heaves much with a reduplicated motion, and has a ſhort rattling cough; under theſe circumſtances there can be little hopes of his recovery, or any future ſervice from him, conſequently, to ſave further expences, the beſt way would be to diſpatch him as an incurable. *Bartlet's Farriery, p.* 76.

CONVOLVULUS, the ſame with bind-weed. *See the article* Bind-Weed.

COOM, the ſoot that gathers over the mouth of an oven; alſo a compoſition of tar and greaſe, with which the axle-trees and boxes of the wheels of carriages are daubed or ſmeared over, in order to leſſen the friction.

COOP, a tumbrel, or cart encloſed with boards, to carry dung, ſand, grains, &c. which would otherwiſe fall out.

Coop, likewiſe ſignifies a pen, or encloſed place, where lambs, poultry, &c. are ſhut up, in order to be fed.

COPPICE, low woods, cut at ſtated times for poles, fuel, &c.

“ If you are to plant a coppice, ſays the ingenious Mr. Liſle, it is a good way to ſet your plants in trenches, as one raiſes quickſet hedges, and not to ſow ſeeds, for they are tedious in coming forward, and will tire one's patience in weeding them. I would not ſet above four plants in twelve feet ſquare, and at regular diſtances, ſo that the benefit of ploughing might not be loſt; and then at ſix or ſeven year's growth I would plaſh, by laying the whole ſhoot, end and all, under the earth in the trenches, which would not therefore be choaked, but ſhoot forth innumerable iſſues: this, by great experience, oak, aſh, hazle, and withy, will do.

“ In our parks we never ſet leſs than an hundred plants in a double chaſed lugg; and, if the earth turned up ſuch rubbiſh and ſtony ſtuff that the edge of earth on which they are to plant, is too narrow for a double chaſe, then they always ſet eighty plants on a ſingle chaſe in a lugg.

“ I obſerve the ſedgy graſs comes not up in felled coppices the firſt ſummer; conſequently the young ſhoots have a year's ſtart of that graſs; the next ſummer the ſedgy graſs comes up, and grows ancle high, equal with the two year's ſhoots: but what harm can it then do to the wood? The third year the ſedgy graſs dies, and you ſee no more of it. I ſpeak this, in anſwer to the countryman's objection, who pleads for putting ſome ſort of cattle into coppices to keep down the ſedge, which he pretends otherwiſe will choak and damage the plants. I have experienced this to my coſt.

“ It was May the ſixth, in the year 1701, that I bought ſome yearlings; and I aſked the farmer, if I might not put them in the coppice till midſummer; the farmer ſaid, not yet, by any means, for fear they ſhould be oakered, that is, leſt they ſhould bite off the oak-bud before it came into leaf, which might bake in their maws and kill them; but after the oak-bud was in leaf, it would be ſafe enough. The higher coppices are fit for yearlings, and the coppices of the laſt year's growth for hog-ſheep in winter. My ſhepherd ſaid, what the farmer obſerved as to the oak-bud was true; but he thought that the year was ſo backward, that they were not yet come out, and ſo there could be no danger at preſent. Farmer Elton ſaid, his father had loſt abundance of yearlings by the oak-bud, by putting them into the coppices while that was out. I have ſince experienced the ſame, and I have remarked the ſame.

“ It is a common ſaying, that calves will not crop in woods: but I put ſix calves into my woods, in November, which very much cropt the yearling-ſhoots. All huſbandmen I told of it very much wondered at it; but the reaſon to me was clear, viz. On firſt putting them in there came three or four days hard froſt, with a ſhallow ſnow, and a rime that laid on the bennetty graſs, ſo that they could not come at the ground, but only met with brier leaves, of which, though I had plenty, they were but thin diet to depend on altogether; yet together with other pickings would have been a noble maintenance for them, if they could have come at the rowet: this ſtreightneſs of fodder brought them to the neceſſity of cropping the young ſhoots, which they afterwards continued to do, having got the habit of it, and finding, when the weather came ſevere, the ſhoots to be toothſome, though the rowet in the coppices would have been ſufficient.

“ For a general rule, newly weaned calves are leſs hurtful to newly cut ſpring-woods than any other cattle, eſpecially if there be abundance of graſs; and ſome ſay, colts of a year old will do no harm: but the calves muſt be permitted to ſtay a while longer, and ſurely the later you admit beaſts to graze the better.

“ Letting coppice-wood grow to ſixteen or ſeventeen years growth is of great ſervice to young heirs, becauſe by ſo many years growth their backs are caſe-hardened, and able to withſtand the cold, when the coppice is cut, and they muſt ſtand naked, whereas, when coppices are cut at ten and eleven years growth, the barks of the young heirs are ſo tender, that they are ſtarved with cold air and winds. Ivy itſelf, ſays Evelyn, the deſtruction of many a fair tree, if very old, and taken off, does frequently kill the trees by a too ſudden expoſure to the unaccuſtomed cold.

“ When coppice-wood is of fourteen or fifteen years growth, it will yield a better price in proportion than young wood, becauſe it will be applicable to more uſes, and particularly in the cooper's buſineſs; for he will uſe the withy and ſome of the aſh for hoops and wine hogſheads; another part of the aſh may ſerve for prong-ſtaves, rake-ſtaves, and rath-pins for waggons, and the reſt may be parcelled out for hurdle and flake-rods.

“ Oaken ſtems of fourteen years growth are, in my woods, which in a great meaſure conſiſt of them, as high as the aſh or withy, and meaſure more in the diameter; for oaken ſtems are ſtronger at root, and will hold growing longer than aſh, withy, or hazle. When hazle grows ſpriggy in the body, and ſhoots forth from the ſides of the back, it is a ſign that it has given out, and done growing at the top.

“ Coppice-wood, in hedging and hurdling, wears much better and longer, if cut between Michaelmas and Chriſtmas, but ſells beſt in faggots, if cut between Chriſtmas and Lady-day, becauſe it ſhrinks leſs, and is much ſwelled, and looks beſt to the buyer. The method at Crux-Eaſton, and the hill-country adjacent, is only to oblige the buyers to rid the coppice by Midſummer; they think the coppices are not harmed, if rid by the time the Midſummer-ſhoots ſpring up; but they had not rid this year, 1697, by the latter end of July.

“ It is obſerved, that coppice-wood, cut for hedging at the latter end of winter, will not endure ſo long by a year as that which is cut at the beginning of winter: which, as I believe, may not only be, becauſe the wood late cut, is cut after the ſap is riſen, or attenuated by the ſun, but alſo oftentimes becauſe it is not cut long enough before ſuch rarefaction is made; for, if a tree, or a cyon cut to be grafted, as Quintery affirms, will endure many weeks of the winter out of the ground, or without being grafted, and, when ſpring ſhall come, it will by virtue of the ſap inherent in it, when attenuated,

PLATE. V.

Facing Corn-crowfoot.

The figures from 1 to 31, Inclusive are explained in the Article Butterfly.

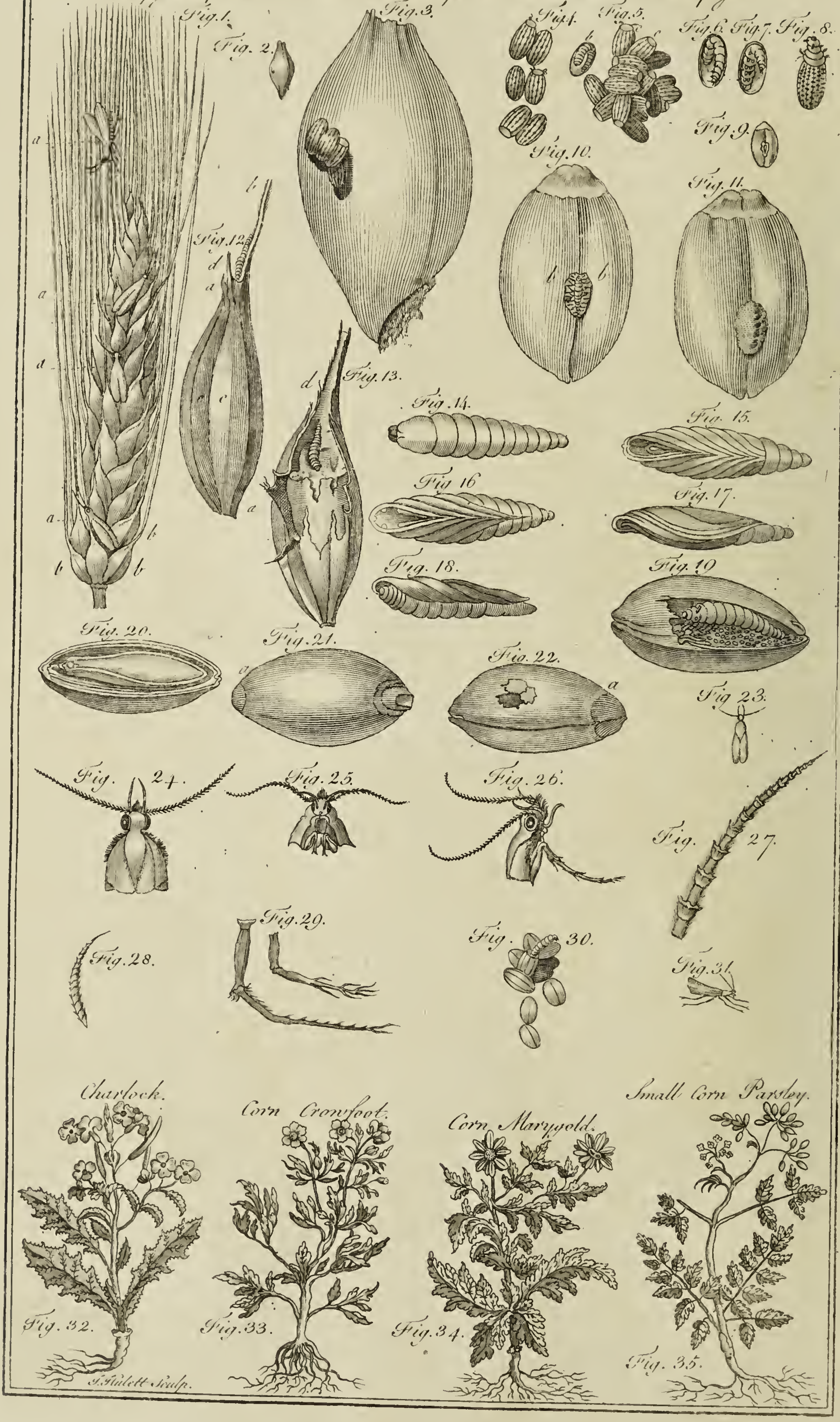


Fig. 1.
Fig. 2.
Fig. 3.
Fig. 4.
Fig. 5.
Fig. 6.
Fig. 7.
Fig. 8.
Fig. 9.
Fig. 10.
Fig. 11.
Fig. 12.
Fig. 13.
Fig. 14.
Fig. 15.
Fig 16
Fig. 17.
Fig. 18.
Fig. 19
Fig. 20.
Fig. 21.
Fig. 22.
Fig 23.
Fig. 24.
Fig. 25.
Fig. 26.
Fig. 27.
Fig. 28.
Fig. 29.
Fig. 30.
Fig. 31.
a
b
c
d
Charlock.
Corn Crowfoot.
Corn Marygold.
Small Corn Parsley.
Fig. 32.
Fig. 33.
Fig. 34.
Fig. 35.
J. Hulett Sculp.

put forth buds for ſome time, till it dries away; ſo it follows, that the ſap inherent always in the ſtem of the wood, if not cut ſo early as to have long time to dry, may be put into motion at ſpring, ſo as to effect the abovementioned inconvenience; therefore I hold hedging-wood and fire-faggots ſhould be cut in October.

“ It is a common practice of huſbandmen to fell their hedge-rows, and ſmall brakes within the grounds, thoſe years they ſow the grounds with wheat; but ſuch perſons ought well to conſider, firſt, whether ſuch land, after the wheat is off, will not bear a rowet too long for ſheep to eat, and, if ſo, great cattle muſt be put in to eat up the long rowet, and the ſooner the better for their tooth; and then attendance muſt be given by a cow-keeper by day, before the harveſt is in, and conſequently the wages dearer, and when you may have many other offices to employ ſuch a perſon in: therefore, in ſuch caſe, my advice is to let the hedge rows ſtand till after the wheat crop be got in, when great cattle may be ſuffered to feed down the rowet without prejudice to the hedge-rows, and at that time of the year ſuch graſs is wanted by night; and, during the future three crops, it is to be ſuppoſed the rowet will not be ſo large, but ſheep may overcome it, nor will they very much prejudice the young wood.” *Liſle's. Huſbandry, vol.* II. *p.* 245.

In raiſing coppices, great care ought to be taken that the wood they are to be compoſed of be ſuch as is proper for the ſoil you raiſe them on, and that it be proper for the uſes you deſign to ſell it for, which you muſt be regulated in by the vent you have; and let the profits reſulting from your under-wood regulate the thickneſs of your ſtandards; for in proportion as they are thicker or thinner, they will do more or leſs injury to your under-wood. You ſhould likewiſe conſider at what growth you can ſell your under-wood; only remember that the older and taller your under-wood is, the better it is both for fuel, and for what ſtandards you leave, becauſe they will be the taller and ſtraiter, by being forced up by the wood that grows about them; though a deep ſoil contributes much to their ſpring. It is alſo neceſſary, about the time of your felling, to lay out your ſeverals falls, that you may have an annual ſucceſſion, to yield a yearly profit. But though the ſeldom felling of coppices yields the more and better wood; yet the frequent cutting of it makes it thicken, and gives room for the ſeedlings to come up. If many trees grow in the coppice that is to be cut down, fell both them and the underwood together, cutting off the ſtubs as near the ground as convenient, and thoſe of the underwood a-ſlope and ſmooth, and not above half a foot from the ground; and ſtock up the roots of the timber-trees, if they ſend forth no ſhoots, in order to make room for ſeedlings and young roots to grow.

The under-wood may be cut from the beginning of October to the latter end of February; but February is the beſt month to cut wood in, where you have but a ſmall quantity to fell, that you may do it before the ſpring comes on too much: take great care to prevent the carters from bruſhing againſt the young ſtandards, and let all your wood be carried out by Midſummer, and made up by the end of April at the fartheſt; for if the rows and bruſh lie longer unbound or unmade up, it will ſpoil many of the young ſhoots and ſeedlings. If the winter before you fell, you encloſe it ſo as to keep all cattle out of it, your care and trouble will be well recompenſed.

Your elder underwood may be grazed about July, or in winter, but, for a general rule, newly weaned calves are the leaſt prejudicial to new cut wood, where there is abundance of graſs; and ſome ſay colts of a year old; but then they muſt be drove out by the beginning of May at fartheſt. However, if nothing at all be ſuffered to come in, it will be better. In this every man's experience muſt direct him.

If your woods happen to be cropt by cattle, it will be better to cut them down, and they will then make freſh ſhoots; whereas what has been bit by the cattle, will be otherwiſe ſtunted for ſeveral years before it will take to its growth. *Mortimer's Huſbandry, vol.* II. *pag.* 69.

CORD *of Wood*, a certain quantity of wood for fuel, properly ſtacked up; ſo called becauſe it was formerly meaſured with a cord. The dimenſions of a ſtatute cord of wood are eight feet long, four feet high, and four feet broad.

CORE, a diſorder incident to ſheep, occaſioned by worms in their liver, reſembling a plaice, or flounder.

A ſheep, if chiefly fed with hay, will live a year after being affected with this diſtemper, by which time he will have a water-bladder as large as an egg, under his throat; at the ſame time his eyes, mouth, and gums, will be white.

If any ſheep in a flock core during the winter, it will be eaſily ſeen at ſhearing-time; for ſuch ſheep will be poorer than the reſt; their wool alſo will run into threads, twiſting together at the ends, and look ſomewhat like teats. The laſt particular is not however a certain ſign of a ſheep's being cored; for ſometimes the wool of very ſound ſheep will be apt to run together into threads; and the finer the wool the more apt it is to twiſt together in that manner. There is no method of curing this diſtemper hitherto known. *Liſle's Huſbandry, vol.* II. *pag.* 207.

CORIANDER, the name of a plant formerly much cultivated in England; but at preſent little of it is ſown.

The ſeeds ſhould be ſown in autumn on rich land; and when the plants are come up, they ſhould be hoed out to about four inches diſtance, every way, clearing them from weeds. By the above management, the plants will grow ſtrong, and produce a greater quantity of good ſeeds. *Miller's Gard. Dict.*

CORN, a general name for grain that grows in ears, not in pods, as wheat, barley, &c.

If corn be lodged, it may be cut before it is quite ripe; and if blighted, it cannot be cut too ſoon. But if neither of theſe accidents happen, both wheat and barley ſhould be ſuffered to ſtand till full ripe. The grain will alſo grow plumper by being left a while in the field after cutting, to take the dew; but the ſtraw will be injured by it; nor muſt it by any means be laid up damp in the mow, leſt it heat, and become what is called mow-burnt; and perhaps take fire. A great number of weeds will produce the ſame effect, if the corn be houſed before their ſtalks are ſufficiently withered.

A correſpondent of the authors of the Muſeum Ruſticum tells us, that in the year 1763, he had twenty acres of barley, which was rather weedy at harveſt: on which account he was deſirous of giving it as much field room as he could conveniently; but the weather promiſing to be very wet, he was obliged to cart his barley, which he put into the bay of a large barn.

Whilſt this work was going forward, he was called away, and in his abſence his ſon got a horſe upon the mow to tread it; by which means, the weeds, not being thoroughly dry, cauſed the barley to heat to ſo violent a degree, that he was very apprehenſive of its firing.

“ My men, adds he, were in a violent hurry to get it out of the barn; but this I would by no means conſent to. I however ordered one of them to get upon the mow with a cutting-knife, and cut in it a round hole like a well. He began the work; but in about five minutes, being almoſt overcome by the heat, I ſent another to relieve him; and thus they worked ſpell and ſpell, till they got to the bottom.

“ This round hole ſaved my barley, and perhaps my barn too; for it formed, as it were, a chimney or flue, to carry off the heat.” *Muſeum Ruſticum, vol.* III. *p.* 365.

For the method of preſerving corn after it is threſhed, *ſee the article* GRANARY. And for preſerving it in the ſtraw, *ſee* REEK.

CORN-CROWFOOT, a weed very common among the corn. It has an upright ſtalk; the leaves are of a pale green, and cut into long, narrow, acute ſegments. The flowers are much ſmaller and paler than the crowfoot of the paſtures: but the ſeed-veſſels are the moſt remarkable, being covered all over with prickles. *See* Plate V. fig. 33.

CORN-FLAG, a very troubleſome weed, multiplying exceedingly by its roots. It has a round compreſſed tuberous root, which is of a yellowiſh colour, and covered with a brown furrowed ſkin, like that of the vernal crocus. From this root ariſes two flat ſword-ſhaped leaves, which embrace each other at their baſe; and between theſe ariſes the flower-ſtalk, which grows near two feet high, having one or two narrow leaves embracing it like a ſheath. This ſtalk is terminated by five or ſix purple flowers, ſtanding above each other at ſome diſtance, and ranged on one ſide of the ſtalk; each of theſe has a ſheath, which covers the flower-bud, before it expands, but ſplits open lengthways when the flowers blow, and afterwards ſhrivels up to a dry ſkin, which remains about the ſeed-veſſel, till the ſeeds are ripe, which is in the beginning of Auguſt. The flowers come out in the beginning of May, or in June. Some of theſe flowers are white, and others fleſh-coloured.

Corn-flag is extremely difficult to root out, as every part of the root will grow. The beſt manner of extirpating it is that already mentioned under the article coltsfoot. See COLTSFOOT.

CORN-MARYGOLD, the name of a very troubleſome weed, of which there are two ſpecies, one common in corn-fields, and the other in moiſt paſtures. The leaves of the firſt ſort embrace the ſtalks, the upper being jagged, and the lower indented like a ſaw. The ſecond is, by C. Bauhine, called the greater wild daiſy, with a leafy ſtalk. It riſes with ſtalks near two feet high, garniſhed with oblong indented leaves, which embrace the ſtalks with their baſe. Each of theſe ſtalks is terminated by one white flower, ſhaped like that of the daiſy, but four times as large. It flowers in June. *See* Plate V. fig. 34.

The corn-marygold has a perennial woody root, which ſtriking deep requires a conſiderable quantity of food, and therefore muſt be a great enemy to the corn. Conſiderable pains muſt be taken before this weed can be extirpated, as it is highly probable, that, beſides multiplying by its roots, its ſeed will grow, if ploughed in, as that of the garden marygold will do when dug in. Deep and repeated hoeings are therefore neceſſary, before it runs to ſeed.

CORN-PARSLEY, the name of a low branching plant common among corn. The branches grow thick together, and are knotted and crooked. The flowers grow cloſe together after the manner of parſley, and are of a white colour inclining to yellow. The ſeeds are large in proportion to the plant; and are ſet about with little crooked briſtles; which makes them adhere to the ſtockings in great plenty, when the ſeeds are ripe; which is generally about harveſt. *See* Plate V. fig. 35.

CORN-WORM, the inſect lately obſerved in France to be ſo very deſtructive to corn. *See the article* BUTTERFLY.

CORNER-TEETH, the teeth which appear when a horſe is coming five years old. *See the article* AGE.

CORONET, the loweſt part of a horſe's paſtern, which runs round the coffin, and is diſtinguiſhed by the hair which joins and covers the upper part of the hoof.

COSH, the ſame with pods. *See the article* POD.

COSSART, or *Coſſet Lamb*, a lamb left by its dam's dying before it is capable of ſhifting for itſelf; or it is a lamb taken from a ewe that brings two, three, or four lambs at a yeaning, and conſequently is incapable of bringing them all up. The word is alſo applied to a colt, calf, &c.

In either of theſe caſes, if there be not another ewe at liberty to ſuckle it, it muſt be brought up by hand, or periſh. By an ewe at liberty is meant one that has, by ſome accident, loſt her lamb, and has milk enough to ſuckle a lamb yeaned by another.

COSTIVENESS, a complaint to which horſes are often ſubject; ſometimes occaſioned by violent and hard exerciſe, eſpecially in hot weather; and ſometimes by ſtanding long at hard meat, without graſs, or other cleanſing diet, and with very little exerciſe.

The cure for this complaint is eaſy, only by giving him an open diet for ſome time; and if any thing more is wanting, lenitive mild purges are the moſt likely to ſucceed. Such as Glauber's ſalts with lenitive electuary, four ounces of each, diſſolved in warm ale or water, and repeated every other day. This, with ſcalded bran given every day, will ſoon remove the complaint, and carry off the viſcid ſlime engendered in the guts, which is generally the cauſe of his coſtiveneſs.

But there is another kind of coſtiveneſs in horſes, which is much harder to be removed, viz. that which ſeems to be natural, or grown into a habit. We find ſome very good horſes liable to this diſorder; and, when it is of long continuance, they are apt to grow lean and emaciated, feel hot and dry, their hair ſtaring, and there is danger of ſome approaching ſickneſs.

This diſorder is not eaſily removed; nor is it often neceſſary to bring ſuch horſes into a contrary habit; for where this is natural, it may proceed from a more than ordinary ſtrength and rigidity in the ſmall fibres of the ſtomach and guts, which makes them digeſt their aliment well, and retain their excrements longer; and when ſuch a habit can be kept within any proper medium, the horſe will continue in ſtrength and vigour, without any inconvenience; and it is obſervable, that theſe horſes are, for the moſt part, able to endure great fatigue and labour. However, it is proper to give ſuch horſes, at all convenient times, an opening diet. For if this habit happens, by any accident, to grow into an habitual coſtiveneſs, ſo as to produce ill effects, as heat, dryneſs of the conſtitution, little ſcabby eruptions over the ſkin, and a rough coat, it will then be neceſſary to remove it in ſome degree, which cannot be done but by a continual uſe of emollients, joined by a looſe opening diet.

Purging is here alſo neceſſary, and ought by all means to be complied with; but purging in the common way with Barbadoes or other plantation aloes, ſeldom has any great effect longer than the purge is working; for when that is over, the ſame habit of coſtiveneſs generally returns as ſtrong as ever. Scalded bran, and the common opening diet, ſeldom makes any great alteration in theſe horſes. The aloetic purges will ſcarcely work, eſpecially if they are made ſtrong, for they then chiefly run off by urine, which does the creature little ſervice in this caſe. But after the common purges have failed, the following will ſucceed beyond expectation.

Take ſuccotrine aloes, ſix drams; ſpermaceti, half an ounce; fœnugreek-ſeeds in powder, two ounces: make the whole into two balls, with a ſufficient quantity of honey, or common treacle, and give them in a morning faſting.

Let the horſe have ſcalded barley inſtead of ſcalded bran, and the liquor of the barley for his drink, milk warm. This will work very gently, where ſtronger purges have little other effect upon coſtive horſes than to gripe and make them ſick. It ought to be repeated once in four days, and may be continued till he has taken ſix doſes. Let him have an ounce of fœnugreek-ſeeds once a day, in one of his maſhes, and when the purgation is over, continue the uſe of the fœnugreek; and ſometimes give linſeed in the ſame manner, either in his dry or moiſt feeds, until the horſe grows ſmooth and well coated, and his dung moiſt and in good order. *Gibſon's Farriery, vol.* II. *p.* 134.

COTYLEDONS, rinds, or huſks.

COUCH-GRASS, *quick-graſs*, *knot-graſs*, or *dog-graſs*, is one of the worſt of weeds among corn, and one of the moſt difficult to extirpate in arable land; every joint of its long creeping roots being capable of ſoon producing a new plant, after thoſe roots have been broken by the plough. The uſual way of deſtroying it, is by laying the land fallow in ſummer, and frequently harrowing it well over, to draw out the roots, every piece of which ſhould then be burnt, for the reaſon already mentioned. Where this is carefully done, the ground may be ſo well cleanſed in one ſummer, that the remaining roots will not do any great injury to the enſuing crop: but the beſt way is to ſow the land in which this weed prevails with ſuch plants as require the horſe-hoeing culture. The blade of this graſs is ſo rough, that cattle will not feed upon it when green.

COVERT, ſheltered, not open, not expoſed.

COUGH, a convulſive motion of the lungs, being an effort of nature to throw up ſome offending matter.

Horſes are very ſubject to coughs, which are ſometimes occaſioned by colds, and often by the injudicious treatment of an inflammation of the lungs; the conſequence of which is often ſettled habitual coughs, which frequently degenerate into aſthmas, and broken wind.

Nothing has more perplexed practitioners than the cure of ſettled coughs; the cauſe of which, perhaps, has been their want of attention to the different ſymptoms which diſtinguiſh one cough from another; for, without ſtrict obſervance thereof, it is impoſſible to find out the true method of cure.

Thus, if a horſe's cough is of long ſtanding, attended with loſs of appetite, waſting of fleſh, and weakneſs, it denotes a conſumption; and that the lungs are full of knotty, hard ſubſtances, called tubercles, which have often been diſcovered on diſſection.

The following ſigns denote when the cough proceeds from phlegm, and ſlimy matter, that ſtuff up the veſſels of the lungs.

The horſe's flanks have a ſudden quick motion; he breathes thick, but not with his noſtrils open, like a horſe in a fever, or that is broken-winded; his cough is ſometimes dry and huſky, ſometimes moiſt, before which he wheezes, rattles in the throat, and ſometimes throws out of his noſe and mouth great gobs of white phlegm, eſpecially after drinking, or when he begins or ends his exerciſe, which diſcharge commonly gives great relief. Some ſuch horſes wheeze and rattle to ſuch a degree, and are ſo thick winded, that they can ſcarce move on, till they have been out ſome time in the air; though then they will perform beyond expectation.

Theſe are properly aſthmatic caſes, and ought to be diſtinguiſhed in their ſymptoms from that purſiveneſs and thick windedneſs we ſee in ſome horſes, occaſioned by too full, or foul feeding, want of due exerciſe, or their being taken up from winter's graſs. But theſe two laſt caſes are eaſily cured by proper diet and exerciſe; the one by lowering his keeping, and the other by increaſing it.

The above aſthmatic caſe proves often very obſtinate; but, if it happens to a young horſe, and the cough is not of long ſtanding, it is greatly relieved, if not totally cured, by the following method.

If the horſe is full of fleſh, bleed him plentifully; if low in fleſh, more ſparingly; which may occaſionally be repeated, on very great oppreſſions, and difficulty of breathing, in proportionate quantities.

As mercurial medicines are found remarkably uſeful in theſe caſes, give a mercurial ball, with two drams of calomel, over night, and a common purge the next morning: or the following, which is much recommended by Mr. Gibſon:

Take gum-galbanum, ammoniacum, and aſſa-fœtida, of each two drams; fine aloes, one ounce; ſaffron, one dram; oil of anniſeeds, two drams; oil of amber, one dram; with honey enough to form into a ball.

They may be repeated at proper intervals, with the uſual cautions. In the intermediate days, and for ſome time after, one of the following balls may be given every morning:

Take cinnabar of antimony, finely levigated, ſix ounces; gum-ammoniacum, galbanum, and aſſa-fœtida, of each two ounces; garlic, four ounces; ſaffron, half an ounce: make into a paſte for balls, with a proper quantity of honey.

Theſe balls are extremely well calculated for this purpoſe: but if they are thought too expenſive, the cordial ball may be given, with an eighth part of powdered ſquills and Barbadoes tar: or equal quantities of the above, and cordial ball may be beat up together; and where they can be afforded, balſam of Peru, balſam of ſulphur, and flower of Benjamin, would undoubtedly, added to the cordial ball, make it a more efficacious medicine, in caſes of this ſort, as thus:

Take of the pectoral or cordial ball, one pound; balſam of Peru, half an ounce; balſam of ſulphur aniſated, one ounce; flower of Benjamin, half an ounce: honey as much as is ſufficient to form them into a paſte: give the ſize of a pigeon's egg every morning.

Exerciſe in a free open air is very ſerviceable, and the diet ſhould be moderate. Horſes ſubject to any inward oppreſſions of the lungs, ſhould never be ſuffered to have a belly full; that is, they ſhould never be permitted ſo to diſtend their ſtomach with meat or water, as to preſs againſt the midriff; which of courſe would hinder reſpiration. Their hay ſhould even be abridged, given in ſmall quantities, and ſprinkled with water; and their uſual allowance, both of corn and water, ſhould be divided into ſeveral portions: by ſuch a regulation in diet, horſes may be ſo recovered as to do great ſervice; and in all diſorders of the lungs, it is what ſhould principally be attended to.

The following are the ſymptoms of a dry cough, or aſthma.

The horſe afflicted with this cough, eats heartily, hunts, and goes through his buſineſs with alacrity, appears well coated, and has all the ſigns of perfect health; yet he ſhall cough at particular times almoſt inceſſantly, without throwing up any thing, except that the violence of the cough will cauſe a little clear water to diſtil from his noſe. Though this cough is not periodical, yet ſome of theſe horſes cough moſt in a morning, after drinking.

This may properly be ſtiled a nervous aſthma in a horſe, as probably it chiefly affects the nerves in the membranous parts of the lungs and midriff; and is a caſe very doubtful at leaſt, if not incurable: but when the horſe is young, the following method may be ſucceſsful:

Take away firſt a moderate quantity of blood; then give him two drams of calomel, mixed up with an ounce of diapente, for two nights; and the next morning a purging ball. Keep him well cloathed and littered, and feed him with ſcalded bran and warm water.

Once in eight or ten days this purge may be repeated, with one mercurial ball only, given over night.

The following balls may then be taken, one every day, about the ſize of a pullet's egg, the horſe faſting two hours afterwards; and ſhould be continued two months, or longer, to be of real ſervice:

Take native cinnabar, or cinnabar of antimony, half a pound; gum-guaiacum, four ounces; myrrh, and gum-ammoniacum, of each two ounces; Venice ſoap, half a pound: the cinnabar muſt be finely levigated, as before obſerved, and the whole mixed up with honey, or oxymel ſquills.

The following alſo will be found a uſeful remedy in obſtinate dry coughs:

Take gum-ammoniacum, ſquills, and Venice ſoap, of each four ounces; balſam of ſulphur, with anniſeeds, one ounce; beat up into a maſs, and give as the former.

Theſe mercurial and ponderous medicines are well adapted to open obſtructions in the lungs, and prevent thoſe little knots, or tubercles, which ſo frequently ulcerate, and lay the foundation of an incurable malady, or conſumption; but the common pectorals alone will avail nothing in old ſtubborn coughs, their efficacy being loſt in the long tour they have to make, before they come to the lungs; and indeed, were it otherwiſe, without they had ſuch powerful openers joined with them, they would be of little conſequence; for where there are expectations from medicines, ſuch are chiefly to be relied on, which have a power of diſſolving and attenuating the viſcid humours, opening the ſmall obſtructed veſſels, and promoting all the natural ſecretions.

Before we conclude this article, it may be neceſſary to obſerve here, that ſome young horſes are ſubject to coughs on cutting their teeth, their eyes alſo are affected from the ſame cauſe. In theſe caſes always bleed, and if the cough is obſtinate, repeat it, and give warm maſhes; which, in general, are alone ſufficient to remove this complaint. But when the cough is an attendant on worms, as it often is in young horſes, you muſt give ſuch medicines as have a power to deſtroy thoſe animals; particularly mercurial phyſic, at proper intervals, and intermediately half an ounce of Æthiop's mineral, mixed up with the cordial; or pectoral balls may be given every day. *See* WORMS. *Bartlet's Farriery, page* 51.

But horſes are not the only animals ſubject to this diſorder: it is ſo common among ſheep, that one ſeldom paſſes near a flock without hearing it in ſeveral. They cure this diſorder in the Ardennes by throwing up their noſtrils with a ſyringe blanched almonds pounded in wine, for ſix or eight days ſucceſſively.

COUPLES, ewes and lambs.

COW, the female of the bull.

Cows are very ſerviceable to the huſbandman for work, and for the ſupply of the family and market. The beſt breed is reckoned that of Yorkſhire, Derbyſhire, Lancaſhire, Staffordſhire, &c. and a good hardy ſort for fatting on barren, or middling ſort of land, are your Angleſey's and Welſh. The hardieſt are the Scotch; but the beſt ſort of cows for the pail, only they are tender, and require very good keeping, are the long-legged, ſhort-horned cow, of the Dutch breed, which is to be had in ſome places of Lincolnſhire, but moſtly in Kent; many of theſe cows will give two gallons of milk at a meal: but in furniſhing yourſelf with cattle, you ought to conſider the goodneſs of your land, and the uſe you deſign your cattle for, as whether for breed, milk, or work.

If for breed, the better your land is, the larger may your kine be; and the cheaper, the more will be your profit: only obſerve, that of what kind ſoever your breed is, that it be the beſt of the ſort, and let your bull be of the ſame country with your cow, for a mixed breed is not reckoned to be ſo good.

The cow ought to have a broad forehead, black eyes, large clean horns, her neck long and thin, a large deep belly, thick thighs, round legs, ſhort joints, a white large deep udder, having four teats, and her feet large. As for the ſize of your cows, as of all other cattle, it muſt be ſuited to the goodneſs of your land, though the largeſt commonly give the moſt milk: and whether you deſign them for breed, fattening, or the dairy, let them be ſuch as come off a worſe ground than your own, if poſſible. The beſt time to breed calves is from three years old to twelve. *See the article* CALVES.

For a fortnight or three weeks before a cow calves, put her into good graſs; or, if it be in winter, give her hay; and be ſure to keep her in the houſe the firſt day and night after ſhe has calved, and let a little of the cold be taken off the water which you give her: the next day, if well, and ſhe be well cleaned, turn her out about the middle of the day, and take her in two or three nights more, giving her water a little warmed every morning, before you turn her out. *Mortimer's Huſbandry, vol.* I. *p.* 225.

COW-LEASE, paſture, or meadow ground, kept for feeding of cows.

COWHERD-MILK, implies milk received from the hands of the cowherd, a perſon whoſe office it is to attend upon, and look after, the herd of cows in places where they run in common.

COWL, a term uſed in ſome counties of England to ſignify a tub.

COW-PARSLEY, the name of a plant common in paſture grounds, and of which cows are ſaid to be very fond. This plant ſhould be rooted out of all paſtures, for it is one of the moſt early plants in ſhooting, ſo that by the beginning of April its leaves are near two feet high. The ſeeds of this plant ſpread greatly over the ground, and as the roots are perennial, ſo they are often very troubleſome weeds to deſtroy.

COW-PARSNIP, *wild parſnip*, *meadow parſnip*, or *madrep*, the name of a weed that grows to near three feet high. The ſtalk is round, furrowed, and hollow. The leaves proceed from a large membrane or ſheath. They grow on long hairy ſtalks, and are divided and downy. The flowers grow in large umbels, are white, and conſiſt of five irregular petals: two oval, ſtreaked, compreſſed ſeeds, ſurrounded by a wing, ſucceed each flower.

COW-WHEAT, by ſome called *fox-tail*, is a pernicious weed in many countries. Its ſeed is ſomething like wheat, and according to Cluſius, ſpoils the meal with which it is ground, by giving it a dark colour, and a bitter taſte: though Mr. Ray ſays he could never perceive any diſagreeable reliſh in the bread with which it was mixed. Mr. Miller ſays it is a delicious food for cattle, particularly for fattening of oxen and cows, and that it may be worth while to cultivate it for that purpoſe.

Its ſeeds ſeldom grow the firſt year, unleſs they chance to be ſown, or ſow themſelves, in the autumn, ſoon after they are ripe.

CRADLE, a part often added to a ſcythe, the better to gather the corn, when low, into ſwarths, when it is mowed.

CRAGG, *cragge*, a name given in Suffolk to the remains of marine ſhells, of various kinds, and in which the greater part of the Britiſh cliffs abound.

This is a very excellent manure for cold, wet, or clay land; ſo that every farmer would do well to ſearch his grounds, in order to know whether he is, or is not, poſſeſſed of this treaſure, which will inſure him of very large crops of corn, though his lands were before worn out by continual labour.

CRAKE, a name given in the northern counties to the crow.

CRAKE-NEEDLE, the ſhepherd's needle; or rather the ſeed-veſſels of it.

CRANE's-BILL. *See* CROWFOOT, CRANE's-BILL.

CRAP, a name given in ſome parts of England to darnel; and in others to buck-wheat.

CRATCH, or *critch*, a rack.

CREAM, the unctuous, or oily part of milk.

CUBBITTING, a vice to which ſome horſes are ſubject; conſiſting in their catching hold of the manger, ſucking in of the air, and ſwallowing it down in gulps, till they are often ſo full that they are ready to burſt. Some do it only on their collar reins, and ſome on every poſt and gate they come at.

This vice is more common in London than any where elſe, and may either come upon horſes from very low feeding, while they are young and have appetites, or perhaps by ſtanding much at the crip while they are ſhedding their teeth; for then their mouths are hot, and their gums tender and itching, which may readily make them ſuck in the air to cool their mouths: but young horſes are the more apt to imbibe this ill habit, when they ſtand next thoſe that do it; for young horſes often follow others. Horſes addicted to this vice are but of ſmall value; they drop a great part of their food unchewed, which makes them almoſt always look lean and jaded, with a ſtaring coat, and conſequently few of them are able to endure much labour; beſides their being frequently ſubject to the gripes, and other diſorders, owing to their continual ſucking in the air. There is no method yet known, that has proved effectual in the cure of this vice. *Gibſon on Horſes*, *vol.* I. *p.* 40.

CRESSES, are of various kinds; but the common garden creſs, the Indian creſs, and the water-creſs, are the ſorts uſed for the table.

The common garden creſs, pretty generally cultivated as a ſallad herb, is moſt eſteemed in the winter and ſpring, becauſe it is one of the warm kind. It is propagated by its ſeeds only. If raiſed in the winter ſeaſon, it muſt be ſown upon a gentle hot-bed, and covered ſo as to defend it from great rains or froſt, both of which are equally deſtructive to it in that ſeaſon. If it be not raiſed till the ſpring, it may then be ſown in warm borders, well fenced from all nipping winds: but if it is to be continued in the ſummer, it muſt be ſown upon ſhady borders; and this ſowing ſhould be repeated every third day, or it will ſoon be too large for uſe, as it grows very faſt at that time of the year.

A curled ſort of this plant is propagated in ſome gardens, more for curioſity, and to garniſh diſhes, than for any real uſe; for the common ſort is full as good. This curled creſs ſhould not be ſown quite ſo thick as the other, and when its plants are come up, they ſhould be thinned, ſo as to leave the remaining ones at leaſt half an inch aſunder, that they may have room to expand their leaves. To preſerve this curled variety unmixed, all ſuch plants of it as ſeem to have a tendency to degenerate muſt be pulled up as ſoon as they are noticed.

The beſt method of ſowing both theſe ſorts of creſſes is in drills, becauſe it will then be eaſieſt to cut them as they may be wanted. Their ſeeds, which are very ſmall, ſhould be but barely covered with earth; and to ſave theſe ſeeds when they are ripe, the plants ſhould be drawn up, ſpread upon a cloth, and dried in the ſun for two or three days. They may then be eaſily beaten out; and they ſhould be kept in a dry place.

The Indian creſs (commonly called naſturtium, which is the right botanic name of the garden creſs, as tropæolum is the proper appellation of this,) is an annual plant, ſeldom propagated otherwiſe than by its ſeeds; though it may be continued through the winter, if kept in pots, and ſheltered in a good green-houſe, and there it may be multiplied by cuttings, as is ſometimes practiſed with the double flowered ſort. But this is not worth while, as the ſeeds ripen every year, and plants are eaſily raiſed from them. They are often raiſed in hot-beds about the end of March, or the beginning of April, and then tranſplanted: but they may be ſown in April, in the places where they are to remain. This, for the ſake of ornament, and that no ſmall one in a kitchen-garden, ſhould be where their ſtalks may find ſupport, for they will climb up to the height of ſix or eight feet, and make a very pretty appearance when their flowers are blown. Thoſe of a deep orange colour, inclining to red, are leſs common now, in this country, than the larger ſort with a pale yellow flower; this laſt being generally preferred on account of it's ſize. Theſe flowers have a warm taſte like the garden-creſs. They are commonly uſed for garniſhing of diſhes, and are frequently eaten in ſallads. Their ſeeds fall off as ſoon as they are ripe, and are excellent when pickled. Some call them capuchin capers.

The water-creſs, which grows naturally in ditches and rills of water in moſt parts of England, is much eſteemed as a ſallad herb in the ſpring of the year. Many people even prefer it to all other ſallatting of that ſeaſon, for its agreeable warm bitter taſte, and becauſe it is reckoned an excellent anti-ſcorbutic, a great cleanſer of the blood, and a good diuretic. The editor of the laſt edition of Mr. Mortimer'sHuſbandry ſays, that water creſſes, freſh gathered, and eat faſting in a morning, have performed wonders in conſumptive caſes; and he judiciouſly recommends to ſportſmen, or others, who ſtay long in the fields in cold weather, to gather them out of the ſprings where they grow, and eat them, as a better cordial to warm the ſtomach, than any dram of ſpirituous liquors.

Water creſſes are eaſily cultivated, by taking ſome of the plants, entire, from the place of their natural growth, early in the ſpring, with all their roots to them, then ſetting them in mud, and letting water in upon them by degrees, ſo as at length to form a kind of pond, if it cannot be continued as a running ſtream; though few ſpacious grounds are without ſome brook or other, along the ſides of which they will grow perfectly well. After they have taken root, they will ſoon multiply, eſpecially if they be not cut the firſt ſeaſon, but ſuffered to ripen their ſeeds; for theſe will fall into the water, and afterwards afford a ſufficient ſupply of plants. If the water is too deep to admit of planting them with eaſe, and if it be not a running ſtream, the beſt way is to throw upon its ſurface, at the places where it is deſired they ſhould grow, ſome of the plants taken from elſewhere juſt as their ſeeds are coming to maturity: for they will there complete their ripening, ſink to the bottom, and produce a plentiful growth of creſſes.

Incautious perſons have, not unfrequently, ſuffered in their health, by eating the leaves of the creeping water parſnip, inſtead of thoſe of the water creſs. To guard againſt this miſtake, which may chance to prove fatal, it is proper to obſerve, that the leaves of the right water creſs are roundiſh, almoſt heart-ſhaped, ſmall, with few indentures on their edges, and of a dark green colour; whereas thoſe of the water parſnip are oblong, pretty ſharp pointed, ſawed at their edges, and of a light green colour.

CRIBBLE, coarſe meal, or that but one degree better than bran.

CROFT, a ſmall field or incloſure. In the northern counties it is uſed as a ſmall cloſe or incloſure, one end of which contains the dwelling-houſe and kitchen garden.

CRONES, old ewes.

CROP, the produce, or the quantity of corn, graſs, &c. growing on any parcel of land.

CROSS-TINING, a method of harrowing land, conſiſting in drawing the harrow up the interval it went down before, and down that which it was drawn up.

CROTCH, a hook.

CROW, an iron bar, with a claw at one end, uſed as a lever, and for making holes in the ground, &c.

CROW-FOOT, or CRANE'S-BILL, the name of a perennial weed common in paſtures. The leaves are divided almoſt to the middle, uſually into ſeven parts. The ſtalk commonly divides into two branches; and each of theſe into two more. From the corner of each diviſion comes a flower-ſtalk, ſupporting two large blue flowers; conſiſting of five roundiſh, intire petals, ſucceeded by a long ſeed-veſſel, reſembling a crane's-bill. This bill-like ſeed-veſſel is thick and rough; but not ſo long as in ſome other plants.

CROWS. *See the article* ROOKS.

CROWN-SCAB, a diſeaſe in horſes, conſiſting in an humour, that breaks out round the coronet; of a very ſharp and itching nature, and attended with a ſcurfineſs. Sharp waters prepared with vitriol are generally uſed for the cure of this diſorder: but the ſafeſt way is firſt to mix equal parts of marſhmallow ointment and yellow baſilicon together, ſpreading the compoſition on tow, and laying it all round the coronet. A doſe or two of phyſic may be very proper, to carry off the humour. *Bartlet's Farriery, p.* 296.

CUCUMBERS, a well known plant, cultivated in moſt kitchen gardens.

Cucumbers, for very early ſhew, that is to ſay, to decorate the table at a time when no prudent man would chooſe to eat them, are nurſed in ſtoves by ſome fantaſtical gentry, who pique themſelves on having this fruit fit to cut in every month of the year. But I ſhall here content myſelf with relating the more rational, and far leſs troubleſome, practice of thoſe who have patience to wait till they can be produced in the natural ſeaſons.

To have as early cucumbers as the not too much forced courſe of vegetation can yield in this country, their ſeeds ſhould be ſown, about the middle of March, or a little later if the ſpring be backward, either under a bell glaſs placed upon a ſpot of hot-bed, or at the upper end of a more regular hot-bed covered with frames, where they will not then take up the room of other plants. It is neceſſary that the due temperature of the hot-bed ſhould be attended to here and when theſe plants are come up, they ſhould be tranſplanted into another moderate hot-bed, at the diſtance of about two inches aſunder. Here they ſhould be covered with bell or hand glaſſes ſet quite cloſe to each other, and they ſhould be ſhaded, and ſparingly watered, until they have taken root. They ſhould alſo be aired, as much as the weather will permit, by raiſing up the ſide of the glaſs oppoſite to the wind, in order to ſtrengthen them, and when they have begun to put out their rough leaves, they muſt be re-tranſplanted on the ridges where they are to remain.

Theſe ridges are made with new horſe-dung, in the ſame manner as before directed for the hot-bed, excepting that they are neither ſo thick nor ſo wide. About two feet four inches will be ſufficient for the breadth of the trenches in which they are made; but their length may be whatever is moſt convenient, according to the number of plants intended for them. The trenches for theſe ridges ſhould be about ten inches deep in dry ground; but very little earth need be dug away for them if the ſoil is wet. About one cart load of dung will make a ridge long enough for five or ſix holes of cucumbers, at the diſtance of about three feet and an half from each other. This ridge of dung, being well beaten down and levelled at top, ſhould be covered with about four inches deep of earth, of which the ſame thickneſs ſhould alſo be laid over its ſides. Hillocks of mould ſhould then be raiſed up in the middle of the ridge, at every diſtance at which the plants are to be ſet; and after theſe have been cloſely covered with the glaſſes during four and twenty hours, in order to warm the earth, and thereby fit it for the reception of the plants, they ſhould be ſtirred up by hand, ſo as to make a little hollow in the middle of each, in the form of a baſon. Four plants ſhould then be ſet, as far as can be from each other, in each of theſe hollows, where they muſt again be watered and ſhaded until they have taken root; and after this they muſt be aired, by raiſing the glaſſes on the ſide oppoſite to the wind, in proportion to the warmth of the weather: but they ſhould be raiſed thus only in the middle of the day, until the plants begin to fill them;

for after that, they ſhould be propped up with a forked ſtick on the ſouth ſide, to a height proportioned to the increaſe of the plants, which muſt be carefully preſerved from being ſcorched by the ſun. This will alſo harden and prepare them for the open air, to which they ſhould not, however, be expoſed too ſoon, becauſe we frequently have morning froſts in May, which they would not be able to reſiſt. Rather than run any hazard of this kind, the glaſſes ſhould be kept over them as long as can be without damaging the plants; and this may be for a conſiderable time, if the glaſſes are raiſed all round, by ſetting them on three bricks.

About the end of May, when the weather begins to be ſettled and warm, and rather in a cloudy day which ſeems to promiſe rain, than in a very dry and ſunny one, the plants ſhould be gently turned down from out of the glaſſes; and theſe ſhould then be ſupported over them at the height of four or five inches from the ground, by three forked ſticks, which will hold them up very ſecurely, and prevent their bruiſing the ſhoots of the plants underneath: for it is beſt not to remove the glaſs entirely before the latter end of June or the beginning of July, becauſe they will preſerve a moiſture about their roots much longer than if they were quite expoſed to the open air. The plants thus turned down will have made a conſiderable progreſs by the end of three weeks, eſpecially if the weather has been favourable; and then it is that the ſpaces of ground between the ridges, or along the ſides of the ridge if there be but one, ſhould be dug up, and added to the bed, or beds, that the roots of the plants may be enabled to ſtrike into it; for they will extend themſelves a great way (ſome ſay as far as the vines,) if they are not cramped. The runners of the vines ſhould be laid in exact order, without tumbling them too much, or bruiſing, or breaking of their leaves. Some pin them down gently with little wooden hooks, to prevent their being blown about by the wind. After this, they will require no farther care, except keeping them clear from weeds, and watering them when neceſſary, that is to ſay, when their greater leaves drop and hang down to the ground. But here it is to be obſerved, that, though pretty frequent watering of them increaſes their fruitfulneſs, they are beſt taſted, and wholeſomeſt, when they have had but little water; and, though they ſhould be watered ſometimes in dry weather, they ſhould be carefully defended from rain when it is cold. The ridges thus managed will yield large quantities of fruit, from June till the latter end of Auguſt. Mr. Mortimer recommends nipping of the top ſhoots of cucumber plants after they have put out three or four joints, as a means of making them knit the ſooner for fruit.

It is from cucumbers planted on ridges, like the above, that moſt of the gardeners about London ſave their ſeeds. To this end, they leave a number of the earlieſt and fineſt fruit upon the vines, until their ſeeds are perfectly ripe; and then, when the outer cover begins to decay, they cut them open, and ſcrape out their ſeeds, with the pulp, into a tub, which they cover over with a board, to keep out all filth. They let theſe ſeeds and pulp remain thus for eight or ten days, only ſtirring them well with a ſtick, to the bottom, every day, in order to rot the pulp, and make it ſeparate the more eaſily from the ſeeds. They then pour water into the tub, and ſtir the whole well about, till there ariſes a ſcum, after which they let the ſeeds ſettle to the bottom, and pour off the water. This they repeat two or three times, till the ſeeds are perfectly cleared from the pulp. They then ſpread them upon a mat expoſed to the ſun and open air for three or four days, till they are quite dry, and after this they put them into bags, and hang them in a dry place, where vermin cannot come to them. They will keep good for ſeveral years, but are thought to produce the leaſt luxuriant, and therefore moſt fruitful, plants, when they are three or four years old.

To avoid the trouble of making beds, or ridges, of dung on purpoſe for them, as above deſcribed, (which is undoubtedly the ſureſt way to have early fruit), many people, who are leſs ſollicitous about the earlineſs, or even the great plentifulneſs of theſe crops, than the trading gardeners about London are obliged to be, only dig holes of the ſize of a buſhel, fill them with warm ſtable dung, then ſet in the middle of them four or five cucumber plants, with as much mould as poſſible about their roots, and afterwards earth them up in the form of a baſon, to render the watering of them more effectual. They ſhade them till they have taken root, and cover them for a while with bell or hand-glaſſes, if they have any; or they even truſt them at once to the open air. If the plants thrive, three of them will be ſufficient in a hole; and then the reſt of them may be plucked up, or tranſplanted elſewhere. Some even raiſe them from their ſeeds planted in holes of this kind, without any previous hot-bed, and they do very well, if the ſeaſon be at all favourable.

The time for ſowing the latter crop of cucumbers, commonly called picklers, is the beginning of June. The London gardeners generally ſet theſe between their wideſt rows of cauliflowers, which are four feet and a half aſunder. To this end, they dig ſquare holes about three feet and an half from each other, breaking the earth well, and hollowing the ſurface of each hole, with their hands, till it is like a baſon. They then plant eight or nine ſeeds in the middle of each of theſe ſpots, and cover them with earth to the thickneſs of about half an inch. If the weather is very dry, they water them gently at the end of a day or two. In five or ſix days the plants will appear above ground; and particular care muſt be taken then to defend them from birds, eſpecially ſparrows, which will otherwiſe ſoon pinch them off, and thereby fruſtrate all expectations of a crop: but this danger will be over in little more than a week; for the ſparrows will not meddle with them after they have expanded their ſeed leaves. Care muſt alſo be taken to continue to water them gently, from time to time, according as the ſeaſon is more or leſs dry; and when they begin to ſhew their third leaf, which is the firſt of their rough ones, all the weakeſt plants ſhould be pulled up, leaving in each hole only four of the moſt promiſing and beſt ſituated. The ground about theſe ſhould then be well ſtirred with a ſmall hoe, to deſtroy the weeds, and earth up the plants, around the ſtems of which the mould ſhould afterwards be gently preſſed down by hand, the better to ſeparate them from each other as much as can be without hurting them. This being done, they are watered a little to ſettle the earth about them, and at ſuch other times as the dryneſs of the weather may render neceſſary: but, above all, they muſt be kept clear from weeds. When the cauliflowers are quite removed, the whole ground ſhould be thoroughly hoed and cleaned, freſh earth ſhould be laid up around the plants, ſo as to deepen the hollows in which they ſtand, that they may the better contain water when it is given them, and their vines ſhould be ſpread out carefully in the order they are to run, in ſuch manner that they may not croſs or be entangled with one another. A little earth ſhould then be laid, and gently preſſed down, between the plants, the better to ſeparate them every way, and a gentle watering now, and as often afterwards as the ſeaſon ſhall require, will forward their growth. With this management, theſe plants will begin to yield young cucumbers, fit for pickling, about the latter end of July, or early in Auguſt.

About fifty or ſixty of theſe holes will be neceſſary for a middling family; becauſe a ſmaller number of them will not afford fruit enough at one gathering to requite the trouble and expence of pickling, and they never are ſo good if they are gathered long before they are put into the vinegar. Fifty holes will ſeldom furniſh more than two hundred cucumbers fit to gather at a time; and this may be repeated twice a week as long as the ſeaſon laſts, which generally is five weeks. What are not wanted for pickling, may be left to grow till they become fit to eat.

Though M. Duhamel has not given us any experiments on the culture of cucumbers according to the principles of the new huſbandry, there can be no room to doubt of their ſucceeding perfectly in that way, ſince M. de Chateauvieux raiſed excellent melons, which are a much more tender fruit, in beds of common earth, in open fields, merely by keeping the ground in fine order by a judicious uſe of the horſe-hoe, without the help of either dung, hot-bed, or glaſſes over them, and they were, in all reſpects, preferable to any in his garden. This ſurely merits the attention of all kitchen gardeners, and ſingularly of thoſe near London, where land and labour bear extraordinary prices.

A correſpondent of the editors of the Muſeum Ruſticum has given us the following new method of raiſing cucumbers, without the help of forcing frames, though the fruit are much finer than any raiſed by the other methods yet in uſe. “ I procured, ſays he, ſome of the beſt ſeed of the common prickly cucumbers I could get; and from this ſeed, in the ſpring of the year 1750, I raiſed ſome plants on a moderate hot-bed, not hurrying them too much in their growth.

“ In May, when the danger of the froſt was almoſt over, I familiarized the plants by degrees to the air, and towards the latter end of the month planted them in the open ground againſt a ſouth wall.

“ In this ſituation they throve apace, and as faſt as they put forth their runners, I nailed them gently up againſt the wall. They did not ſend forth many bloſſoms till they had run a conſiderable height, at leaſt five feet; after which the fruit began to ſhew itſelf.

“ I did not give my plants too much water, and this I have ſince found a neceſſary precaution.

“ The fruit increaſed in ſize daily, was of a fine green colour, and differed greatly from that of ſome other plants raiſed from the ſame ſeed, but planted in the common way; the runners being ſuffered to trail on the ground.

“ When I gathered my firſt cucumber, I was exceedingly delighted with its appearance. It was long, thin in proportion to its length, of a beautiful green, not too deep, with a whitiſh ſummit.

“ When I cut it I found the fleſh thick and firm, but few ſeeds, and thoſe very ſmall, and its flavour extremely delicious.

“ Deſirous of knowing whether the plant might not be improved by ſowing the ſeeds of fruit raiſed in this manner, I pitched upon ſome of the fineſt cucumbers, not at too great a diſtance from the roots, and left them on the vine to perfect their ſeed.

“ In this manner I have raiſed cucumbers for my own uſe ever ſince, and have the ſatisfaction to find, that inſtead of degenerating, they have improved ſurpriſingly.

“ My neighbours in the country are exceeding glad when I have any ſeed to ſpare for them, and always find their cucumbers that year much better for uſing it, though they do not grow ſo large as mine, neither have they ſo delicious a flavour, unleſs nailed up againſt a wall.

“ I am very ſenſible that this method cannot, with any degree of convenience, be brought into general practice; yet, in every garden, a few plants may be ſo trained to prevent the ſeed from degenerating; eſpecially as one or two plants raiſed in this manner would ſupply a ſufficient quantity of ſeed for a large garden.

“ I muſt own, that in my method the plants do not bear ſo great a number of cucumbers as in the common way; but then they are, without compariſon, larger, and of an exquiſite flavour.” *Muſeum Ruſticum, vol.* I. *page* 131.

CUCKOW-FLOWER. *See the article* LADIES SMOCK.

CUCKOW-LAMBS, a name given in Hertfordſhire to ſuch lambs as are yeaned in April or May, becauſe they fall in cuckow time. They are generally either the lambs of very young, or very old ſheep, and occaſioned by their taking ram very late in the ſeaſon. Theſe lambs are uſually of the ſmalleſt ſort, and therefore both ewe and lamb ſhould have the beſt of keeping, in order to fatten the lamb for the butcher; for ſuch diminutive lambs are improper to be kept for ſtore-ſheep. Beſides, as theſe lambs are yeaned later than ordinary, it is very likely they will meet with green meat ſufficient to fatten them apace, and come in ſeaſon to be ſold for the more money; as they are of the youngeſt ſort, and fatted late. *Ellis on Sheep, page* 79.

CUCKOW-SPIT, a kind of frothy ſubſtance frequently found on plants, containing one or two inſects. M. Poupart tells us, that as ſoon as the little creature comes out of its egg, it haſtens to ſome plant, which it touches with its fundament, and faſtens there a drop of white liquor full of air; it drops a ſecond near the firſt, then a third, and ſo on, till it covers itſelf all over with a ſcum or froth: this froth defends it from the heat of the ſun, and alſo from the attacks of the ſpiders, which would otherwiſe devour it. Mr. Liſle is of opinion, that this froth is nothing more than the nightly dew which falls upon the fork or joint of the plant, and which the little inſect, with its proboſcis, as with a pair of bellows, works into froth.

CULMIFEROUS *Plants*, ſuch as have a ſmooth jointed ſtalk, and their ſeeds are contained in chaffy huſks.

CULTIVATION, the art of improving ſoils, and forwarding or meliorating the produce of the earth, by manual labour, manure, &c.

CULTIVATOR, a name given by foreign huſbandmen to inſtruments invented for ſtirring the earth, on the principles of the new huſbandry. Theſe inſtruments are generally called in England horſe-hoes. We ſhall here give a deſcription of thoſe invented by Meſſrs. de Chateauvieux and de Villiers, and deſcribe thoſe invented in England under the article horſe-hoe. *See* HORSE-HOE.

Deſcription of M. de Chateauvieux*'s ſingle* CULTIVATOR.

M. de Chateauvieux, having remarked the good effects of his plough in ſtirring the alleys between the rows of corn, rightly judged, that the inſtrument we are now going to deſcribe, which is much lighter and ſimple in its make, would anſwer the ſame end; or at leaſt that it might be uſed alternately with that plough, employing this laſt only when a greater quantity of earth is to be turned up towards the rows of corn: “ for, ſays he, it is to be obſerved, that the cultivator hardly changes the ſituation of the earth, but divides and breaks it in the place it is in, ſo as to render it looſe and light, and fit for the roots of plants to penetrate with eaſe. This inſtrument, like a miner, works chiefly under ground, where it cuts the earth, divides its particles, raiſes it up, and lightens it. It has this farther advantage, that one horſe is ſufficient to draw it. The cultivator, Plate VII. is compoſed of a beam, AB, Fig. 1. the handles CD, and the ſhare EF, which is more particularly repreſented in Fig. 2, 3, 4, 5, and 6.

“ The beam AB is three feet and a half, or four feet long. Its diameter ought not to exceed three inches at moſt; and, if it be ſquare, the edges ſhould be rounded off. It ſhould be pierced with mortiſes under the letters G, H, in order to let through the croſs ſtaves I, L; in the ſame manner as in the fore-carriage of the plough; and is fixed by the keys K, M, or the pins *a*, *b*. The middle of the handles ſhould be exactly oppoſite to the beam; that is to ſay, the ſpace between them ſhould be equal on both ſides. Theſe handles ſhould be made ſlighter than thoſe of the plough before referred to, and they ſhould be fixed to the beam by a tenon in a mortiſe, rivetted at N, and ſupported behind by the prop P.

“ The end A of the ſhare, Fig. 3, and the two fins B, C, are made flat. The crooked handle ABC, Fig. 4, ſhould be triangular, and ſomewhat ſharp before, to anſwer the end of a coulter, as in Fig. 2, and 5.

“ This ſhare is to be let into a grove cut in the under part of the beam, as repreſented in Fig. 7, and 8; and faſtened there by a ſingle ferrule, as in Fig. 9. If it ſhould cut too deep, that may be remedied by altering the poſition of the wheel, as in the plough, or by inſerting a very ſmall wedge *g*, Fig. 10, between the handle of the ſhare and the beam. If it does not cut deep enough, that wedge muſt be inſerted, as at *h*, Fig. 11, at the other end of the handle.

“ When this inſtrument is uſed, the beam before deſcribed is to be ſubſtituted in the place of that of the plough, which is to be taken off. The two croſs ſtaves I, L, Fig. 1, of the fore-carriage of the plough, are then run through the mortiſes G, H, of this beam, which is thereby fixed to that fore-carriage.

“ This cultivator is very eaſily guided: the ploughman may hold it upright, or incline it to the right or left, juſt as the intended ploughing may require. The ſhare and its handle enter ſo deep into the earth, as to be quite buried in it, if a deep ploughing is intended to be given: and in that caſe the tail A of the beam touches the ground. Though the ſhare is but ſmall, it ſtirs the earth at leaſt a foot around it: its point ſhould be of ſteel, and ſomewhat inclined towards the earth.

“ The ſhare of this inſtrument, like that of the plough, may be brought as near as one pleaſes to the rows of corn, by placing the beam accordingly in the frame.”

Deſcription of M. de Chateauvieux’*s double* CULTIVATOR.

“ This inſtrument, Plate VII. Fig. 12, 13, and 14, has two ſhares. It has a beam AB, and the ſhares CD, EF, Fig. 13, which being exactly like that of the ſingle cultivator, I have only to point out wherein theſe inſtruments differ. The beam of this ſhould be ten or twelve inches longer than that of the other. It has likewiſe two mortiſes more, under the letters G and H, to let through the croſs ſtaves EK, IL, which bear the handles MN, OP of the ſhares. The croſs ſtaves EK, IL, are rivetted permanently to the beam: the handles MN, OP, are moveable upon the croſs ſtaves, to which they are faſtened by the keys R, S, Q, T; ſo that the ſhares may be ſet at a greater or leſs diſtance from each other, according as the quality or ſituation of the ground may require or allow.

“ This inſtrument ſtirs the earth extremely well, and does a great deal of work in a little time. Each ſhare being about fifteen inches wide at AC, BD, Fig. 14, and the diſtance between them from A to B, Fig. 14, being about four inches, or, upon occaſion, ſix; and the earth being ſtirred about two inches on each ſide beyond the extent of the outmoſt fins of the ſhares; each cut of this cultivator ſtirs about two feet breadth of ground. This double cultivator requires two horſes, unleſs the ſoil be very light; in which caſe, I fancy one may do, though I have not yet tried it.

“ If one had a mind to fix a coulter in the middle of the beam, juſt before the ſhares, I ſee no inconveniency that could ariſe from thence, provided it be a very light one.

“ The way to uſe this cultivator, is, to faſten it to the fore-carriage of the plough, by running the two croſs ſtaves V, X, Fig. 13, through the beam A, B.

“ I would particularly recommend, not to make the wood work of this cultivator too thick or heavy, and therefore by no means to exceed the dimenſions I have given: for the lighter theſe inſtruments are, the more eaſily they are managed both by men and cattle.”

Deſcription of M. de Chateauvieux’*s* CULTIVATOR, *with two Mould-Boards.*

“ If, ſays M. de Chateauvieux, I could have imagined, that my propoſing for the uſe of the new huſbandry, ſome other inſtruments beſides the plough, properly called, could have been looked upon as either ſo expenſive or ſo troubleſome as to diſcourage people from practiſing that huſbandry; I ſhould not, by any means, have thought of communicating them to the public.

“ But why ſhould not agriculture enjoy the ſame advantages as almoſt all great manufactories, in which every uſeful diſcovery and improvement, either to perfect the manufacture, or to fabricate it in leſs time and with leſs expence, is readily adopted?

“ It is with a view to facilitate the various labours of cultivation, to execute them better, more ſpeedily, and with much leſs expence, that I have introduced the uſe of my new inſtruments in the culture of my own lands. If others think proper to do ſo too, they will enjoy the ſame advantages. I offer them, not as things abſolutely neceſſary, for the plough alone may ſuffice; but as things of which I have experienced the good effects during the years 1753 and 1754; and which, for that reaſon, I think it incumbent on me to recommend to thoſe who adopt the new huſbandry.

“ The cultivator with two mould-boards differs from the ſingle cultivator before deſcribed, only in the two mould-boards which I have added to it, one on each ſide, and which are repreſented in Plate VII. Fig. 15. A, C, E, H, is the mould-board on the left-hand ſide of the plough; and B, D, G, H, the mould-board on the right-hand ſide. The whole of this Fig. 15, repreſents an entire and a perſpective view of the ſhare and mould-boards.

“ The mould-boards are made of plates of iron, either caſt or hammered, about the twelfth part of an inch thick; which is ſufficient to reſiſt the preſſure of the earth. Thicker plates than theſe would render the ſhare too heavy, and it would be much more difficult to give them their proper bent.

“ The two mould-boards join to the handle at HL, and lap about an inch one over the other; or elſe they are faſtened together by rivets. They form, in that part, an angle E, H, F, of ſomewhat leſs than ninety degrees, which is ſufficiently acute to ſerve inſtead of a coulter: though a coulter may alſo be uſed upon occaſion, by placing it a little more forward.

“ From the lower part L of the handle, the mould-board ſhould paſs underneath the fin L, G, of the ſingle ſhare, and follow the direction of that fin, as at G; being let in beneath, about an inch and an half, according to the pointed line LG, and firmly riveted by three ſtrong rivets.

“ The hind part of the mould-boards is fixed and ſupported by the ſtay F, to which they are ſtrongly riveted. This ſtay muſt have exactly the ſame bend as the mould-board.

“ Behind the lower part of the handle is another ſtay, M, N, quite cloſe to it, and about two inches below the top of the mould-boards, to which it is riveted at both ends. This ſtay helps to keep them firm: but its chief uſe is to prevent their being raiſed up by the preſſure of the earth againſt their extremities A and B, which would throw their common angle H too forward, and miſplace the ſhare.

“ The proper ſlope of the mould-boards cannot be ſo well deſcribed by words, as it may be conceived by the figure, which repreſents at F the convex inſide of the one, and at Q the concave outſide of the other. The diſtance to which the earth is turned over, when the cultivator opens it in order to make a large furrow, depends on the degree of this bending, and the ſpace between the two upper extremities of the mould-boards E, F.

“ The hind-moſt part of the mould-boards is cut ſloping at C and D, almoſt in a ſegment of a circle. This ſhape helps to effect a greater diviſion of the earth.

“ The plate of iron, before it is bent, ſhould be cut nearly in the ſhape of Fig. 16.

“ The ſize of the mould-boards, as well as their proper bending, depends a little upon the quality of the land intended to be cultivated. I have found that, for light ſoils, they need not be bent quite ſo much: ſo that the diſtance from C to D, Fig. 15, may be twelve or thirteen, and even fifteen or ſixteen inches. This ſame cultivator may likewiſe be uſed in ſtiff lands.

“ Nothing hinders making theſe mould-boards two or three inches longer, from B to G, and from E to H; or varying ſome of their proportions, as the huſbandman may think beſt.

“ This ſhare, with the mould-boards, is fixed to a beam, as in the ſingle cultivator, Fig. 1, where it is faſtened to the fore-carriage by the croſs ſtaves I, L.

“ If this deſcription does but convey a ſufficient clear idea of the ſhape and proportions of this cultivator, I will anſwer for its ſucceſs when uſed. I deſcribe it after one of the ſame kind, which I have made uſe of for two years paſt, with very great ſucceſs.”

Direction for uſing the CULTIVATOR, *with two Mould-Boards, by M. de* Chateauvieux.

“ This cultivator opens the main furrow in the middle of the alley, by turning the earth over on both ſides at the ſame time; and I have found by experience, that as much work is done by that means, by one turn of this inſtrument, as could be done by two, and frequently three turns of the common plough, and that without uſing a greater number of cattle. I muſt now prove this propoſition; though I am perſuaded that it will eaſily be allowed by whoever only caſts any eye upon Fig. 15, Plate VII. which repreſents the ſhare of this cultivator." *See the article* ALLEY.

Deſcription of a CULTIVATOR *invented by M. de* Villiers.

"This inſtrument is compoſed of a ſhare, Plate VII. Fig. 17, the two fins of which are eight inches and a half aſunder at their extremities *a*, *b*. The ſocket *c*, which is between the two fins, projects ſome inches, and the hollow in it is three inches long, and one inch wide. It does not deſcend ſo low down as the fins, to prevent its touching the earth. The length of this ſhare, from the point *d*, to the extremity of the fins *a* or *b*, is from 12 to 13 inches. At the diſtance of five inches from the point *d*, is a hole *e*, into which is inſerted the crooked point *f*, of the iron ſafeguard, Fig. 18, which is uſed in ſome countries in order to faſten the ear to the ſhare of the plough. Upon the ſhare is placed a ſmall triangular ear *h*, Fig. 20, 21, and 22; ſomewhat concave at bottom, that the two ſmall ears may join exactly to the ſhare at about an inch diſtance from the edge of the fins. This ear is about two inches and a half high at *a*, Fig. 21, and is faſtened firmly to the ſhare by a double and angular ſafeguard, which covers its edge as far as *b*. It is fixed at one end by its point, which enters into the hole *e*, Fig. 17, in the ſhare, and by four ſmall pins faſtened to the ear. Fig. 18 and 19, repreſent this ſafeguard. The double ear is faſtened at its other extremity, by the ſheat or upright piece, *e*, *g*, Fig. 21, which paſſes through the ground-reſt of the hinder part of the ear and beam, and by a piece of iron *c d* bent in a right angle. This piece of iron covers the fore-part of the ſheat, and reſts upon the tail of the ear, againſt which the beam preſſes it very tight, by means of a wedge *e*, driven into the ſheat. The piece *c d* may likewiſe ſerve to fix two mould-boards from *g* to *c*. It is nine inches high. *f* is another ſheat or upright piece, which joins the beam to the ground-reſt, to add to the ſtrength and ſolidity of the inſtrument, which is increaſed alſo by the lower part of the handles being fixed in the ground-reſt at *i*, and traverſed by the beam at *k*."

M. de Villiers, in a letter to M. Duhamel gives the following account of his manner of uſing this cultivator.

"Finding it impoſſible to plough my alleys well when they were but three feet or three feet and a half wide, without greatly damaging the rows of corn bordering upon them; I reſolved to make them four feet wide, and took particular care to have the rows drilled very ſtrait: but even then I found only one way of ploughing them well, which is, to open the firſt furrow ſo near to the bed, that the next furrow within that may come within two or three inches of the neareſt row of plants in the bed; turning over the earth of theſe furrows towards the alley. After two or three ſuch turns of the plough, the ploughman will be ſure not to make any miſtake. It is of great importance to cut this firſt furrow, by which all the others are directed, quite parallel to the rows. The reſt of the work will then go on regularly, and without any of that confuſion which would be capable of giving many people a diſlike to the new huſbandry. My horſes were led by hand, till they were ſufficiently accuſtomed to this work: but that was neceſſary only for the firſt furrow, which they afterwards follow of their own accord, ſo that the reſt of the alley is ploughed with great eaſe.

"The earth of the ſecond furrow, which is cut very near to the rows, is turned over in the ſame direction as that of the firſt; that is to ſay, from the bed.

"The third furrow is ploughed the contrary way, and the earth is then turned over towards the rows, ſo that the laſt furrow is filled up by this ploughing, and a conſiderable quantity of well divided earth is turned over to the rows, for the plants to extend their roots in in the ſpring.

"I then continue ploughing in the ſame direction, cutting the furrow that is turned over towards the rows as thick as poſſible, till the whole alley is ploughed almoſt cloſe to the oppoſite bed, when, by turning over one large furrow on that ſide, the ſmall one cut there at firſt is filled up. By this means, the firſt ſpring hoeing is completely executed.

"I begin the ſecond ploughing on the ſide where I ended the firſt, turning the earth over that way, which is the contrary to what was done before: and when I come to the other ſide of the alley, I leave there, as was left before on the ſide I now begin at, the breadth of a ſmall furrow, which I do not plough, but over which I turn the earth of my laſt furrow.

"I think this ſecond hoeing may be deferred, when the ground does not produce many weeds: and in this caſe I perform it with the cultivator, which I bring almoſt cloſe to the rows.

"After thus uſing, ſometimes the plough, and ſometimes the cultivator, according as the condition of the ground ſeems to require, I finiſh all my hoeings by putting two horſes to the cultivator, and drawing it once or twice through the middle of the alleys; becauſe it cuts four or five inches deeper than the plough."

M. de Villiers adds, that he could not always turn the earth over towards the rows, as M. Duhamel directs, becauſe the wheel of his plough, getting too deep in the middle furrow, altered the direction of the ſhare. To this M. Duhamel obſerves, that he himſelf met with the ſame difficulty, and found no other way of remedying it, but by opening a ſmall furrow near the rows, by the help of which he turned the earth over towards the alleys, and then filled up that furrow immediately; taking care at the ſame time to turn the mould over towards the roots of the plants, ſo as to earth them up as much poſſible. "I am glad, adds he, that I have had this opportunity of giving M. de Villiers's method, becauſe I think it a good one, and believe it will be of great ſervice to ſuch as may be inclined to practice the new huſbandry." *Duhamel's Cultures des Terres, tom.* I.

CULTUR, or rather *Coulter*, the piece of iron that cuts the earth before the plough-ſhare. *See the article* PLOUGH.

CULTURE, the art of cultivating, improving, or meliorating the ſoil.

CULVER, a pigeon.

CURB, an iron chain faſtened to the upper part of the branches of the bridle, in a part called the eye, and running over the beard of the horſe.

CURB, is alſo the name of a diſeaſe in horſes, conſiſting in a ſwelling at the junctures of the bones on the hind part of the hock, forming a pretty large tumour over the back part of the hind leg, attended with ſtiffneſs, and ſometimes with pain and lameneſs.

A curb proceeds from hard riding, ſtrains, blows, or kicks. The cure at firſt is in general eaſily enough effected by bliſtering repeated two or three times, or even oftener. If it does not ſubmit to this treatment, but grows exceſſively hard, the quickeſt and ſureſt way is to fire with a thin iron, making a line down the middle from top to bottom, and drawing ſeveral lines in a penny form manner pretty deep; and then to apply a mild bliſtering plaſter or ointment over it. This method will entirely remove it. *Bartlet's Farriery, p.* 262.

CURRANT-TREE, the name of a ſhrub well known in the Engliſh gardens, and of which there are ſeveral varieties; but the moſt valuable ſorts, for common uſes, are the white and red Dutch.

Theſe ſorts may be eaſily propagated by planting their cuttings any time from the middle of September to the end of October, upon a ſpot of freſh earth, either in rows, at a foot aſunder, or in beds, which in the ſpring muſt be kept very clear from weeds. Theſe may remain one or two years in the nurſery, during which time they muſt be pruned up for the purpoſes they are deſigned for; that is, either to clear ſtems about a foot high, if for ſtandards; or, if for walls, pales, or eſpaliers, they may be trained up flat. They ſhould then be planted out where they are to remain, for the younger they are planted, the better they will ſucceed; the beſt ſeaſon for which is when their leaves begin to decay, that they may take root before winter, ſo that they may be in no danger of ſuffering from drought in the ſpring.

Theſe ſhrubs are generally planted in rows at about ten feet aſunder, and at four diſtance in the rows, in thoſe gardens where the fruit is cultivated for ſale; but the beſt method is to train them againſt low eſpaliers, in which manner they will take up much leſs room in a garden, and their fruit will be much fairer.

The diſtance they ſhould be placed for an eſpalier, ought not to be leſs than ten or twelve feet, that their branches may be trained horizontally, which is of great importance to their bearing.

Thoſe that are planted againſt pales or walls, ſhould alſo be allowed the ſame diſtance. If they are planted againſt a ſouth-eaſt wall or pale, it will cauſe their fruit to ripen at leaſt a fortnight or three weeks ſooner than thoſe in the open air; and thoſe which are planted againſt a north wall or pale, will be proportionally later; ſo that, by this method, the fruit may be continued a long time in perfection, eſpecially if thoſe againſt the north pales are matted in the heat of the day.

Theſe plants produce their fruit upon the former year's wood, and alſo upon ſmall ſnags which come out of the old wood; ſo that in pruning them, theſe ſnags ſhould be preſerved, and the young ſhoots ſhortened in proportion to their ſtrength. The only method, very neceſſary to be obſerved in pruning them, is not to lay their ſhoots too cloſe, and never to prune their ſnags to make them ſmooth. This, with a little care in obſerving the manner of their growth, will be ſufficient to inſtruct any perſon how to manage this ſhrub, ſo as to produce great quantities of fruit.

Theſe plants will thrive and produce fruit in almoſt any ſoil or ſituation, and are often planted under the ſhade of trees: but the fruit is always beſt when they are planted in the open air, and upon a light loamy ſoil. *Miller's Gard. Dict.*

The juice of the currant preſſed out, mixed with a proper quantity of ſugar, and duly fermented, makes an excellent wine, which is very comfortable to the ſtomach and nerves.

CURRY-COMB, an iron inſtrument full of ſmall teeth, uſed for currying horſes.

CURSONS, ſpurs, or ſnags, growing on the ſtems and branches of the apple, currant, and other fruit-trees.

CUSPATED *flowers*, thoſe whoſe petals or flower-leaves end in a point.

CUTTING-BOX, a machine for cutting fodder, as ſtraw, hay, haulm, &c. into ſmall pieces, commonly called chaff, for the uſe of cattle.

We have given on Plate VI. Fig. 11. a cut taken from the Muſeum Ruſticum, vol. VI. page 10, of an improved cutting-box. The improvement conſiſts in what the inventor calls a preſſer, which is a piece of wood as long as the box is wide, with three iron tongues in it, like thoſe of a hay-fork. Theſe tongues are put into the bundle of hay or ſtraw to be cut; and by means of a rope fixed thereto, and extending under the box, the preſſer is forced down by the left-foot of the cutter, and conſequently the bundle kept tight. By this means the chaff is cut with great eaſe; and after every cut, the operator riſes his left-foot, puſhes his ſheaf or bundle forward with his left-hand, then preſſes it down again with his foot, and takes another cut. In this manner he continues working, till the whole bundle is reduced to chaff.

This deſcription will be very eaſily underſtood by inſpecting the figure above referred to, where A is the preſſer, B a large knot at the end of the rope, which faſtens it to the preſſer. C the rope, DF, the ſlit in which the rope moves, as the cutter puſhes the bundle forward. E the loop in which the cutter puts his left-foot. F the box to contain the hay, ſtraw, &c. The knife is not delineated in this figure, as the manner of placing it is ſufficiently known.

A correſpondent of the editors of the Muſeum Ruſticum tells us, that he never gives his horſes any pure corn, but always makes uſe of his cutting-box, in which his ſervants cuts his horſe-meat, which conſiſts of unthraſhed oats, tares, peaſe, or beans. They cut off the heads where the corn lies, and take beſides a cut or two of the ſtraw to mix with it. This he gives to his horſes inſtead of corn: it being a very nouriſhing food, and of which they are very fond. Nor is there any danger of their being ſurfeited with it, which they often are with pure corn; many of their diſorders ariſing from their being over-fed.

"I cannot, continues he, enough commend the uſe of a cutting-box, though I am perſuaded the ploughmen will endeavour to prepoſſeſs their maſters againſt it, becauſe the cutting of the horſe-meat is pretty tough work, and they do not, in general, love to do more than they can help.

"When oats, beans, peaſe, or tares, are intended to be thus cut for horſe-meat, it is beſt to mow them before they are quite ripe, as by that means fewer of them will be loſt by ſhaling, and the ſtraw, or ſtalks, will be of a better quality, and more nouriſhing for the cattle.

"Care muſt, however, be taken that the crop be well dried before it is houſed, leſt it heat in the mow, and take damage, if not ſet the barn, or ſtack, on fire." *Muſeum Ruſticum, vol.* I. *p.* 258.

CYDER, or *Cider*, a liquor made from the juice of apples, expreſſed and fermented.

A Herefordſhire planter has given us the following method of making cider in that county, which has been ſo long famous for this liquor.

"The worſe, ſays he, the apple is for the table, the better it is, in general, eſteemed for cider, ſuch as grow all over this county, and are, in a manner, wild, harſh, and crabbed to the taſte. Theſe go under various names, as the redſtreak, the white and green muſts, the gennetmoyl, the ſtocking apple, the ſummer and witer fillets, &c. &c. of all which I prefer the firſt, provided it is a good ſort, which is not always the caſe, particularly in ſome parts of Worceſter and Glouceſterſhire, where they grow in great plenty.

"I have long laid down from experience, the beſt miſtreſs, that, firſt, the more red an apple has in its rind, the fitter it is for cider; that is to ſay, if it is at all fit; for I have ſeen an apple of very deep red, by ſome called ſopſy-wine, quaſi ſopped in wine, which was worth nothing in this intention.

"Secondly, That the paler the rind, the worſe the juice.

"Thirdly, I have found it a maxim in general true, that a ſweet apple with a tough rind will always yield a good vinous liquor.

"Fourthly, The more yellow the fleſh of the fruit, the better and finer coloured will the cider be.

"Theſe few maxims, not too ſcrupulouſly adhered to, have been of great ſervice to me in life; for though I have a high opinion of them, I do not abſolutely rely on them. There is no rule ſo general, but an exception may be made to it; but a man of reflection, with a few well-founded rules, will ſeldom be at a loſs how to act in this, or in any other caſe.

"I ſeldom ſuffer my apples to be gathered till they begin of themſelves to drop from the trees: nature then tells me they have, for the moſt part, acquired a proper degree of maturity.

"Great care is taken in the gathering of them, for fear they ſhould be bruiſed in the operation; and this I have always found a very neceſſary precaution.

"As they are gathered I have them ſorted, according to the ſeveral degrees of ripeneſs they are of, making, in general, three ſorts, which a little experience eaſily teaches to ſeparate properly, the difference being apparent enough at firſt ſight.

"As faſt as they are gathered and ſorted, they are carried under a ſhed prepared for the purpoſe, and laid in large heaps to meliorate: this practice I cannot enough recommend, as being of great ſervice to the liquor, improving its quality, and making it keep, without compariſon, better; and all this is cauſed by a little ſweating in the heap.

Fig.1. A Chese Preſs.

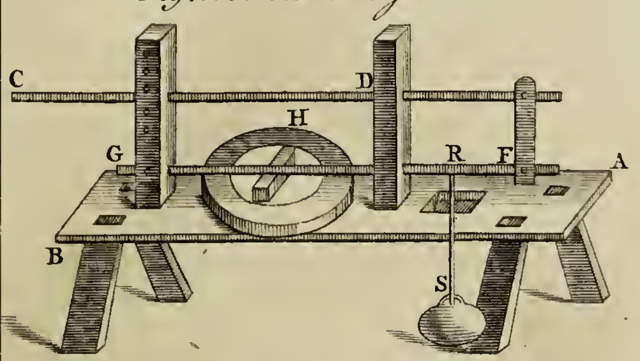
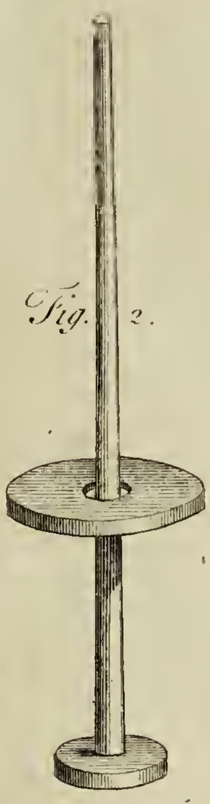


Fig. 2.



Churn

Fig. 3.

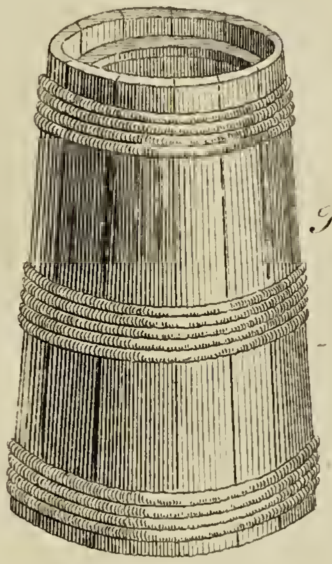


Fig. 4.

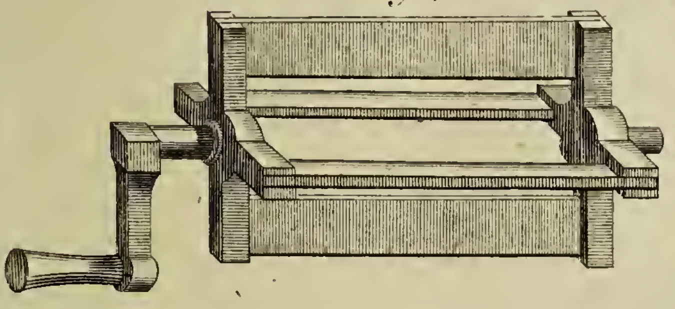


Fig. 5.

Fig. 7.

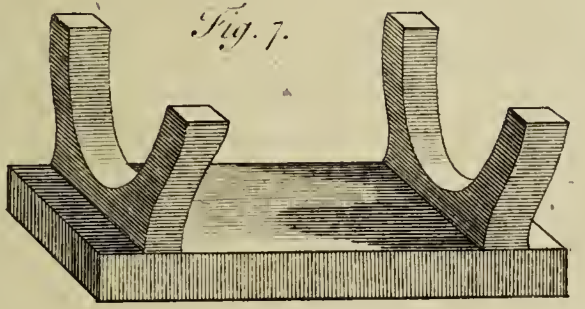


Fig. 6. Churn.

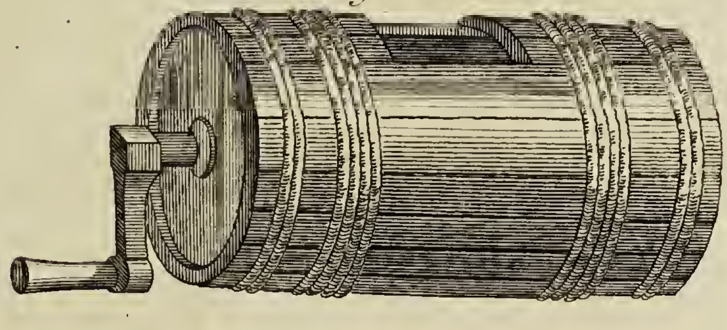


Fig. 8. Cider Mill.

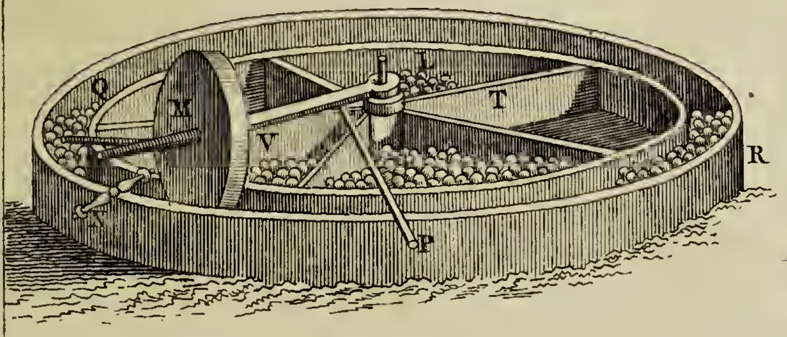


Fig. 9. Small Cider Preſs

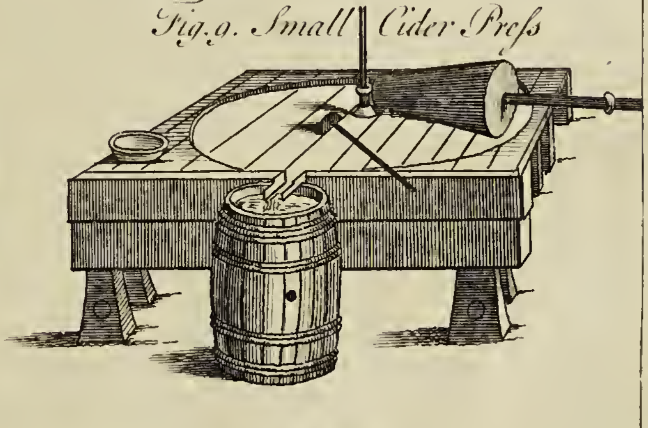


Fig. 10. Cider Preſs.

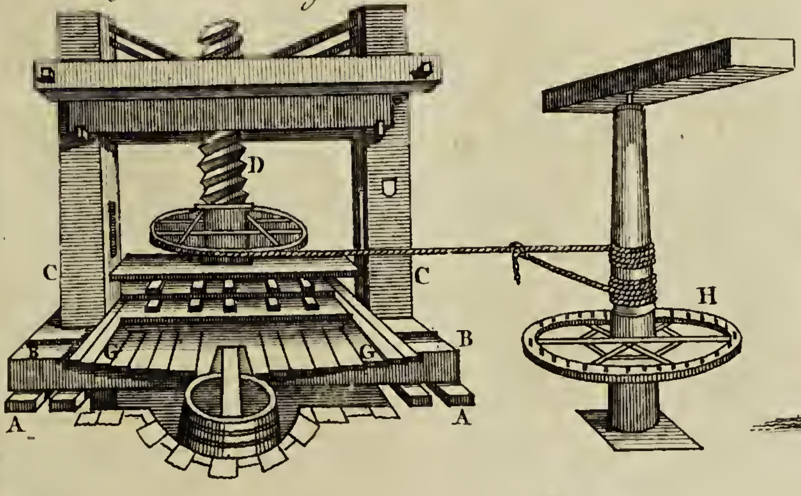
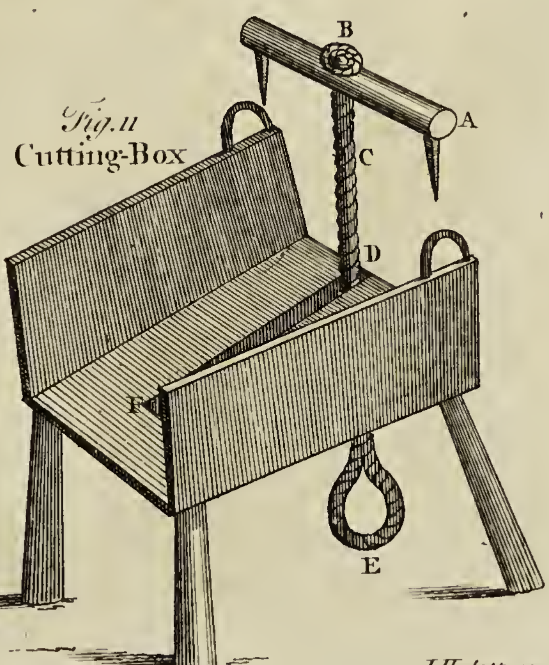


Fig. 11
Cutting-Box



J. Hulett sculp.

“ Yet, good as this practice may be, ſome avaricious planters cannot be induced to adopt it, becauſe, ſay they, the apples freſh from the tree will yield better; as, of theſe laſt, about twenty buſhels will give a hogſhead of cyder; whereas, of the other apples, which have been heaped, it will take about twenty-five to make the ſame quantity.

“ I ſuffer my apples to lie in the heap a longer or a ſhorter time, according to the nature of them, ſuch as are harſh and ſolid requiring to lie longer, by ſeveral days, than thoſe that are mellow and pulpy; and the degree of maturity the apples had attained before they were heaped, makes alſo ſome difference in this reſpect.

“ I have already obſerved, that I divide my fruit into three ſeveral ſorts, according to the ſtate of its maturity: I have now to add, that from theſe three ſortings I have no leſs than ſix ſeveral kinds of cyder, each different from the other in taſte, flavour, and quality.

“ As faſt as the fruit is ground (I need not, I think, mention that I uſe the ripeſt firſt) the pulp is put into a large vat near the preſs: at the bottom of the vat is a tap, through which a conſiderable quantity of the prime vinous juice will run without any preſſing, induced by its own weight only: this produces my beſt cyder; and I always tun it up by itſelf: the pulp is afterwards preſſed in the uſual way. The ſame proceſs is uſed in all the three ſortings of apples; by which means I get, as I ſaid before, ſix ſorts of cyder.

“ The firſt runnings from the vat I immediately put into the veſſels in which it is to remain; only, if it happens, by any accident, to be too foul, I ſtrain it firſt. I allow here but a ſmall vent-hole, and when it has done working, I fill the veſſel with ſome of the ſame liquor reſerved for that purpoſe: I afterwards, by degrees, cloſe the vent till it is finally and well ſtopped.

“ As to the juice, which undergoes the action of the preſs, I put this, as ſoon as it runs off, into veſſels, where I ſuffer it to remain about thirty hours, according to the ſeaſon, till the *fæces* are precipitated, or fallen to the bottom; after which I draw it off, and tun it up in the veſſels in which it is to remain, with the precautions, however, above-mentioned, when I treated of the firſt runnings.

“ The kind of veſſels I uſe, and which I think by far beſt, are upright hogſheads, broader at the upper head than at the bottom; and I often, after my cyder has done fermenting, caſt two or three handfuls of wheat-bran into each veſſel, which ſerves to thicken the head or cream of the liquor, and makes it keep better.

“ I am very careful with reſpect to the veſſels into which I put my cyder, always avoiding new ones, if poſſible, as they give the liquor a twang, or bad taſte, and hurt its colour: my uſual way is, to ſeaſon all my new caſks, that I poſſibly can, with ſmall beer, which I uſe in common in my family, though I live in a cyder country; and if I have not an opportunity of doing this, I ſcald them with water, in which a conſiderable quantity of apple-pulp has been boiled.

“ If a veſſel is not ſweet, it may eaſily be cured, unleſs very bad indeed, by putting ſome unſlaked lime into it, adding ſome cold water, ſtopping it cloſe, and rolling it about till the noiſe within is no longer heard.

“ I have often found it of great uſe towards enlivening the liquor, to ſlice about a dozen ſweet apples into a hogſhead: I am alſo inclined to think it makes it keep better.

“ The beſt cyder I ever had was a few years ago, when I put in each hogſhead about three quarts of good wheat firſt boiled and hulled, ſo as to have, in ſome meaſure, the appearance of boiled rice.

“ When I am obliged to put any cyder into a caſk I ſuſpect, and afterwards diſcover it has given the liquor a bad taſte, I cauſe ſome muſtard ſeed to be ground in a quern with ſome cyder: this mixture, being put into the hogſhead, is often of great ſervice, and reſtores it to its original good taſte.

“ Cyder, when it is tunned, is very apt to loſe that fine mild ſpirit which renders it ſo pleaſant and briſk a liquor; therefore great caution ſhould be uſed with reſpect to the vent. The wild, furious, and ungovernable ſpirit ſhould be ſuffered to eſcape; which may eaſily be effected, by leaving a ſmall vent open for a few days; after which the barrel muſt be cloſe ſtopped, for if it gets any vent, the liquor will ſtand a great chance of being entirely ſpoiled; on the contrary, if well bunged, though it may be dead and flat at firſt, it will ſoon recover itſelf, maturate, and be fit for drinking. This particular part of the management of cyder is critical, and depends greatly on the temperature of the air, ſo that it is impoſſible to give any abſolute directions about it, as ſomething muſt ſtill be left to be learned by experience, and governed by diſcretion.

“ I muſt give one particular piece of advice to ſuch as intend making cyder, which is, that they diligently watch the alterations in it upon every change of weather, as a ſmall neglect, at ſuch times, is often fatal to many hogſheads, and the danger is much greater in ſummer than in winter. There is ſcarcely any diſeaſe incident to this liquor, but what may eaſily be cured by a timely application: if it is only a little inclined to tartneſs, wheat, managed as above-mentioned, will cure it; and the ſame thing is alſo very good to preſerve it, when it is drawn out of one caſk into another: the quantity when the liquor is tart is about half a peck to a hogſhead; I have ſometimes even put a quart more.

“ This ſimple remedy will, I ſay, often cure the tartneſs I mentioned; but ſometimes, when it is very thick and ſouriſh, it may be neceſſary to raiſe a new fermentation, to purge off the impurities, and make them ſubſide: this may be ſoon done by bruiſing the fleſh of a few apples to a pulp with ſome of the liquor, and putting the whole into the bung-hole of the veſſel; this will raiſe a ferment, and cure the cyder: when that is over, it will be proper to draw it off into another caſk; and it will alſo be a very uſeful precaution, to put into the laſt mentioned veſſel about a quarter of a peck of wheat, prepared as I have already directed: this will give it new life and ſpirits, and make it keep better, and drink much pleaſanter.

“ I have ſometimes alſo uſed another method to cure tart cyder; but it has not always ſucceeded with me; why, I cannot ſay, as ſome people, who live not many miles from me, have great dependence on it. Something may depend on their ſoil differing from mine, though this may, to ſome of your readers, ſeem to have a very remote analogy to the caſe in hand. The remedy is, to break half a dozen new-laid eggs, and beat them up, ſhells and all, till they are brought to a frothy oil: this is put into the bung-hole of a hogſhead, and, as I am credibly informed, ſometimes proves a very efficacious remedy: it has ſucceeded with me, but not ſo often as to induce me to depend much upon it; I mention it, however, as it may prove of more efficacy with others than it has with me.

“ An induſtrious planter will, by the conſtancy of his obſervations and remarks, always have it in his power to cure his own liquor by receipts of his own diſcovering; and for this purpoſe I would recommend, that he be continually making experiments, and that whatever trials he makes, be in various modes and proportions; for the remedy that may be of no ſervice in one form, may poſſibly be very efficacious when altered with judgment, which judgment can only be acquired by experience and obſervation.

“ It is to be noticed, that, if the cyder is acid, and at the ſame time clear, it is in a very dangerous ſtate, being but rarely recovered: therefore, in general, when this is the caſe, the cure is ſcarcely worth attempting.

“ I have often uſed wheat for the recovery of my cyder in other forms, ſometimes putting about half a peck, unground, into a hogſhead for it to feed on; at other times I have made dough of coarſe meal with the bran in it, adding ſome leaven, uſing no ſalt, and putting warm cyder, or white wine, inſtead of water, in the mixture: this dough I make into lumps about as large as my fiſt, and thruſt them into the bung-hole of the hogſhead, the quantity being about half a peck of the meal to a hogſhead.

“ Many mix different kinds of ſpice with their liquor, particularly ginger, which they think of great ſervice; but I never uſe it now, ſeldom having found any great effect reſulting from it, and being of opinion that it renders the cyder more unwholeſome than it can poſſibly in its own nature be; for, though the ginger may not make any very ſenſible alteration in the immediate taſte of the liquor, it muſt, I think, ſtrongly impregnate it with its fiery particles, and thereby greatly irritate the maſs of blood, and inflame the lungs of ſuch as drink any quantities of liquor wherein it has been infuſed: others, however, may differ in opinion from me: I know, indeed, many that do ſo; therefore I only declare my opinion." *Muſeum Ruſticum, vol.* II. *p.* 37.

It is of great importance in the making of cyder, that the fruit be thoroughly ripe. The juices of unripe apples retain their harſh, ſour taſte, in ſpite of all endeavours, and never acquire that racy, mellow flavour, which the ſun only can beſtow. Sweating together in a heap will, indeed, give them an artificial ripeneſs; but this is not equivalent for that which they receive from nature, which though it receives ſome aſſiſtance from the induſtry of man, can never be completely imitated by art.

It ſhould, therefore, be the firſt care of every one concerned in the making of cyder, to let his apples hang upon the tree till they arrive at full maturity. But no certain time can be aſſigned for this: it varies with the nature of the fruit, and the circumſtances of the ſeaſon. Different apples have different times of ripening; and the ſame, according to the weather, change their times conſiderably from one year to another: but ſigns there always are ſufficient to direct the huſbandman. The brownneſs of the kernels, their rattling in the apple, the fragrant ſmell of the fruit itſelf, and its ſpontaneouſly falling from the tree in calm weather, are certain indications, which, in all kinds, may be depended on. It is, however, an uſeful caution in this, as in every other caſe, to err on the right-ſide, and to let the apples hang too long, rather than too little. Summer fruit, indeed, will ſuffer by this method, grow pulpy, dry, and mealy, and afford little or no juice. In every other caſe the rule is good, and in the beſt fruits, moſt. The harſher kinds can hardly hang too long, for they daily mend upon the tree: their juices mellow, throw off their crude and watery parts, and conſequently, as the crude juices leſſen in quantity, the apples improve proportionably in quality. They may hang upon the tree as long as the weather can be expected to continue open: but ſevere froſt ſhould be moſt carefully avoided, becauſe it deſtroys the texture of the fruit ſo much, that even cold water, the only remedy in ſuch caſes, will not reſtore it to its former ſtate: for as all fluids enlarge their dimenſions when frozen, the containing veſſels of all ſucculent ſubſtances muſt be thereby burſt, and this has upon the fruit an effect ſimilar to a bruiſe, or any other cauſe that deſtroys the veſſels, whereby the extravaſated liquors ſoon putrify. From this cauſe it is that the ſtrongeſt foreſt trees are often rent aſunder in very ſevere froſts.

When your apples are fit for gathering, it is eſſential to chooſe dry weather for that purpoſe: for water is a bad ingredient in all vinous liquors, and your fruit ſhould therefore be guarded from it with peculiar care. The wet which adheres to the apples after rain or dew, or even the ſmaller quantity of moiſture which they might contract by falling or lying upon graſs, is ſufficient to impoveriſh your cyder in a ſenſible degree. Gather your fruit therefore in the drieſt day, and in the drieſt part of it, when the dew is thoroughly exhaled, and, of choice, gather it by hand. This method may, perhaps, be troubleſome and difficult in plantations of great extent, and where the trees are very tall: but wherever it can be uſed it is of great advantage, and certainly quits coſt. You then can chooſe your apples, and leave upon the tree thoſe which are not of a ſufficient ripeneſs: you ſave your fruit from bruiſes, and your trees from the damage they frequently receive by violent unſkilful ſhaking.

The gathering by hand is ſo eſſential, eſpecially for winter fruit, which is to be ſweated for a conſiderable time, that it ſhould not by any means be diſpenſed with; becauſe, as every wounded part of an apple will rot in the ſweating, a very great loſs muſt be occaſioned, both in the quantity of the fruit, and in the longer time taken up in wiping and rubbing off every ſpeck of rottenneſs upon each ſingle apple. This laſt labour is indiſpenſible; becauſe, otherwiſe, the putrid taint would ever remain in the liquor. Thoſe who plead the want of time, where a great quantity of fruit is to be preſſed, may be anſwered, that it would be more to their advantage to have only half the quantity of good cyder, than the whole of indifferent; and the gathering may certainly be expeditiouſly performed by means of ſtep-ladders. The apples may be put into baſkets, as they are gathered, and thereby be preſerved free from hurt, and the tree will not be injured as the ſupport of the ladders here recommended is independant of the tree. However, for thoſe who will follow the contrary practice, the beſt method is, to cover the ground under the trees with a ſufficient thickneſs of ſtraw to ſave the apples in their fall, and to lay blankets upon the ſtraw; then, with an eaſy motion, to ſhake the boughs ſucceſſively, removing, at every ſhaking, the apples already fallen, that they may not be bruiſed by the next. By theſe means all your apples are kept dry, and, for the moſt part, free from bruiſes; and with a little additional care you may alſo, in this method, ſeparate the fruits according to their ripeneſs: for if you proceed regularly from bough to bough, and give each a gentle ſwing, the ripeſt will fall firſt, and the unripe remain upon the tree till more violent motion brings them down.

Windfalls, as they are generally termed, bruiſed, apples, and thoſe which have not been well ripened, ſhould not by any means be mixed with the choice fruit; for if they are, it would be in vain to expect good cyder: the quantity of it may indeed be large, but it will always be proportionably bad. This fruit need not, however, be thrown away, excepting only that part of it where the bruiſe appears black and mouldy; for a very little of this would communicate an offenſive taſte to the whole liquor. The reſt will make inferior kinds of cyder; and if care be taken that the windfalls do not lie too long upon the ground, and if keeping cyder be not expected from bruiſed apples, they will anſwer tolerably well: nay, Mr. Newburg tells us, in a letter ſubjoined to Mr. Evelyn's Pomona, that a neighbour of his aſſured him he had made a quantity of very good cyder with windfalls, which he ripened by ſweating them for about a month, that they were beaten off the tree earlier than the ſeaſon when nature would otherwiſe have compleated their maturity; but that all the neighbours of this perſon, who preſſed their untimely fruit as ſoon as it fell, had a crude, auſtere, indigeſted liquor, not worth the name of cyder.

The ſweating of the apples has, however, been made a matter of ſome diſpute. The writer of the 24th letter in the Dublin Society's weekly obſervations diſapproves of it for choice ripe fruit, and inſtances his having been informed of ſome curious gentlemen who carried their thoroughly ripe apples directly from the tree to the grinding mill, without any previous ſweating, and obtained from them ſome of the beſt cyder they ever taſted. As to the winter fruits, he thinks it probable that the neceſſity of ſweating them might be removed, by leaving them upon the trees, ſomewhat longer than is neceſſary to ripen them; "no reaſon," (ſays he, without having perhaps ſufficiently attended to the benefit which fruit receives from being diſcharged of its watery parts,) "hitherto appearing to make us think that this fermentation by ſweating ſerves any other uſe than to increaſe the degree of maturity which the fruit had acquired upon the tree.—It is indeed poſſible," continues he, "that it may anſwer farther purpoſes, and diſpoſe the fruit to an eaſier emiſſion of its juices: and as our reaſonings upon nature frequently loſe their way, where experience does not guide them, it is from trials only that we can form a judgment to be depended on: recourſe muſt therefore be had to actual experiments, which in this caſe are eaſy, and will certainly quit coſt: for which ever way the queſtion be determined, ſomething muſt be found very well worth the knowing. Should ſweating anſwer ſome purpoſe not to be attained upon the tree, it will, when once diſcovered, aſcertain the nature, the uſe, and the degree of ſweating: or ſhould nothing of this kind appear, it will correct a practice, which, if it does no good, muſt certainly do miſchief: ſince it is evident to common ſenſe, that if maturity be all that is wanting, it is more perfectly and more naturally attained upon the tree." However, till this is determined by experience, it will be right to continue the practice of ſweating every apple: for as to windfalls, and other hard and unripe fruit, it is out of diſpute, that as they are deprived of natural maturity, they muſt be aſſiſted by art.

Upon the whole, there ſeems in this caſe, one rule which may be followed for all fruits; namely, to preſs their juice for fermenting at the time when the fruit itſelf is in the greateſt perfection for eating. Experience teaches us, that there are few apples which do not require time for their being mellowed, before they attain to their higheſt flavour. The golden pepin, for example, is in its greateſt perfection when kept till October; and in favourable years it will retain its flavour and juicineſs even till Chriſtmas, or longer. The nonpareil does not attain its chief excellence till near Chriſtmas, and after that it continues in perfection ſeveral weeks. It is therefore during the time theſe apples continue in perfection, that they are fitteſt to be preſſed for cyder; and the ſame will doubtleſs hold good of the other ſorts, none of which ſhould be preſſed before they have attained their higheſt flavour, nor after they have begun to loſe it. A principal advantage accruing from the ſweating of apples is, that the fruit is thereby deprived of the watery parts of its juice, which would only weaken the liquor; while its pulp yields a greater quantity of the enriched juice after it has been mellowed.

The material points to be obſerved in the ſweating of apples are, that the fruits be ſeparated according to their different degrees of ripeneſs, and that the floor on which they are laid be as dry as poſſible. The more ſtrictly the former of theſe cautions is obſerved, the better it will be; and the more the fruit in every heap is alike in its maturity, the ſooner the ſweating will be over, and the leſs damage will accrue to the ripeſt and beſt apples in the heap. However, if care be taken not to mix any that are very ripe with others that are very green, the injury will not be great: but if this ſhould be neglected, as it too frequently is, either the ripe apples will rot, or the green ones will remain unmellowed; and in either of theſe caſes, the cyder will be conſiderably leſſened in its value. Boarded floors will beſt anſwer the intention of the ſecond caution, becauſe they are drieſt: earthen floors, however, if covered ſome inches deep with wheat, rye, or oat ſtraw, will do tolerably well. It is likewiſe eſſential, for the better preſervation of the apples, that they do not touch the walls or ſides of the ſtore-room in which they are laid to ſweat. To heap them up in the orchard, or any where elſe upon the graſs, or on an uncovered floor where the rains and dews have free acceſs to them, is a ſure way to make the cyder weak and watery, and frequently muſty and ill-taſted.

Sweating being then undeniably neceſſary, at leaſt for unripe, hard, and winter fruit, the huſbandman, who makes a conſiderable quantity of cyder, will find a great conveniency in having near his orchard a building, of which his mill and preſs ſhould occupy the lower floor, and his apples be ſweated in that above, from whence they may be conveyed into the mill by a proper trunk. The duration of the time of ſweating is beſt determined by the ſmell of the fruit; that is, whenever it emits a full ſcent of the apples, they are fit for the preſs. Different kinds require different lengths of time, viz. from eight or ten days, to ſix weeks. The harſher the apple is, the more time it wants.

Apples that have laid any time in heaps, are generally covered with a clammy moiſture, proceeding from their ſweating. This ſhould be well wiped off; for it is a watery juice, which would impoveriſh the cyder; and at the ſame time every bruiſed and rotten part of the apple ſhould be carefully cut out, and thrown away, and it ſhould be cleared of its ſtalk; becauſe the former would give a putrid taſte, and the latter too much roughneſs, to the cyder.

The common practice is to carry immediately the apples from the heap where they have been ſweated, to the mill, and then to grind them; but if we attend to the length of time during which they will remain in a ſucculent ſtate after having been ſweated, carefully wiped dry, and properly laid up in a place of preſervation; we ſhall find, that, if theſe directions are duly obſerved, the fruit will continue in a perfectly ſound ſtate, and fit to be made into cyder, till it may be convenient for the huſbandman to preſs it: but before he does this, or rather before he ſweats his apples, he ſhould take care to ſort them, or at leaſt all the moſt valuable kinds, and particularly the ſtire, under-leaf, fox-whelp, and golden pepin, which hitherto have not been found to do ſo well in mixtures, as each of them does by itſelf.

The juice of the apples is obtained either by pounding the fruit in a trough, or grinding it in a mill. The former of theſe is leaſt approved, becauſe it is ſo tedious as to ſuit only ſmall quantities, and the work is performed by it unequally, and with waſte; much of the liquor being daſhed out of the trough by the beating, and ſome of the apples being hardly broken, when others are reduced to a perfect pomice.

There are ſeveral engines uſed for grinding the apples; but one in particular, reſembling a tanner's mill, is uſed in many parts of England. It conſiſts of a circular trough in which apples are bruiſed by a large flat ſtone moved round upon its edge. This engine we have repreſented on Plate VI. Fig. 8, where M is the ſtone ſet upon its edge; N, the ſpring-tree bar, or that to which the horſe is faſtened; P, Q, R, the circular trough in which the ſtone moves; T, L, V, compartments, or diviſions for different ſorts of apples.

When the apples are ground, ſome carry them directly to the preſs; but others empty them out of the trough into tubs, or large, wide, ſhallow vats. This work is done with moſt eaſe by broad wooden ſhovels: which ſhould alſo be uſed to turn the pomice in the vats five or ſix times a day, to prevent any fermentation; the whole of this operation being chiefly intended to give the pomice a red colour, which afterwards heightens that of the cyder, and brings it to a deep, fine amber. This buſineſs is over in two days.

From theſe vats the pomice is carried directly to the preſſes, of which there are ſeveral kinds: we have given figures of two kinds on Plate VI. where Fig. 9. is the ſmall cyder preſs, by which the juice is preſſed out of the pomice by means of a ſtone, or block of heavy wood, cut in the form of the fruſtrum of a cone, and moveable about the center. The pomice is ſpread upon the bed of the preſs, where a conical preſſer is turned round by means of a lever inſerted into its baſs, by which means the juice is forced out and conveyed by notches cut in the bed, to the veſſel, by means of a ſpout, and repreſented in the figure.

Fig. 10, is a large cyder-preſs, where A B is the baſs with its ſupporters. C, C, the cheeks, which are upright beams, whoſe lower extremities are ſunk in the earth, where they are firmly fixed by croſs-bars and maſonry. They are connected at the top by two beams, the lowermoſt of which contains the nut, or female ſcrew. D, is the ſcrew with its wheel; below which is the bearer, or large piece of timber on which the force of the ſcrew is exerted, in order to ſink the beams croſſing the planks that cover the pomice or cheeſe, as it is then called. G, G, are the planks on which the pomice is diſpoſed in hair bags, in order to be ſqueeſed: theſe planks are cut in notches to conduct the liquor to a veſſel properly placed to receive it. The bed of this preſs is ſupported on a maſſive work of maſonry. It is the wheel which forces down the ſcrew and bearer upon the pomice laid in hair bags upon the bed of the preſs. This is done by turning the wheel H round; for by that motion the cord is wound round its axis, and by that means the wheel fixed on the bottom of the ſcrew is turned round, and the bearer together, with the croſs planks under it, are forced down upon the pomice, laid in bags upon the bed.

Theſe bags hold about two or three buſhels, or as much as the mill can grind at once: and theſe are heaped over each other till the preſs is full. The larger preſſes will hold from eight to fifteen bags, which yield, from one to two hundred gallons of liquor, according to the largeneſs of the cheeſe. To perform the work neatly, it is neceſſary to have two ſets of theſe bags; for they clog and fur in preſſing, and, conſequently, become unfit for uſe till they have been waſhed and dried; ſo that while this is doing, either the preſs muſt ſtand ſtill, or another ſet be ready to employ it.

Some, inſtead of hair-bags, lay long ſtraw under the pomice, the ends of which they turn up over it; then cover the pomice entirely with freſh clean ſtraw, upon which they ſpread another layer of pomice, and ſo on, alternately, till the preſs is full. Either of the above methods will do: but thoſe who are deſirous of doing the work in the neateſt and beſt manner, generally uſe the bags.

It is uſual to diſpoſe of all the liquor preſſed out of the cheeſes, the ſame way, and without diſtinction: but if the analogy holds, as it ſurely does, between cyder and other vinous liquors, this muſt be a conſiderable error. Experience has ſufficiently ſhewn, that in making wines, there is a very great difference between the firſt yieldings of the grapes, and the juices which are afterwards extracted by hard preſſings; and this difference is always in favour of the former; ſo that, if the ſame be true of cyder, the richeſt, and choiceſt kinds are loſt, by an imprudent mixture of the whole.

It is an opinion generally received, and the writer of the letters in the Dublin Society's weekly obſervations, already mentioned, has adopted it; namely, that ſummer fruit do not make good cyder. “Summer fruit, or ſweet apples, ſays he, afford only a weak, pert, windy juice, agreeable enough to the palate from its livelineſs and tartneſs, but in a great degree unwholſome. It has no body, and therefore will not keep, and ſcarcely deſerves the name of cyder.” But Sir Paul Neile, whoſe reaſoning we ſhall give in his own words, judged very differently.

“I aſſert, ſays he, that the beſt apples will make the pleaſanteſt, which in my opinion is the beſt cyder; and I account thoſe the beſt apples, whoſe juice is the pleaſanteſt at the time when firſt preſſed, before fermentation. I ſhall need, beſides the experience of the laſt ten years, only to ſay, that it is an undeniable thing in all wines, that the pleaſanteſt grapes make the richeſt and pleaſanteſt wines, and that cyder is really but the wine of apples, and not only made by the ſame way of compreſſion, but, left to itſelf, hath the ſame way of fermentation, and therefore muſt be liable to the ſame meaſures in the choice of the materials.

“This truth was not formerly owned, by reaſon that in Herefordſhire, and thoſe countries where they abound with pepins and hard apples of all ſorts, they make cyder of both kinds, and uſed them alike; that is, that as ſoon as they had ground and preſſed the apples and ſtrained the liquor, they put it into their veſſels, and there let it lie till it had worked, and afterwards was ſettled again and fined; as not thinking it wholſome to drink till it had thus, as they call it, purged itſelf; and this was the frequent cuſtom of moſt men in the more ſouthern and weſtern parts of England alſo. Now, when cyder was thus managed, it is no wonder that when they came to broach it, they for the moſt part found their pepin cider not ſo pleaſant as their moyle or redſtreak cyder; but to them it ſeemed a wonder, becauſe they did not know the reaſon of it, which I ſhall next explain: for till they knew the reaſon of this effect, they had no cauſe but to think it was the nature of the ſeveral apples that produced it; and conſequently to prefer the hard apple cyder, and to uſe the other apples, which were good to eat raw, for the table, for which the hard apples were totally improper.

“To ſhew that, in Herefordſhire, they know not what was the true cauſe why their pepin-cyder was not, as they uſed it, ſo good as the cyder made of hard apples, I ſay, that for all liquors which are vinous, the cauſe that makes them ſometimes harder or leſs pleaſant to the taſte, than they were at the firſt preſſing, is the too much fermenting. If wine or cyder by any accidental cauſe do ferment twice, it will be harder than if it had fermented but once; and if it ferment thrice, it is harder and worſe than if it had fermented but twice; and ſo onward, the oftener it ferments, and the longer it ferments, it ſtill grows the harder.

“According to the old method of making and putting up the cyder, they took little care to put up only the clear part of the liquor into their veſſels or caſks. Now pepins being a ſofter fruit, are in the mill bruiſed into ſmaller particles, than the harder ſorts of apples; and conſequently more of thoſe ſmall parts paſs the ſtrainer in the pepin cyder, than in the cyder of hard apples. This cauſeth a ſtronger fermentation, and, according to my former principle, a greater loſs of the native ſweetneſs, than in the hard apple cyder; and not only ſo, but the lee of the hard apple cyder being compounded of greater particles than the lee of the pepin cyder, every individual particle is in itſelf of a greater weight than the particles of the lee of the pepin cyder, and conſequently leſs apt to riſe upon ſmall motions. When the fermentation of the hard apple cyder is once over, a ſecond fermentation ſeldom happens, unleſs the veſſels be ſtirred: but in pepin cyder it is otherwiſe; for if the groſs lee be ſtill remaining with the cyder, it need not the motion of the veſſel to cauſe a new fermentation; but every motion of the air, by a change of weather, will cauſe a new fermentation, and conſequently make it work till it hath deſtroyed itſelf by loſing its native ſweetneſs. This alone hath been the cauſe why commonly when they broach their pepin cyder, they find it ſo unpleaſant.

“What firſt gave me the hint of this, is that in divers parts they make three ſorts of wine out of one and the ſame grapes; that is, they firſt take the juice of the grapes without any more preſſing than what comes from their own weight, and the bruiſing they receive when put into the vat; which cauſeth the ripeſt of theſe grapes to break, and the juice, without any preſſing at all, makes the pleaſanteſt and moſt delicate wine. The ſecond ſort they preſs a little, which makes a wine neither ſo pleaſant as the firſt, nor ſo harſh as the laſt, which is made by the utmoſt preſſing of the very ſkins of the grapes, and is by much more harſh than either of the other two. Now I preſume the cauſe of this, at leaſt in part, to be, that in the firſt ſort of wine, which hath little of the ſubſtance, beſides the very juice of the grape, there is little lee, and conſequently little fermentation; and becauſe it doth not work long, it loſes but little of its original ſweetneſs. The ſecond ſort, being a little more preſſed, hath ſomewhat more of the ſubſtance of the grape added to the juice, and therefore, having in it more of that part which cauſes fermentation, ferments more ſtrongly, and is therefore, when it hath done working, leſs pleaſant than the firſt ſort, which worked leſs. For the ſame reaſon the third ſort, being moſt of all preſſed, hath moſt of the ſubſtance of the grape mingled with the liquor, and worketh the longeſt: but at the end of the working, when it has ſettled and is clear, it is much more harſh than either of the two firſt ſorts. The thought of this made me firſt apprehend, that the ſubſtance of the apple, mingled with the juice, was the cauſe of fermentation, which is really nothing elſe but an endeavour of the liquor to free itſelf from theſe heterogeneous parts which are mixed with it: and when there is the greateſt proportion of thoſe diſſimilar parts mingled with the liquor, the endeavour of nature muſt be the ſtronger, and take up the more time to perfect the ſeparation, which, when finiſhed, leaves all the liquor clear, and the groſs parts, called the lee, ſettled to the bottom of the veſſel. Nor did this apprehenſion deceive me: for when I began to ſeparate a conſiderable part of the lee from the cyder before it had fermented, I found it to retain a very great part of its original ſweetneſs, more than it would have done if the lee had not been taken away before the fermentation; and this not once, but conſtantly for ſeven years.

“The method which I uſed was this: when the cyder was firſt ſtrained, I put it into a great vat, and there let it ſtand twenty-four hours at leaſt, but ſometimes more, if the apples were more ripe than ordinary: then, at a tap before prepared in the veſſel, three or four inches from the bottom, I drew it into pails, and from thence filled the hogſhead, or leſſer veſſel, leaving the greateſt part of the lee behind. During this time that the cyder ſtood in the vat, I kept it as cloſe covered with hair-cloths, or ſacks, as I could; that ſo too much of the ſpirits might not evaporate.

"Now poſſibly I might be aſked why I did not, ſince I kept it ſo cloſe in the vat, put it at firſt in the veſſel: to which I anſwer, that had I put it at firſt into the veſſel, it would poſſibly, eſpecially if the weather had chanced to prove wet and warm, have begun to ferment before that time had been expired; and then there would have been no poſſibility to ſeparate any part of the groſs lee, before the fermentation had been wholly finiſhed; which keeping it only covered with theſe cloths was not in danger: for, though I kept it warm in ſome degree, yet ſome of the ſpirits had ſtill liberty to evaporate; which had it been in the hogſhead with the bung only open, they would not ſo freely have done; but in the firſt twenty-four hours it would have begun to ferment, and ſo my deſign had been fully loſt: for thoſe ſpirits, if they had been too ſtrongly reverberated into the liquor, would have cauſed a fermentation before I could have taken away any part of the groſs lee. The great myſtery of the whole lies in this; to let ſo many of the ſpirits evaporate, that the liquor ſhall not ferment before the groſs lee be taken away; and yet to keep ſpirits enough to cauſe a fermentation when you would have it: for if you put it up as ſoon as it is ſtrained, and do not let ſome of the ſpirits evaporate, but ſuffer the groſs lee to be ſeparated by its own weight only, without fermentation, it will ferment too much, and loſe its ſweetneſs; whilſt on the other hand, if none be left, it will not ferment at all, and then the cyder will be dead, flat, and ſour."

Experience taught Sir Paul, that it was neceſſary to delay the fermentation till late, or till the cold weather had come in, as he informs us, when he ſays, "It is neceſſary that the apples have a little time to ſweat in the houſe before the cyder is made; but not too much: for if they be not full ripe before they are gathered, and not ſuffered to lie a while in the heap, the cyder will not be ſo pleaſant; and if they be too ripe when they are gathered, or lie too long in the heap, it will be very difficult to ſeparate the cyder from the groſs lee before the fermentation begins: and in that caſe it will work ſo long, that when it fines, the cyder will be hard: for when the apples are too mellow, they will break into ſo ſmall particles, that it will be long before the lee ſettles by its own weight only; and then the fermentation may begin before it be ſeparated, and ſo deſtroy your intention of taking away the groſs lee. And if the apples be not mellow enough, the cyder will not be ſo pleaſant as it ought to be."

To the cauſe above aſſigned by Sir Paul Neile for the liquor's fermenting too much, another may be added; namely, that as the ſummer fruits are fermented earlier than the hard apples, the warmth of the weather hurries the fermentation on too faſt, and by this means renders the liquor much leſs palatable: or it may even hurry it beyond the vinous ſtate, till the acetous fermentation begins. The ſweetneſs of the ſummer fruits make them likewiſe more liable to ferment too much; whereas the ſour roughneſs of hard apples retards that operation, and makes a longer time neceſſary to perfect the vinous fermentation. Theſe cauſes render it neceſſary that great care be taken in preparing the juice as directed by Sir Paul, and that there be a cellar in which the heat is ſuited to carry on as ſlow a fermentation as poſſible. If the maker of the cyder is not provided with ſuch a cellar, the juice of the apples may be buried in cold ſpring water, as before mentioned, and be kept there till the temperature of the weather becomes fit for its being fermented.

"What has been ſaid of the time for making the pepin cyder, may, adds Sir Paul Neile, with due allowances for the nature of the apples, ſerve for all other ſummer fruit; as the Kentiſh-codlin, marrigold, gillyflowers, ſummer-pearmains, ſummer-pepins, Holland-pepins, golden-pepins, and even winter-pearmains. For though they muſt not be made at the ſame time of the year, yet they muſt be made at the time when each reſpective fruit is in the condition before directed for the pepin. Nay, even in the making of that cyder, you are not tied preciſely to that particular time, but, as the condition of the year hath been, you may make your cyder one, two, three, or four weeks later."

When the preſſing of the apples is finiſhed, the moſt careful makers of cyder ſtrain their liquor through a hair ſieve, to ſeparate from it the coarſeſt dregs; which is a practice every way adviſable. It muſt then be left to itſelf, till it has undergone the neceſſary fermentation, and depoſited its groſſer lees. To this purpoſe ſome put it immediately into hogſheads, others into large tubs or vats, and the moſt curious into a veſſel intended for that very uſe, wide at top, and growing narrower all the way down to the bottom, near which is a tap to draw off the liquor. This veſſel is fixed upon a ſtand, or ſtilling, and frequently contains from five to twenty hogſheads. In theſe veſſels the heavier lees ſubſide, and the lighter form at top a cruſt, which, by its ſinking afterwards, gives timely notice that the ferment is gone off, and that the liquor is fit for racking. Some gentlemen, who ſpare no pains to make their cyder as fine as poſſible, think that the excellence of the liquor depends greatly on catching the very inſtant when this cruſt breaks; and in order to be ſure of it, they ſet a perſon to watch and give immediate notice of the crack or noiſe which the cruſt makes in breaking. They hold this to be the critical time for racking off the liquor, and maintain, that ſo much of its ſpirit is evaporated very ſpeedily after, as to render the cyder irrecoverably vapid. This, therefore, ſhould be carefully attended to; and upon the firſt appearance of the cruſt's falling, the cyder, which is then become tolerably fine, ſhould be drawn off the groſſer lees, and tunned into the hogſheads. The uſual time taken up in this primary fermentation is from thirty-ſix to forty-eight hours; more or leſs, according to the weather. Some affirm that they have had good cyder by tunning it directly from the preſs, without any other caution than leaving room for the liquor to ferment in the hogſhead, where it remained from firſt to laſt: but this method is liable to many hazards, and ſucceſsful, where it has been ſo, only in favourable ſeaſons. The groſs lees are apt to riſe on every conſiderable change of weather, and when they do, they ſet the cyder on the fret, which, ſhould it do no worſe, certainly robs it of its ſpirit, and, when over, leaves it flat and vapid. Beſides, repeated experiments have proved, that ſourneſs in all fermented liquors begins ever at the lees, and therefore the more of them is left among the cyder, the more readily it will turn eager.

Here I muſt obſerve, that a moſt important precaution is too often overlooked by many of thoſe who make cyder of winter fruits; for that a ſufficient warmth of the air is as eſſential to ferment the rough juices of hard apples, as it is dangerous to ſuffer the heat to be too great in the fermenting of cyder made of ſummer fruits. If the weather is very cold when the hard apples are preſſed, the help of fires ſhould be recurred to; or if that has been neglected, or could not be conveniently uſed, it will be right to carry the cyder to a place warmed conſiderably by the ſun for a ſhort time in the ſummer, and there to place it out of the immediate reach of the rays of the ſun. The bung of the caſk muſt be looſened, becauſe there will ariſe a degree of fermentation, which will attenuate any viſcidity not overcome by the firſt fermentation. Great care muſt be taken that this fermentation be not carried beyond the nice point of correcting the rough raw taſte of the fruit: for if it goes farther, the liquor will either become vapid, or turn to vinegar. As ſoon as the deſired point is obtained, the liquor ſhould be racked off, eſpecially if much feculence has ſunk to the bottom, and it ſhould then be carried down into the vault, where it may be preſerved long in perfection.

The choice of proper veſſels to keep the cyder in after it has fermented is very material; no liquor being ſo apt as this to take the taſte or tang of the caſk. New veſſels, though the wood be ever ſo well ſeaſoned, generally give a diſagreeable reliſh to all liquors, and will do ſo remarkably to cyder, unleſs due caution be uſed before-hand. Frequent ſcalding with hot water, into which ſome handfuls of ſalt have been firſt thrown, or with water in which ſome of the pomice has been boiled, and waſhing afterwards with cyder, are the uſual remedies againſt this evil, and ſeldom fail of removing

moving it effectually. Of old caſks, beer veſſels are the worſt: they always ſpoil cyder; as, in return, cyder caſks infallibly ſpoil beer. Canary and brandy caſks do well, and all wine veſſels tolerably; for, provided the tartar adhering to their ſides be carefully ſcraped off, and they well ſcalded, there is no danger in uſing them. The beſt way of ſcalding them, is to boil a parcel of dried wormwood in water, and with that and a bruſh of the ſame plant to rub and ſcour their inſides. This will correct the acid of the tartar; and ſo will likewiſe all vegetable aſhes uſed in the ſame manner. Thoſe who adviſe fumigating the caſks with brimſtone, confidently affirm that the cyder becomes ſtronger, and keeps better, when the veſſels have been thus prepared, and for this reaſon they tun immediately after the operation, and before the ſmoak evaporates. To enable ſuch as may chooſe to examine, by fair trials, how far this is true in fact, I ſhall here add the neateſt method of performance. Melt a pennyworth of brimſtone, and dip in it a piece of new cloth, or of canvaſs, till all the brimſtone is imbibed, and the cloth or canvaſs looks like a piece of ſearcloth: then roll it cloſe, tie it, and with a wire ſuſpend it at the bung, three parts in four within the veſſel; light it, and let it burn till it is ready to fall into the caſk, then take it out, and tun without delay. Some add a little powdered cinnamon, cloves, pepper, or other ſpice to the brimſtone for fumigating; but I ſee no great reaſon for their ſo doing.

The beſt ſhaped veſſels for keeping cyder in are, as adviſed by captain Sylas Taylor, in a letter ſubjoined to Mr. Evelyn's Pomona, and by Mr. Worlidge, thoſe of which the barrel-boards are ſtrait, the veſſel broader at one end than the other, and ſtanding on the leſſer end, with the bung-hole in the top. The advantage of this form is, that in the drawing of the cyder, though but ſlowly, the ſkin or cream contracted by its fermentation (as is the caſe of all ſtrong liquors) deſcends, and covers the liquor by means of the tapering of the veſſel, and thereby preſerves to the laſt the ſpirits of the cyder, which would otherwiſe evaporate and waſte. A little wheaten-bran caſt in after the fermentation, thickens this coat or cream of the liquor, and thereby conduces much to its preſervation.

We come now to a point of great importance, and hitherto of as great uncertainty, which has raiſed among the curious a controverſy of long ſtanding, and not likely to be brought to a ſpeedy deciſion, without a courſe of regular experiments. Some maintain, that continued fermentation and frequent racking certainly ſpoil the cyder; whilſt others aſſert, that it can never be good without them. Some rack once, ſome twice, and others whenever the liquor frets. Some look upon the lees as the food and nouriſhment of cyder: others, as a cauſe at hand, upon every change of weather, to ſet it on the fret, and turn it ſour. Every man has a ſyſtem of his own, and a peculiar practice conſequent thereon; and ſo great is the variety of methods, that nothing certain can be drawn from them but this one general concluſion, that we are ſtill at gueſs work, and muſt be obliged to future trials for any rules that can be thoroughly depended on. I ſhall therefore here relate the ſeveral ways now in uſe, and then give my own general opinion of this matter: but I ſtrongly recommend the making of accurate experiments on each.

One method is, to leave the cyder in the vats ſome days longer than was before adviſed, and till it fines in a great meaſure: then to tun it into hogſheads, where it is to remain without any farther racking. Thoſe who recommend this practice ſay, that their cyder is thereby rendered the ſtronger and mellower: and thoſe who object to it reply, that lying on the groſſer lees, which cannot all be fallen in the vats, it muſt be apt to fret, turn foul, and, in unſettled weather, eager.

A ſecond and more common method is, a fortnight after tunning, to rack into other hogſheads. There the cyder undergoes a ſecond gentle fermentation, and while this laſts the bung muſt be left open; afterwards, when the fermentation leſſens, covered only with a wet cloth, or a tile; and when it is quite over, ſtopped down cloſe with well tempered clay, kept moiſt, to prevent its cracking, by ſtrewing over it a handful of bay-ſalt.

To this ſecond racking others add a third in March or April, when the lees have thoroughly ſubſided. This again is followed by a little fermentation; and for that reaſon chiefly it is objected to by thoſe who think every fermentation hurtful which is not ſtrictly neceſſary.

Others, on the contrary, and particularly thoſe of Devonſhire, where the ſtrongeſt cyders are made, look upon thorough fermentation as the great ſecret to have their cyder fine, light, and free from dregs, and accordingly they not only approve of the above laſt mentioned method, but proceed much farther, as follows:

At firſt tunning they do not fill their hogſheads to the bung, but leave an empty ſpace to receive a pailful of freſh cyder from the preſs: this renews or increaſes the fermentation, and ſets the whole on working with ſome violence. The froth which riſes at the bung is carefully ſkimmed off, and the waſte of liquor thus occaſioned is conſtantly repleniſhed with unfermented cyder. By theſe means the whole is kept from the fret for a conſiderable time: for it is not uncommon to have cyder thus managed working for a fortnight. A month after this operation, and the ſtopping of the veſſels, the cyder is racked, and, generally ſpeaking, in two months more a ſecond time: and if it frets, which however is ſaid ſeldom to happen in this method, it is racked off a third and a fourth time.

To make a proper choice among the ſeveral above recited methods, they ſhould be tried together, with the ſame fruit, of equal ripeneſs; the cyders ſhould be kept to the ſame age, and their different qualities ſhould be attentively obſerved. Juſt information cannot be obtained in any other way: for the want of accuracy and exactneſs will render the experiment fruitleſs and inſignificant. Every one will tell you, that his method affords good cyder: but this general expreſſion gives no determinate idea, and forwards knowledge very little. Would gentlemen be at the trouble to keep notes, and minute down all the differences obſervable in the ſame cyders under different managements, it might ſoon be known what method gives the ſtrongeſt, which the neateſt, the rougheſt, melloweſt, or lighteſt cyders; and every one might then purſue, as his taſte or intereſt ſhould direct, that which would anſwer beſt: but till ſomething of this kind be done, only very ſlow and inconſiderable improvements can be expected.

In the mean time I muſt obſerve, in general, that whenever the lees of cyder are in ſuch quantity as that the liquor cannot preſerve them from a tendency to putrefaction, as muſt be the caſe with the firſt, and generally the ſecond lees, it is certainly adviſable to rack off the liquor; and that, if the cyder is kept in a place not ſubject to the various changes of the weather, the little fermentations raiſed by racking cannot be attended with any great danger; nor will the frettings return. But as to the frequently repeated fermentations which are ſaid to be, of choice, the practice of the makers of cyder in Devonſhire, they ſurely are by no means adviſable.

The few points which experience has hitherto determined in regard to the making of cyder are, that weak cyder cannot bear above one or two rackings without too great a loſs of ſpirits; that ſtrong cyder made of winter apples will ſtand ſeveral rackings, and thereby grow mellower, and be the ſooner fit for drinking; that the more the liquor is fermented, the rougher it will grow; that fermentation is no other way ſo well promoted, as by putting into the hogſhead from time to time ſome of the liquor freſh drawn from the preſs; and laſtly, that to have a rich, racy, palatable cyder, a little inclining to the ſweet, great care muſt be taken to prevent all future fermentation after the liquor is once become fine. If it ſhould be foul, iſinglaſs will help to fine it, by precipitating the flying lee.

In general, the cyder that is longeſt in fining is the ſtrongeſt and moſt laſting, if it has been made of thoroughly ripe fruit: but, as was before obſerved in the article of wines, all liquors will be much longer in clearing in mild moiſt weather, than in cold dry weather or froſt.

When the bung-hole of the veſſel is cloſed up, a ſmall vent-hole ſhould be left open, or but looſely ſtopped with a peg, for ſeveral days, till the wild ſpirit of the liquor be ſpent; for otherwiſe it will break the caſk, or find ſome other vent, which, though but ſmall, will always abide open, and prove the ruin of the cyder. Many have ſpoiled their cyder by this only neglect, and never apprehended the cauſe thereof. After this wild ſpirit is ſpent, the vent-hole, as well as the bung, ſhould be ſtopped quite cloſe; and then the cyder, though ſeemingly flattiſh at firſt, will ſoon improve, and become briſk and pleaſant.

Deadneſs or flatneſs in cyder, if occaſioned by a two free admiſſion of air into the veſſel, for want of right ſtopping, is remedied by grinding a ſmall parcel of apples, and putting them into the caſk, which ſhould then be ſtopped up cloſe: but care muſt alſo be taken to open the vent ſometimes, or the veſſel will be in danger of burſting. The liquor thus managed muſt likewiſe be drawn off in a few days, either into bottles, or into another caſk, leſt the murk ſhould corrupt the whole maſs; to prevent which, ſome put in only the juice of the newly preſſed apples. The ſame may be done to flat bottled cyder, by adding about a ſpoonful or two of new muſt to each bottle of the dead liquor, and ſtopping it again. Cyder that is dead or flat will often revive again of itſelf, if cloſely ſtopped, upon the revolution of the year, and the approach of ſummer: but cyder which has acquired a deadneſs or flatneſs by being kept in a beer veſſel, cannot be revived again.

Thick cyder may be rendered clear and good by a ſecond fermentation, or, ſometimes, by only throwing into it two or three quite mellow apples. But cyder in which the acetous fermentation has taken place, can never be reſtored. If it be only a little ſouriſh, or drawn off in another veſſel, about a gallon of wheat (blanched is beſt) to a hogſhead of cyder, and ſo in proportion for any other quantity, will both amend and preſerve it: or if it is ſo ſour that the wheat does not anſwer that purpoſe, it may be corrected by egg-ſhells, powdered alabaſter, &c.

Cyder which has contracted any ill flavour or taſte from the veſſel, or from any other cauſe, will be helped by the addition of a little muſtard ſeed ground with ſome of the cyder.

Ginger accelerates the maturation of cyder, gives it more briſk ſpirits, helps fermentation, promotes its duration, and corrects its windineſs.

When the juice is too thin or weak, it is a common and very adviſable practice to give by art that ſtrength which nature had not beſtowed. To this end, raiſins of the ſun, or the lees of rich wines, are uſed with good ſucceſs; as is alſo ſugar. Writers on this ſubject give various directions for the uſe of this ingredient: but it would be needleſs to repeat them here, as it is of very little importance in what manner it be done, the giving a body to the liquor being the only thing wanting, and this a proper quantity of ſugar will effect, in whatever ſhape it is uſed. When the deſign is to colour the cyder, the ſugar is boiled till it becomes brown, and then put into the caſk.

CYTISUS, the name of a plant much cultivated by the old Romans for the food of cattle, and called by ſome ſhrub-trefoil, and by others ſhrub-lucern.

It riſes to the height of five, ſix, or even more feet, with a ſhrubby ſtalk, covered with a greyiſh bark, and divided into many branches, covered with a hoary down while they are young, and garniſhed at each joint with trifoliate leaves ſtanding upon foot ſtalks about an inch in length. There are two or three of theſe at each joint, ſo that the branches are cloſely covered with them. The lobes are ſmall, ſpear-ſhaped, and hoary on their underſide; and theſe leaves remain all the year. The flowers, which are of a bright yellow, blow on foot-ſtalks which ariſe from the ſides of the branches, each foot-ſtalk ſuſtaining four or five flowers; and theſe are ſucceeded by compreſſed moon-ſhaped pods, each containing three or four kidney-ſhaped ſeeds.

The cytiſus may be raiſed either from its ſeed ſown about the middle of October, or in the beginning of April; or if greater ſpeed be deſired, from cutting ſlips, or layers, planted in the ſpring or autumn, ſo as to leave a ſpace of four feet between each plant. Such are the directions of Columella, who adds, that if the ground be well dunged for this planting, and well hoed up round the plants, which ſhould be watered during the firſt fortnight, if rain does not fall, plentiful crops may be obtained from this excellent vegetable, equally fit for horſes, oxen, cows, ſheep, hogs, goats, and poultry. It is alſo ſingularly profitable for bees, whoſe honey it increaſes prodigiouſly. It has the ſame effect upon the milk of cows, beſides greatly improving its quality. In the kingdom of Naples the goats feed upon it, and great quantities of excellent cheeſe are made from their milk. In the iſlands of the Archipelago, the Turks make handles for their ſabres of the wood of this ſhrub, which, when full grown, is as hard as ebony, and of a fine yellow colour. It will bear cutting as often as its ſhoots are about fifteen or eighteen inches long, which may be ſeveral times in the year; for it ſhoots and flowers during eight months in the countries where it grows well, and continues green during the whole winter, if the ſeaſon be at all favourable. Its ſeeds begin to ripen towards the end of Auguſt, and continue to do ſo until the cold ſtops them. It will be fit for cutting at the end of three years at fartheſt, and ſhould be carefully kept clear of weeds, and hoed up between each cutting. If given as green fodder, which it affords during eight months of the year, about fifteen pounds weight of it are ſufficient for the daily food of a horſe, twenty pounds for an ox, and ſo in proportion for other cattle, according to their ſize and ſtrength. When made into hay, it ſhould be given more ſparingly, becauſe it is then more nouriſhing. In this ſtate it ſhould be ſteeped in water, before it is given to cattle, and then be mixed with chaff or ſtraw. The time of cutting it for hay, is when the greater part of its ſeeds begin to grow large; and the manner of making this hay is, to let the ſwarths lie ſome hours in the ſun, till they are faded, and then to dry them thoroughly in the ſhade. *Columella De Ruſtica, Lib. V. cap.* 12.

Mr. Miller allows the cytiſus every quality that can recommend it for the feeding of cattle in the countries where it grows naturally, ſuch as the iſlands of the Archipelago, Sicily, and the warmeſt parts of Italy, but is perſuaded that it will not thrive in England, ſo as to be of any real advantage for that purpoſe here; becauſe it cannot bear ſuch hard froſts as we ſometimes have; or if it does not bear them ſo far as not to be abſolutely killed, it will be ſo much damaged thereby, as not to be able to recover its verdure before the middle or latter end of May; nor even then to put forth ſhoots that will bear cutting more than once in a ſummer; beſides, their being ſo woody, if ſuffered to grow to any conſiderable length, as to render that cutting very troubleſome, and of little ſervice by way of fodder. He therefore thinks, upon the whole, that it can never anſwer the trouble and expence of cultivation in this country, where we have many other preferable plants; but that, in hot, dry, rocky countries, of which we have now ſeveral in our colonies, where few other vegetables will thrive, this may be cultivated to great advantage; for it will live there many years, and proſper very well.

D.

DAB-CHICK, a chick newly hatched.

DAFFODIL, the name of a well-known flower, of which there are ſeveral ſpecies. The common ſort grows naturally by the borders of woods, and fields, in many parts of England; this hath a large bulbous root, from which come out five or ſix leaves, about a foot long, and an inch broad, of a greyiſh colour, and a little hollowed in the middle, like the keel of a boat. The ſtalk riſes a foot and a half high, having two ſharp longitudinal angles; at the top comes out a ſingle flower, incloſed in a thin ſpatha, or ſheath, which is torn open on one ſide, to make way for the flower to come out, and then withers and remains on the top of the ſtalk. The flower is of one petal, or leaf, being connected at the baſe; but is cut into ſix parts almoſt to the bottom, and theſe all expand. In the midſt of this is ſituated a bell-ſhaped nectarium, called by gardeners a cup, which is equal in length to the petal, and ſtands erect. The flower nods on one ſide of the ſtalk. The petal is of a pale brimſtone colour, and the nectarium yellow. It flowers in the beginning of April; and after the flowers are decayed, it turns to a roundiſh capſule, with three cells filled with roundiſh ſeeds, which ripen in July. This ſort propagates very faſt by off-ſets from the root. For the method of cultivating the more curious ſpecies of daffodil, *ſee the article* NARCISSUS.

DAG, dew hanging upon the graſs.

DAIRY, the occupation, or art of making various kinds of food from milk, particularly butter and cheeſe. It alſo ſignifies the place where theſe operations are performed.

The following account of managing a dairy was written by a gentleman who has for a conſiderable number of years employed himſelf in that buſineſs, and acquired by his induſtry a plentiful fortune.

He begins with recommending the cultivation of ſaintfoin to every perſon concerned in a dairy, as it is obſerved to increaſe the milk of cows, both in quantity and quality, above any artificial paſture yet known, and therefore he adviſes the farmer to keep his cows upon it, and form a five years dairy.

" An acre of the worſt land, continues he, will, when improved by this graſs, maintain four cows very well from the firſt of April to the end of November, and afford beſides a ſufficient ſtore of hay, to make the greater part of their ſubſiſtance the four winter months following. You muſt buy then about four hundred milch-cows, but take care you chuſe them with judgment. I have bought your largeſt ſort of runts from Wales, for leſs than fifty ſhillings a cow, with a good calf by her ſide, which I always diſpoſed of as ſoon as I could. You will obſerve, that I make too good an uſe of the milk to afford the calf his ſhare of it: I generally keep theſe cows above twelve months, and then, ſelling them, ſometimes for four pounds a-piece, I ſtock myſelf with ſuch that are new milched. I obſerve this rule every year, and the trouble is ſufficiently rewarded by the advantage it brings me; for beſides the profit I make by ſelling dearer than I buy, I avoid the inconvenience of having any thing to do with bulls, and the conſequences; ſo that I always preſerve my cows in their full milk, and find it no uncommon thing for one of theſe milch-cows to be milked twice a day, and afford a gallon and an half at a meal. Four hundred of theſe cows will coſt a thouſand pounds; and you will find, that, coming from a poor paſture to a rich, they will proſper and increaſe both in milk and ſize. In eight convenient places about your hundred acres let there be built eight thatched ſheds, a little riſing in the middle to carry off the water; the height may be ten feet, and the breadth thirty; each of theſe ſheds ſhould be a hundred and twenty-five feet long, and, under the higheſt part, directly in the middle, you muſt raiſe a ſlight partition, lathed and plaiſtered, which ſerves to ſupport the ridge of the roof, while the two ſides are ſuſtained by ſquare wooden poſts, about eight feet high, and placed at proper diſtances.

" On either ſide of the partition wall let there be fixed a kind of rack, like thoſe in ſtables, which is to run the whole length of the ſhed, and muſt be placed as high as a cow can reach her fodder from. The ſhed muſt next be divided into ſtalls, like thoſe for ſtone-horſes, and each ſtall will be above five feet broad; the length of theſe ſtalls muſt be exactly fitted to that of a cow, that a croſs bar, being placed at the outward end, may keep the beaſt from running backwards: thus every ſhed will hold fifty cows, five and twenty on each ſide of the partition: to every one of theſe ſheds you muſt appoint a man, whoſe buſineſs it will be to clear the place, and carry off the dung; as alſo to mow the ſaintfoin every day, and give it to the cows in the rack before-mentioned: this man beginning at one end of his proportion of ground, and going gradually on to the other, the firſt place will always be fit to mow again by that time he has gone through his whole diviſion. Your cows are thus fed at diſcretion, with neither too much nor too little; they are not peſtered with the ſcorching heats, nor troubled with the ſtinging fly, which, in open paſtures, often makes them whiſk about, and trample down more graſs than they eat. At each end of every ſhed you muſt build a ſlight room of brick, thirty feet ſquare, and ten feet high, which is to be divided, the croſs-way of the ſhed, into two partitions, each fifteen feet broad, and thirty feet long; that which joins the cow-houſe muſt be paved with tiles, and is to ſerve for a dairy; the other muſt be floored and windowed, and is to be a lodging-room for the dairy-maids. Every ſhed will require five maids, that is, to every ten cows one dairy-maid; fewer might ſerve, but it is better to exceed, than fall ſhort, in this particular. Thus each dairy will have two or three maids belonging to it, whoſe lodging will be the room adjoining, and whoſe care is to extend to the ſhed on both ſides the partition, to the five and twenty cows which are the neareſt to their ſtation. All along both ſides of the partition, at about a foot above the ground, let there be fixed, cloſe to the wall, a ſtrong pipe of lead, a little leſs than an inch diameter; both which pipes, being ſomewhat raiſed exactly in the middle of the ſhed, muſt have a gentle and almoſt an inviſible deſcent from that riſing to the dairies, through the wall of which their nether ends are to be brought, and there wrought into one another, that whatever deſcends through them, into either of the dairies, may have iſſue but at one mouth. This mouth of the pipes muſt be made very ſmall, and neatly fitted into the hollow end of a ſtrong wooden axle-tree; which, whilſt it is turning ſwiftly round the mouth of the pipe, may by no means ſtrain it by the motion, but receive, into its own hollow, the milk which deſcends through the leaden pipes, without ſpilling any, and paſſes ſo far through a wheel, or veſſel like a barrel, only much larger in its circumference. The axle-tree, which this veſſel is to turn upon, is bored very full of round holes, through which it delivers the milk into the veſſel, as faſt as it receives it from the pipe.

“ The veſſel muſt be capable of containing, at leaſt, three times the quantity of milk, which it is deſigned to receive; and there muſt be ſix wings or thin pieces of wood, glued on edge-ways to the wooden axle-tree, whoſe length and breadth muſt be ſo contrived, as to leave a free ſpace of ſix inches at either end of the axle-tree, and a foot between their edges lenth-ways, and the ſmooth inſide of the veſſel; in the moſt convenient part of which muſt be contrived a door, to open and ſhut down upon occaſion, as cloſely as if there was none. This door will perform its work very neatly, if you line the inſide and edges with ſome kind of cloth, which is commonly uſed in the preſſing of cheeſe. The other ſolid end of the axle-tree muſt extend itſelf about five feet longer; and the whole length may be ſupported by ſquare wooden poſts, and turn in their tops, which are to be made hollow, and kept greaſed for that purpoſe. This end of the axle-tree is to be faſtened into a wheel, exactly like thoſe which are uſed in many places for roaſting of meat. The diameter of this laſt wheel muſt be within ſix inches of the height of the dairy, and two or three large dogs, being put into it at a time, will turn it with extraordinary ſwiftneſs: the dogs are eaſily taught, and will at laſt take delight in the exerciſe. I have brought up a large buck to the practice of this labour, and it is wonderful to ſee the force with which he runs round an hour or two together, and turns a wheel of ten feet diameter; but you muſt make your wheel as light as it can poſſibly hold together. I have but one thing more to ſay, and I finiſh this direction: pretty near that ſide of every ſtall in your ſhed, to which the maid muſt come to milk the cow that belongs to it, let a hole, as ſmall as will ſerve the occaſion, be contrived by your plumber, in the uppermoſt part of the leaden pipe, to ſhut and open with a little ſcrew, which ſcrew, for fear of loſing it, may be faſtened by a little iron chain to the body of the pipe. I have endeavoured, in the deſcription of all this, to make my meaning as plain as poſſible, and hope the reader will, with a little attention, comprehend the whole.”

The ingenious Mr. Liſle obſerves, that ſo much cleaning and ſcalding is neceſſary, that the dairy farmers ſpend as much wood in fire, for that purpoſe, during the ſummer, as they burn for other purpoſes in the winter.

If the milk veſſels are not kept clean they will be ſour, and the cheeſe will be ſour before it can come, and it will eat ſour and choaky. A cold dairy is a great means of preſerving cream from turning ſour. The milk-houſes ſhould alſo be large, for otherwiſe the ſteam ariſing from the hot milk as brought in from the cows, will heat the air of the room.

Care ſhould be taken when cows begin to give off their milk, to milk them clean; for if this be neglected they will ſoon grow dry. Cows generally begin to give off the height of their milk about the time of the bloſſoming of the wheat, and continue ſo till a good aftermath comes on, when their milk will increaſe; but cold and rainy weather in the autumn will ſoon abate their milk again. Perhaps the reaſon why the milk of cows abates about wheat bloſſoming time is, becauſe about that time the graſs of the field bloſſoms alſo, and the fluſh of the ſap is come to its height and maturity, and then abates, for the roots of the graſs at that time begin to harden and grow dry; nor do they take in the juices of the earth ſo freely as they did before, and therefore grow drier and drier, till the ſeed is hardened. The ſeed being thus brought to maturity, the roots of the graſs for ſome time, till the cold of the winter checks them, ſtrike freſh ſap roots, or buds, preparative to the enſuing ſpring, and which will the next year be the ſpring roots and increaſe. On theſe new efforts the ſtart of the autumn graſs depends, till the cold checks it. This graſs is called the aftermath, and upon the growth of this the cows milk depends.

It has been obſerved, that the milk of the hill-country cows do not yield the ſame proportion of cream, as that of the vale cows; owing, in all probability, to the poverty of the hill-country cows, which are generally poor in caſe.

Thunder will break the cream, and turn the milk in the milk-pans, ſo that no cream can be ſkimmed off for butter; nor will the cheeſe-curd hold together, but will break aſunder.

It is commonly ſaid, that a quart of cream will make a pound of butter; but this muſt be underſtood of cream, that hath ſtood two or three days to ſettle, for three pints of cream juſt ſkimmed from the milk will, in three days, be reduced to nearly a quart. If you bring in the milk and ſtrain it immediately into the pans, without letting it firſt ſtand to cool, the cream produced by it will be much leſs, than it would have been, if the milk had been ſuffered to ſtand and cool before ſtraining.

In ſome parts of Dorſetſhire they ſet the milk over the fire in braſs pans to warm, which makes the cream riſe, and when a bladdle is formed in the middle, they take the pans from the fire, ſkim off the cream, and put it into a tub. After this the dairy-maid, by only putting her hand, and ſtirring it about in the tub, brings it preſently to butter, without the help of a churn. The butter made by this method is very rich, but the cheeſe made from the ſkim-milk very poor. *See the article* CHEESE.

The hill-country farms are not ſo well adapted to a dairy as thoſe in the vale; becauſe the foddering ſeaſon in the former holds ſo much longer, occaſioned by the rowet-graſs falling of a month ſooner, and the ſpring-graſs coming a month later than in the vale. *Liſle's Huſbandry, vol.* II. *p.* 139.

A correſpondent of the editors of the Muſeum Ruſticum has given the following account of the profits of a dairy kept on twenty acres of land, which he ſuppoſes to be an addition to a farm, not one by itſelf. Nothing therefore is allowed for the feed which the cattle may accidentally have on the arable land, or turnips, which they may expend in the winter.

EXPERIMENT, 1763.

Food, Produce, and Expences of a DAIRY *of four Cows in a Year.*

Their food, four ſmall paſtures, amounting to ſixteen acres, or thereabouts. Two of them I fed in the ſpring, rather late before I ſhut them up for hay: another, of ſix acres, the cows had to themſelves till the others were mown; and then I ſhut that up for a rowen (aftermath) crop of hay, cutting it the twentieth of Auguſt.

Therefore they had firſt that of ſix acres, another of two acres, which is common for all my cattle, being never mown; next a five acre piece, after the hay was cleared from it, and then the other field of three acres: beſides which, they ran four days in my clover, till finding the butter taſted, I took them out.

It will appear alſo by the following account, that they eat in winter one ton and ſeven hundred weight of hay, and two loads and a half of ſtraw bought for them, beſides their ſhare of ſome which grew on my farm, the whole of which (ſoft corn ſtraw) amounted only to five acres of oats for them and four horſes too; the chief of my lands lying that year fallow.

EXPENCES.

		l.	s.	d.
1763. April 27.	For two hundred weight of hay	0	5	0
Auguſt 8.	Twenty-five ditto	1	17	6
Nov. 30.	A load of ſtraw	0	14	0
Dec. 30.	Half a ditto	0	5	0
1764. Feb. 15.	Ditto	0	3	0
Feb. 20.	A load ditto	0	11	0
Sundry expences, viz. pans broke in dairy, cheeſe-cloths, bruſhes, brooms, ſalt, &c. came exactly to		0	10	10
		4	6	4

In the above account is included nothing for firing, which coſt me very little, as the ſmall buſh-faggots, which I grub up on borders of fields to clear them for the graſs to grow, completely ſerved my dairy this year: theſe are difficult of ſale, fetch but little, and muſt be rooted up if no cows are kept.

The cook in the family managed as dairy-maid: there are in this reſpect great diſadvantages in only keeping four cows, if a dairy-maid is alſo kept to attend them; for ſhe may manage (and they do in this neighbourhood more, in proportion) eight or ten cows, as well as four, which alters the proportion of the expence greatly; and in firing it is but a ſmall addition of wood to the addition of four or five cows.

PRODUCE.

				l.	s.	d.
Butter, milk, and cream, uſed in the family; the butter ſixpence per pound, the cream ſixpence per pint, the milk one halfpenny per pint (the market prices)				9	4	8
Seven hundred and ſixty pounds of cheeſe, ſold at two-pence halfpenny per pound				7	8	6
The value of two yearlings, kept for ſtock (valued by a farmer, who offered to take them at the price)	3	10	0			
Two ſucking calves, ſold at	0	15	6			
				4	5	6
				20	18	8
Deduct expences				4	6	4
Profit, four pounds three ſhillings per cow,				16	12	4

EXPERIMENT, 1764.

Food, *Produce*, &c. *of four Cows a Year.*

Paſtures the ſame as the laſt year. Turned them into an acre of the five acre field the ſixteenth of May, beſides which, they had three acres to themſelves. Mowed this year the ſix acres, and the remaining four of the five acres. No clover.

EXPENCES.

1764,		l.	s.	d.
April 26, and May 8.	Cloths, pans, bruſhes, ſalt, &c.	0	8	10
	Faggots for firing	1	10	0
	Eighteen hundred weight of hay	2	5	0
	Half a load of ſtraw	0	6	0
May 6.	Four hundred weight of hay	0	10	0
July 1, and Auguſt 6.	Salt, cloth, lead, mending brooms &c.	0	5	10½
October 10.	For ſundries	0	9	2
		5	14	10½

The fire-wood was moſt of it this year bruſh-faggots out of a wood, and but few of the ſmall buſh-faggots: I am therefore enabled better to calculate their value. Beſides the ſtraw bought, they had what was to ſpare of my farm.

PRODUCE.

1764,					l.	s.	d.
June 14.	Three calves, ſold to the butcher				3	6	0
Aug. 18.	Seven pounds and a half of butter				0	3	9
Nov. 1.	For two hundred and thirty-eight pounds of butter made to October 22				6	4	9½
	For four hundred and ſeventy-three pounds of cheeſe, at two-pence halfpenny per pound, made to the end of Auguſt				4	18	6½
	For milk and cream to October 22				1	11	6
March 1.	For eighty-two pounds of butter from October 22, to January 17				2	8	0
	For milk and cream to February 14				0	10	6
	For two hundred and thirty-ſix pounds of cheeſe, eighty at two-pence halfpenny, and one hundred and fifty-ſix at two-pence per pound				2	2	8
	Sold two heifers, the laſt year's yearlings, for	7	0	0			
	Valued, &c. at then	4	5	6			
					2	14	6
					24	0	6
Expences					5	14	10½
Profit, four pounds eleven ſhillings per cow					18	5	7½

There are ſome very material obſervations to be made on this account. Is four pounds three ſhillings the value of a cow's feed a twelvemonth? Surely not. Two ſteers, or heifers, may be kept and fatted in the place of one cow: theſe will undoubtedly pay better.

I am aware of the objection, that a dairy is never ſuppoſed to anſwer well without a good dairy-wife to do all the buſineſs of it. This certainly makes a material alteration: but four pounds a cow is, in this neighbourhood, thought pretty near the profit of one, at leaſt as farmers wives own. Yet it muſt be evident, if there was no farther conſideration, a dairy muſt be attended with conſtant loſs: this conſideration is the advantage derived from the hogs, which evidently compoſes the whole profit of a dairy.

I am not yet able, from experiments, to aſſert how many hogs may be kept on a given number of acres without the aid of a dairy: this is neceſſary to be known before the exact profit of cows can be aſcertained. The ſpring litters ſtand greatly in need of the milk and whey, which is then coming on; ſo that few, I doubt, could be bred at that time of the year without them.

I ſhall, every year, make all the obſervations I can on the feeding of them, to be able to judge better for the future.

I ſpeak from experience, and know well that grazing, were it not for the hogs, would be more profitable than four pounds per cow.

I come now to ſpeak of my hogs; and in this point, like the laſt, I ſhall quote a page or two from my manuſcript regiſter of experiments.

EXPERIMENTS, 1763.

Food and Produce of a Sow, and the Pigs bred by her, in a Year.

She pigged in April ſeven pigs, and in October eleven.

EXPENCES.

1763,		l.	s.	d.
Nov. 18.	For two coomb of drains	0	1	4
	Cutting a litter	0	1	6
Dec. 8, and Jan. 21.	Ten coomb of peaſe	5	1	0
	Expences on ditto	0	1	0
	For ten buſhels of barley	1	0	0
Feb. 17 and 25.	Expences in ſelling	0	11	6
	For nine coomb of drains and expences	0	7	6
	For two coomb and two buſhels of peaſe	1	6	3
March 12.	Drains	0	1	6
		8	11	7

PRO-

PRODUCE.

		l.	s.	d.
Oct. 30.	A ſucking pig	0	2	3
	A fat roaſting hog	1	9	0
	A fat hog, one hundred and ten pounds weight	1	12	9
Feb. 17.	Ditto, one hundred and ſixteen pounds weight, at four ſhillings and ten-pence per ſtone	2	0	0
	Heads, &c.	0	5	3
Feb. 22.	Three fat hogs ſold alive	6	7	0
	One ditto, at four ſhillings and ten-pence per ſtone	2	0	0
	Ten live pigs, carried to next year's account, valued at	4	16	6
		18	12	9
	Expences	8	11	7
	Profit	10	1	2

The dairy this year was four cows: all the whey and ſlet milk was thrown into the hogs ciſtern, together with the diſh-waſh and offal of the kitchen, and the drains of about twenty coomb of malt uſed in the family, beſides which, thirteen coomb more I bought for them: all this compoſed their common waſh while lean: for three months in the ſummer, the ſow and the ſeven pigs ran in my clover. Theſe articles, beſides common graſs, (on which, by the bye, they feed as well as ſheep) were all their lean food.

Now, from the above account muſt be deducted the value of the clover-feed, as that certainly was not from graſs-ground, and may be eſtimated. Such deductions I have no objection to, as we may come near the mark in valuing: my calculation, however, does not require them, as the twenty acres were to have been an addition to a farm, not one by itſelf.

	l.	s.	d.
Seven hogs, at fourteen-pence per week, for three months, come to	0	14	0
Thirteen coomb of drains	0	10	4
	1	4	4

But let theſe two articles be ſtated at two pounds one ſhilling and two-pence; the propriety of the ſums mentioned in my calculation for the profit of a ſow will not be impeached thereby.

EXPERIMENT, 1764.

Food, Produce, &c. of Hogs a Year, maintained by a DAIRY *of four Cows.*

The old ſow pigged in April, eleven, and again in November, twelve; the young one ſeven, in January, 1765.

EXPENCES.

1764,		l.	s.	d.
	Ten pigs, from laſt year's account, to be reckoned here	4	16	6
May 6.	For eighteen coomb of drains	0	13	2
19.	For two coomb of ſhorts	0	4	0
	For ſeven coomb and two buſhels of drains	0	5	6
19.	For a young ſow and boar	1	4	0
28.	For eighteen coom of drains	0	12	8
July 2.	For two buſhels of ſhorts	0	1	0
19.	For four coomb ditto	0	8	0
Aug. 23.	Expences in ſelling	0	5	0
	For two buſhels of oats	0	4	0
Oct. 12.	For five coomb of drains	0	2	11
	Sundry expences	0	1	6
Nov. 1.	For one coomb of ſhorts	0	2	0
13.	For two buſhels ditto	0	1	0
	Expences in ſelling	0	3	5
24.	For one coom of ſhorts	0	2	0
Dec. 17.	For one buſhel ditto	0	0	5
		9	7	1

1764,	Brought over	9	7	1
Dec. 22.	For three buſhels ditto	0	4	6
28.	For tail barley	0	14	3
29.	Grinding ditto	0	0	6
Jan. 3.	For bran	0	1	6
	Cutting pigs	0	1	6
8.	For ſixteen coomb of drains	0	10	8
12.	Grinding barley	0	1	0
30.	Six coomb of drains	0	4	0
25.	For ſix buſhels of barley	0	14	3
Feb. 1.	Grinding	0	1	3
22.	For two coomb of ſhorts	0	4	8
27.	For one hundred and twenty buſhels of turnips, and five buſhels of cabbages; ſay one hundred and twenty-five buſhels of turnips	0	6	0
N. B.	My crop of turnips this year produced eight buſhels per rod (their root and top cut off:) one hundred and twenty-five buſhels is therefore ſixteen rods, which, at two pounds two ſhillings per acre, the price this year comes to four ſhillings; but I have ſaid ſix ſhillings.			
27.	A man boiling turnips	0	0	9
	For five buſhels of coals, at three times	0	5	5
March 2.	For ten coomb of drains	0	6	8
	Expences	0	0	6
	For one coomb of ſhorts	0	2	4
6.	Ditto	0	2	2
8.	A man boiling	0	1	0
	Coals	0	2	0
		13	12	2
	Three months feed in clover	0	12	0
		14	4	2

PRODUCE.

Aug. 22.	Sold eleven pigs, lean, for				5	15	0
Nov. 12.	Sold nine lean				13	3	0
Mar. 25.	Value of ſtock carried to next year (the old ſow excepted) viz. the young ſow (one of the ten) with ſix pigs	2	12	6			
	Twelve pigs	5	8	0			
	A little ſow with pig, (bought May 19.)	1	5	0			
	The boar	1	1	0			
					10	6	6
					28	4	6
	Expences				14	4	0
	Profit				14	0	6

Before I make any obſervations on this account, I ſhall explain the price I charge for clover-ſeed.

I am enabled to do it very clearly this year, as I had none of my own, but hired a field of two acres and three rood, at one pound thirteen ſhillings per acre, from May to Michaelmas. I hired it purpoſely for my horſes, but kept the ten hogs in it for three months.

The price of the clover was four pounds ten ſhillings and ſixpence. The cattle it fed were

Five horſes, three months;
Ten hogs, three months;
Thirty-eight ſheep and lambs, one month;
Two heifers, two months.

The common price of joiſting a horſe is one ſhilling and ſixpence per week in clover; but that I may raiſe the price for the hogs, I will reckon the reſt of the cattle as low as poſſible.

	l.	s.	d.
Five horſes, ſay at three ſhillings and ſixpence per week, for three months	2	2	0
Thirty-eight ſheep and lambs, at two-pence per couple, for one month	1	5	4
Two heifers, at three-pence per week each, for two months	0	8	0
The hogs	0	12	0
	4	7	4

This comes as near the truth as any calculation I can make; and I can every year, by hiring clover, keep my hogs as cheap as this, without any aſſiſtance from arable land of my own. *Muſeum Ruſticum, vol.* IV. *p.* 274.

In a later number of the above work, another correſpondent makes the following remarks.

	l.	*s.*	*d.*
Eleven acres and a half, at fifteen ſhillings per acre, is - - - - - - - - -	8	12	6
Eight acres and a half of after-graſs, at ſeven ſhillings and ſixpence per acre, for the remainder of the year after being mowed -	3	3	9
	11	16	3
Deduct for the ewes winter-feed, (for ſeventeen, the average in the nine years) at four ſhillings per head - - - - - - -	3	8	0
To be charged to the annual expence of four cows - - - - - - - - - - - -	8	8	3
Expences attending the winter-feed of the ſaid four cows, as it does not appear any part thereof grew on the twenty acres; the average of two years is - - - -	5	0	7¼
One year's expence attending four cows, per his own accounts - - - - - - -	13	8	10¼
The produce, per ſame accounts, on an average of two years, (making the proper allowance, and three-pence wrong in adding up) is - - - - - - - - - -	22	12	2½
Nett profit on four cows for one year, by his own account - - - - - - -	9	3	4¼
Thus it appears, admitting his accounts of expences to be for two years. But notwithſtanding the appearance theſe two ſums of four pounds ſix ſhillings and fourpence, and five pounds fourteen ſhillings and ten-pence halfpenny, have of being the expence attending four cows two winters, yet I think, that from April, 1763, to May 6, 1764, includes but one; and in which time it may be reaſonable to apprehend the hay and ſtraw therein mentioned were conſumed for fodder, (except the two hundred weight of hay in the firſt *item*, which, it is very probable, completed the feed of the preceding winter) as it does not appear any remained in ſtock; and that the one pound ten ſhillings, charged for firing, was alſo uſed in that time: therefore, if the firſt article of eight pounds ten ſhillings, and the two laſt, amounting to fifteen ſhillings and one halfpenny, in the expences of 1764, be rejected, all the others, which are divided into two experiments, may very juſtly be looked on to be but one year's expence, and amount to - - - - - - - -	8	12	4
Which being added to the rent - - -	8	8	3
Makes the expence attending four cows one year, excluſive of labour - - - - -	17	0	7
Deduct this from the average produce on two years, amounting to - - - - -	22	12	2½
Nett profit on four cows for one year is -	5	11	7½

which is one pound ſix ſhillings and ſeven-pence three farthings per cow per annum, the whey and butter-milk excepted, which, from a cow, can be no great quantity; for, in the account of produce, I obſerve, that the cheeſe, in the year 1763, was ſold for two-pence halfpenny per pound, and in 1764, for two-pence halfpenny, and ſome for two-pence per pound, a price in thoſe years (the ſcarcity of the article conſidered) which indicates it to be not of the beſt ſort, but what is with us called cowherd-milk cheeſe, that is, the night's milk ſkimmed (flected), and the morning's milk freſh from the cow, mixed together, and from which method nothing could be for the pigs from it but whey, and what butter-milk came from the cream of half the milk, which amounts to very little from four cows only; therefore the profits ariſing from pigs ſeem evidently to be from ſomething elſe beſide the paſture-land only, as neither grains (drains) peaſe, barley, gurgins (ſhorts) bran, oats, turnips, cabbages, or clover, grew thereon, and all of which, it appears from the accounts, were made uſe of in feeding the pigs. *Muſeum Ruſticum, vol.* IV. *page* 400.

DAISY, the greater, or *ox-eye*, by ſome called *maudlin-wort*, is the name of a perennial weed common in paſtures. The leaves are jagged, and embrace the ſtalk. The flowers are large, and radiated. The ray is white, and the diſh yellow: the ſeeds have no down.

DALLOP, a tuft, or clump.

DAM, a mole, or bank to confine water.

DAMSON, a ſmall black plum, brought originally from Damaſcus; whence the name.

DANDELION, the name of a very troubleſome and well-known weed in the meadows; and which will ſpread greatly, if the flowers are ſuffered to perfect their ſeeds, which are light, downy, and of courſe eaſily blown about by the wind.

DANEWORK, a name given in ſome counties to that ſpecies of elder, generally called dwarf-elder, or wall-wort.

DANK, damp, humid, moiſt, wet.

DAPPLE, marked with various colours.

DARNEL *See* COCKLE.

Annual DARNEL-GRASS, called *white darnel* by Gerrard, and in the ſouthern counties *crap*. This plant is ſo much like the *red darnel-graſs*, that it has been greatly cultivated under the name of *ray-graſs*, or vulgarly *rie-graſs*; but the ſpike is much longer and paler; and has beards, which the ray-graſs is entirely without. It is likewiſe annual; whereas the ray-graſs has an abiding root. Its ſeeds ripen with the corn. *See* Plate VII. Fig. 1.

DAWN, the time when the light of the morning firſt appears.

DAY-BREAK, the dawn, the firſt appearance of light.

DAY-WORK, work impoſed by the day. Day-labour.

DEARTH, ſcarcity; a time when food is dear.

DEATH-WATCH, the name of an inſect that makes a ticking noiſe, ſuperſtitiouſly imagined to prognoſticate death.

DECEMBER, the laſt month of the year.

The earth is now commonly locked up under its frozen coat, ſo that the huſbandman has leiſure to ſit and ſpend what ſtore he has before-hand provided.

Now is the time to houſe old cattle, and to fell all ſorts of timber, and other trees, for building, or utenſils; to cut coppices, &c.

Let horſes blood, fatten ſwine, and kill them. Deſtroy ant-hills.

Plough up your land that you deſign for beans, provided it be not frozen too hard; drain corn fields, where the water ſtagnates, and overflow, or water your meadows.

Put your ſheep and ſwine to the peaſe-rick, and fatten them for the market. Cut hedges, and lop trees. *Mortimer's Huſbandry, vol.* II. *p.* 448.

DECIDUOUS, falling, not perennial: an epithet applied to ſuch trees and ſhrubs as ſhed their leaves in the autumn. Thus the oak, the elm, the beech, &c. are called deciduous trees.

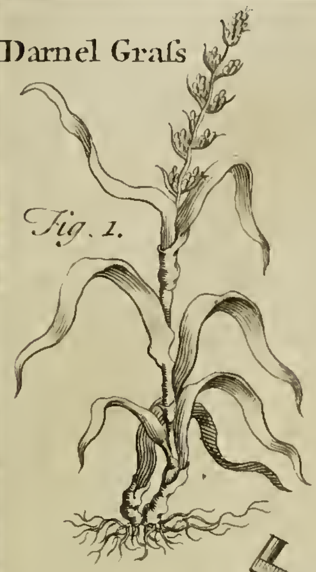
DECLIVITY, inclination or declivity, reckoned downwards; gradual deſcent.

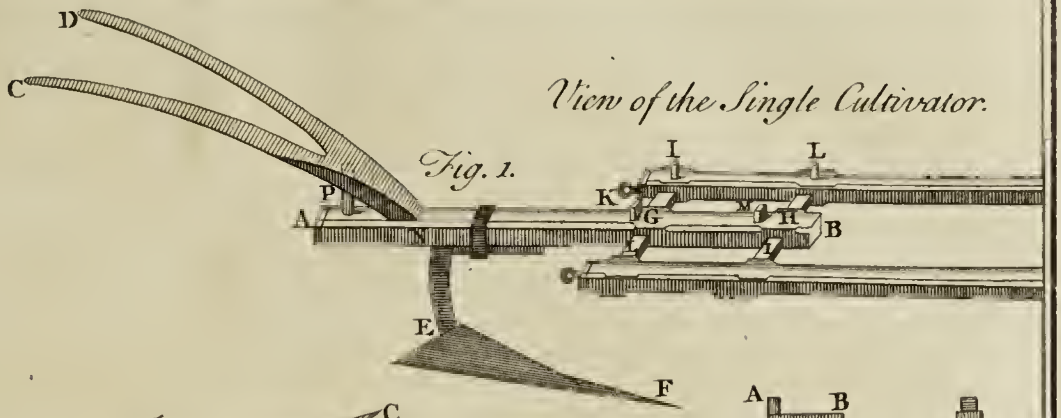
DEFICATION, the act of purifying any liquor from its lees or foulneſs.

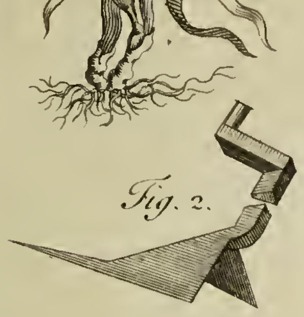
DELVING, digging, or the act of turning up the earth with a ſpade.

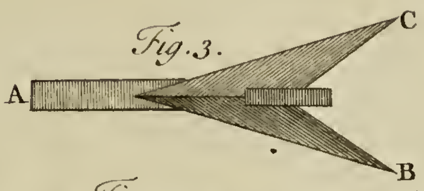
DEMAIN, or *demeſne*, the land which a man holds originally of himſelf. It is alſo ſometimes uſed as a diſtinction between thoſe lands which the lord of the manor hath in his own hands, or in the hands of his leſſee, and ſuch other lands appertaining to the ſaid manor, as belong to free or copy-holders.

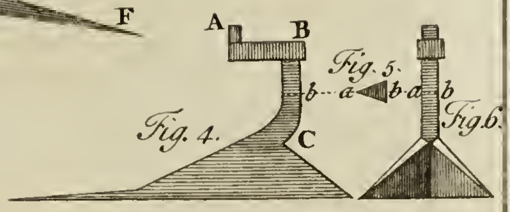
PLATE. VII. *Facing* Darnel Graſs.

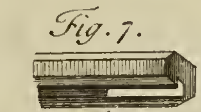


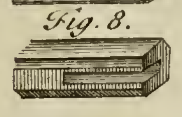


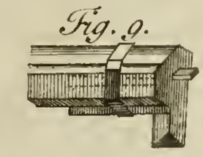


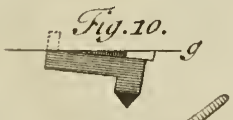


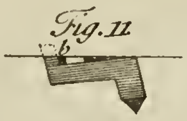


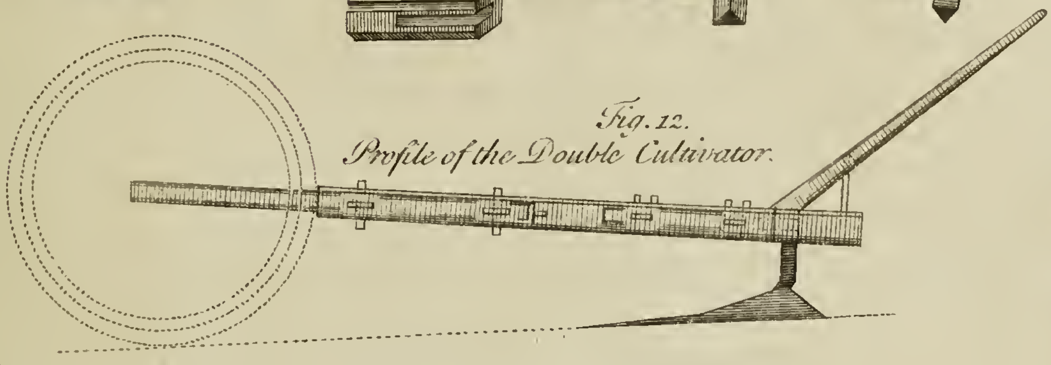


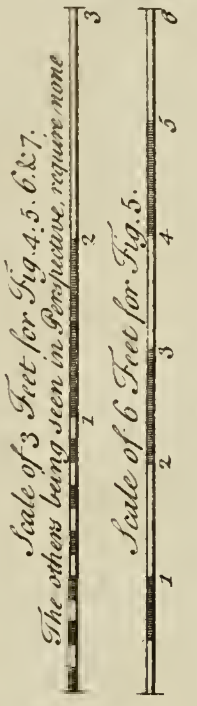


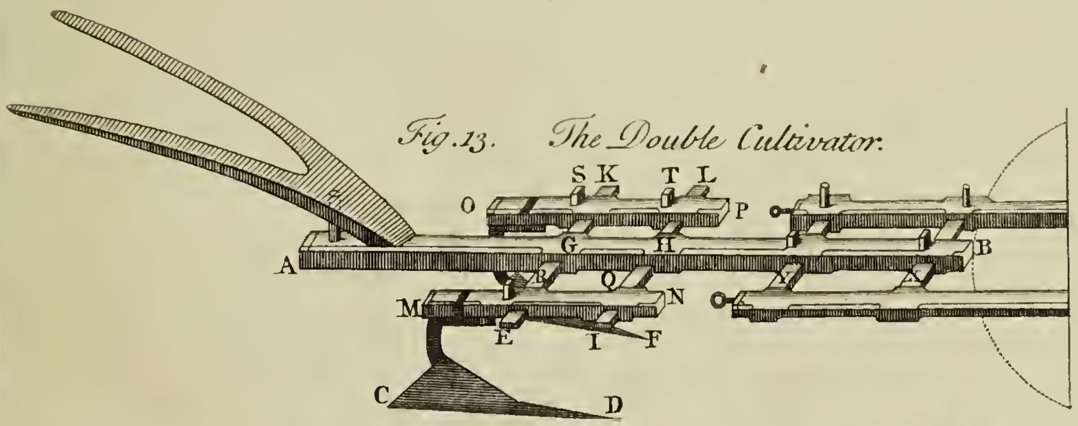


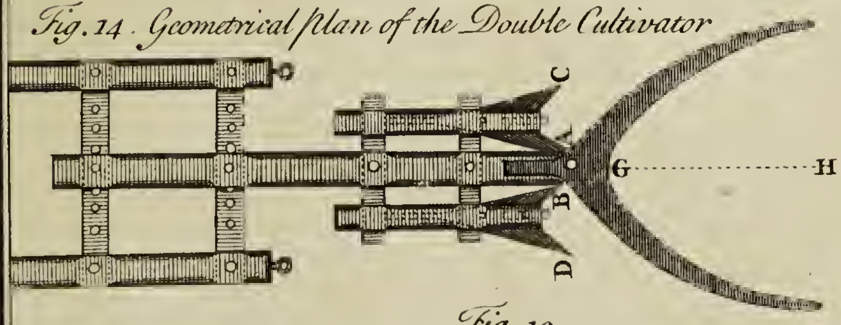


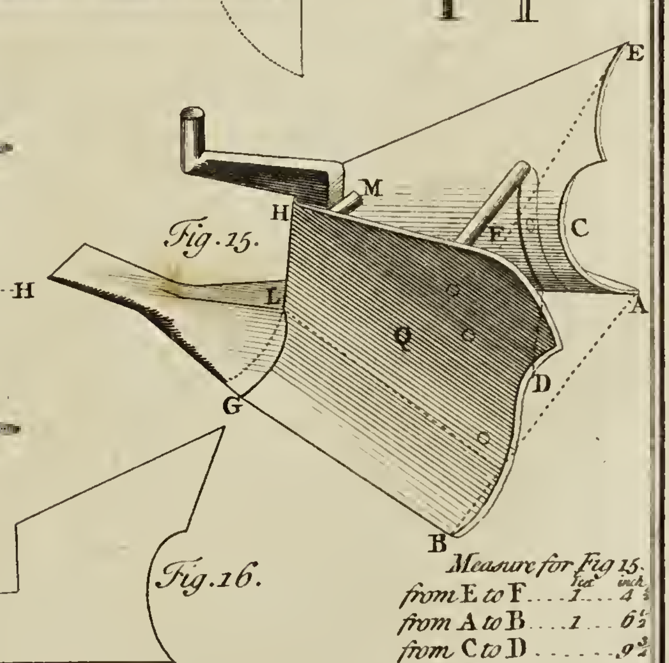





Scale of 3 Feet for Fig. 4.5.6.&7.
The others being seen in Perspective, require none
Scale of 6 Feet for Fig. 5.
1
2
3
4
5
6

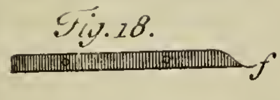


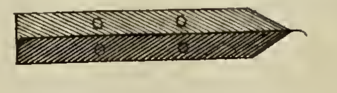


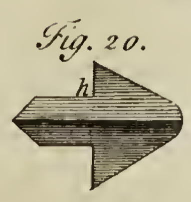


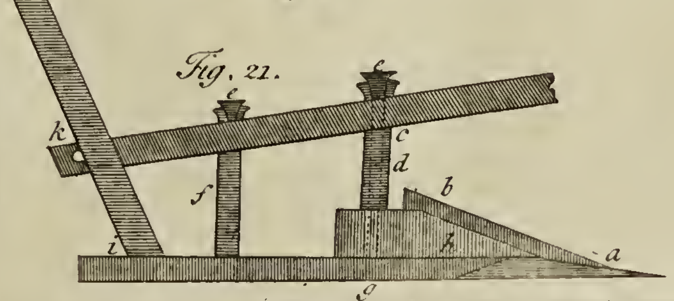
Measure for Fig 15.

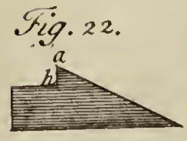
	feet	inch.
from E to F	1	4½
from A to B	1	6½
from C to D		9¾
from F to B		11
from G to H		9¾
from F to H		7

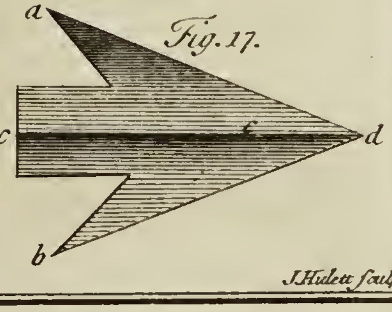












J. Hulett sculp.

DENSHIRING. *See the article* Burn-Baking.

DEVIL *in a buſh*, or *fennel-flower*, a very troubleſome weed among the corn, eſpecially in Italy, France, and Germany, where it abounds much more than in this country. It riſes with ſlender ſtalks, near a foot high, which ſometimes branch out at the bottom, and ſometimes are ſingle, garniſhed with a few very fine cut leaves, ſomewhat like thoſe of dill. Its flower is generally blue, and its ſeeds are rough and black. This, together with their being nearly of the ſame ſize as the grains of wheat, renders it difficult to ſeparate them from the corn, when the plant has been cut and houſed with it; they blacken the meal, and debaſe its value. The plant is annual, and therefore may be extirpated by rooting it out before it can ſeed, which is commonly in Auguſt.

DEVIL's-BIT, the name of a weed often found among the corn, but more frequently in meadows. It has a ſtrong, thick, fibrous, perennial root, which runs deep into the ground, and ſends out ſeveral branching ſtalks, which riſe near three feet high. The lower leaves are ſometimes almoſt entire, and at others they are cut into many ſegments almoſt to the mid-rib: they are ſeven or eight inches long, and from three to four broad in the middle, hairy, and ſit cloſe to the root. The ſtalks are covered with ſtiff, prickly hairs, and garniſhed with ſmaller leaves at each joint. The flowers, which are of a pale purple colour, and have a faint odour, appear in June, upon naked foot-ſtalks at the end of the branches, which decay to the root every autumn.

DEVIL's-GUTS, the ſame with the leſſer bindweed. *See the article* Bind-Weed.

DEVONSHIRING. *See the article* Burn-Baking.

DEW, the moiſture perceived on the ground, and on the leaves of plants, blades of graſs, &c. in the morning.

Thoſe who have made no other reflections on dew than ſuch as preſent themſelves naturally, think that all the moiſture one finds in the morning on plants and upon the ground, comes in reality from above; but, when the affair is examined with more attention, one ſees that at leaſt a great part of the dew ariſes from the earth itſelf and the plants, and keeps hanging to their ſurface. Mr. Gerſten, who hath made a diſſertation on this ſubject in particular, hath even thought that there fell no dew from above on the ground, and that all which we ſee under the form of dew aroſe from the earth or plants, on which it keeps hanging in pearls, till the heat of the day hath diſperſed it.

This opinion of Mr. Gerſten was not new, and we find, in the Hiſtory of the Academy for 1687, that ſome perſons of the company had advanced, that the dew roſe from the earth, and did not deſcend from above, becauſe they found under glaſs-bells as much dew as in other places expoſed to the air: it is probable, that ſince that time ſeveral perſons have been of the ſame ſentiment; one finds even traces of it in ancient authors: but Mr. Gerſten did not derive his notion from thence; he had given, in the work which we have cited, a new explication of the riſings and fallings of the barometer that did not agree with the deſcent of dew; this made him think of examining the thing with more attention than had hitherto been done. He had already obſerved in gardens that the graſs was full of a moiſture in the evening, and covered with very perceptible little drops, whilſt the leaves of trees, and plants that were more raiſed from the ground, had not the leaſt appearance of it; he remarked moreover, that all the plants had it not equally, that on ſome it was very abundant, whilſt he could ſcarce perceive it on others.

We ſhall not relate a great number of experiments that were made by Mr. Greſten, although ſome of them are extremely curious; but the reader will ſee by thoſe which we ſhall give an account of afterwards, that it was neceſſary, in order to draw certain and exact conſequences, to have a knowledge of ſeveral facts, the diſcovery of which was reſerved for Mr. Muſſchenbroek; who after having verified the greateſt part of Mr. Gerſten's experiments, at firſt ſubmitted himſelf to his opinion, but he hath ſince changed, and is fixed in acknowledging ſeveral ſorts of dews, of which one more denſe than all the others riſes from lakes, rivers, and marſhes.

And a third falls from above: Mr. Muſſchenbroek founds the exiſtence of this laſt on a great number of experiments, which he hath made upon the leaden terras of the obſervatory at Utrecht; it was not poſſible that any vapour ſhould riſe from this terras of lead, yet ſeveral bodies which he expoſed there received dew on their upper ſurface; from whence Mr. Muſſchenbroek concludes that there is really a dew that falls.

" Several obſervations and experiments repeated very often, and which always proved uniform, leave no longer any doubt with me concerning the nature of dew, at leaſt with regard to its riſing or falling; and I think one may be ſatisfied that it riſes only from the earth and plants; that this moiſture, or this vapour, conſiſts of an infinite number of little aqueous globules extremely light with which the air is loaded, and which it carries with it whitherſoever it is driven by its fluctuating motion: thus the bodies which are met by this aqueous vapour, receive it in all the parts of their ſurface, and are immerſed all at once. In the experiments of Mr. Muſſchenbroek where bodies expoſed on the leaden terras received dew on their upper ſurface, it is true, the moiſture did not come from the terras, but it roſe from the earth, and from the plants round about; it came ſucceſſively, and by the vehicle of air to the terras of lead; it was afterwards diffuſed through all the air that was above this terras, and faſtened to the bodies which were expoſed to receive it: if Mr. Muſſchenbroek had attended to the time when the dew began to be perceived on the terras, he would have remarked, that it was ſenſible a long time before at the foot of the tower, on whoſe ſummit he made the obſervation; I even doubt not but, if he had raiſed a mirrour or piece of glaſs to ſix feet above the leaden terras, he would have found drops of dew attached to the inferior ſurface of the glaſs, as ſoon and in as great quantities as on the ſuperior ſurface: this I cannot doubt of from experiments I have made along the different heights of the ſteps of a ladder. I placed two ladders oppoſite each other, joined at their tops, ſpreading wide aſunder at their bottoms, and ſo high as to reach thirty-two feet. To the ſeveral ſteps of theſe I faſtened large ſquares of glaſs, and ſet them in ſuch a manner that they ſhould not ſhade or hang over one another. It was plain that, if the dew deſcended without firſt riſing, the top ſquares muſt be firſt wetted, and that on their upper ſurface; but on the contrary, if the dew firſt aſcended from the earth, the bottom ſurfaces of the lower panes muſt firſt receive it: and thus in fact it happened; the lower ſurface of the loweſt piece of glaſs was firſt wetted, then its upper ſurface; then the lower ſurface of the pane next above it, and ſo on gradually till the whole was wetted to the top of the ladders.

" But, in order to aſſure myſelf more certainly, and leave no room for doubt on this ſubject, I have lately repeated the ſame experiments at Paris upon a leaden terras. I ſuſpended a glaſs upon a wooden frame, raiſed only two feet, and I conſtantly found drops of dew pretty nearly in equal quantity on the under ſide as on the upper ſide of the glaſs; which is different from the former experiments that were made in the country, where the inferior ſurface was always ſooner and more abundantly moiſtened than the ſuperior; but the reaſon of this difference is very evident, for in the country the aqueous vapours roſe directly from the earth, and faſtened themſelves to the under ſurface of the glaſs; but it is not ſo on a terras of lead, and ſurrounded by lofty buildings: in this caſe, the air that is loaded with moiſt vapours cannot arrive thither but by long windings, and a very irregular fluctuation; ſo that there is no more reaſon why it ſhould faſten itſelf to the under than to the upper ſide of the glaſs; or, in other words, the vapour doth not riſe there perpendicularly as in the country, but is driven in a lateral direction.

" Notwithſtanding all I have been ſaying, I do not pretend that there is but one kind of dew, and deny not but there may be a dew whoſe parts are groſs enough, and have ſufficient weight to fall to the ground; yet I think in that caſe it would be viſible, and form what we know by the name of fog: but our inquiry is at preſent of that kind of dew, ſo ſtiled by all, which is imperceptible to the eyes, and becomes ſenſible only by wetting thoſe bodies that are expoſed to the air in the night." *Mem. Acad. Roy. Sciences.*

The reverend Dr. Hales, in his treatiſe of Vegetable Statics, tells us, that in order to find out the quantity of dew that fell in the night, on the 15th of Auguſt, at 7. p. m. he took two glazed earthen pans, which were three inches deep, and twelve inches diameter in ſurface; that he filled them with pretty moiſt earth, taken from off the ſurface of the ground, and they increaſed in weight by the night's dew 180 grains; and decreaſed in weight by the evaporation of the day one ounce $+$ 282 grains.

He ſays likewiſe, he ſet theſe in other broader pans to prevent any moiſture from the earth ſticking to the bottom of them. He adds, the moiſter the earth is, the more dew falls on it in a night, and more than a double quantity of dew falls on a ſurface of water than there does on an equal ſurface of moiſt earth: the evaporation of a ſurface of water in nine hours winter's dry day, is $\frac{1}{21}$ of an inch: the evaporation of a ſurface of ice, ſet in the ſhade during a nine hours day, was $\frac{1}{41}$. So here are 540 grains more evaporated from the earth every twenty-four hours in ſummer, than fall in dew in the night; that is, in twenty-one days near twenty-ſix ounces from a circular area of a foot diameter; and circles being as the ſquares of their diameters, ten pounds $+$ two ounces will in twenty-one days be evaporated from the hemiſphere of thirty inches diameter, which the ſunflower's root occupies; which, with the twenty-nine pounds drawn off by the plant in the ſame time, makes thirty-nine pounds, that is, nine pounds and three-fourths out of every cubic foot of earth, the plant's roots occupying more than four cubic feet: but this is a much greater degree of dryneſs than the ſurface of the earth ever ſuffers for fifteen inches deep, even in the drieſt ſeaſons in this country.

In a long dry ſeaſon therefore, eſpecially between the tropics, we muſt have recourſe, for ſufficient moiſture to keep plants and trees alive, to the moiſt ſtrata of earth, which lie next below that in which the roots are.

Now, moiſt bodies always communicate of their moiſture to more dry adjoining bodies; but this ſlow motion of the aſcent of moiſture is much accelerated by the ſun's heat to conſiderable depths in the earth, as is probable, he ſays, from the twentieth experiment in the ſaid book.

Now, 180 grains of dew falling in one night, on a circle of a foot diameter $=$ 113 ſquare inches; theſe 180 grains being equally ſpread on this ſurface, its depth will be $\frac{1}{159}$ part of an inch $= \frac{180}{113 + 254}$. He adds, that he found the dew in a winter's night to be the $\frac{1}{90}$ part of an inch; ſo that if we allow 151 nights for the extent of the ſummer's dew, it will in that time ariſe to one inch deep: and, reckoning the remaining 214 nights for the extent of the winter's dew, it will produce two, thirty-nine inches deep; which makes the dew of the whole year amount to three, thirty-nine inches deep.

And the quantity which evaporated in a fair ſummer's day from the ſame ſurface, being as one ounce 282 grains, gives $\frac{1}{40}$ part of an inch deep for evaporation, which is four times as much as fell at night.

He ſays likewiſe, that he found, by the ſame means, the evaporation of a winter's day to be nearly the ſame as in a ſummer's day; for, the earth being in winter more ſaturated with moiſture, that exceſs of moiſture anſwers to the exceſſive heat in ſummer.

It is very certain, that ſubſtances of a very different kind from the uſual and natural matter of the dew, have ſometimes fallen in that form. Our Philoſophical Tranſactions give an account, that, in the year 1695, there fell in Ireland, in ſeveral parts of the provinces of Leinſter and Munſter, for a conſiderable part of the winter and ſpring, a fatty ſubſtance reſembling butter, inſtead of the common dew; it was of a clammy texture and dark-yellow colour; and was, from its great reſemblance, generally called dew-butter by the country people. It always fell in the night, and chiefly in the mooriſh low grounds, and was found hanging on the tops of the graſs, and on the thatch of the houſes of the poor people. It was ſeldom obſerved to fall twice in the ſame place, and uſually, wherever it fell, it lay a fortnight upon the ground before it changed colour, but, after that, it gradually dried up, and became black. The cattle fed in the fields where it lay, as well as in others, and received no hurt from it: it fell in pieces of the bigneſs of one's finger end, but they were diſperſed ſcatteringly about, and it had an offenſive ſmell, like that of a church-yard. There were, in the ſame places, very ſtinking fogs during the winter, and ſome people ſuppoſe this no other than a ſediment or connection of the heavier matter of thoſe fogs. It would not keep very long, but it never bred worms. The country people, willing to have ſome good of it, tried it on their children's foreheads, and it always cured them of a ſcald-head. *Phil. Tranſ.* N° 220.

For the nature and properties of dew, with regard to vegetation, *ſee the article* ATMOSPHERE.

DEWLAP, the fleſh that hangs down from the throat of oxen.

DIABETES, a morbid copiouſneſs of urine, or the making water in too great quantities. This diſorder is very common in horſes, and often terminates in death.

Horſes ſubject to a diabetes, or profuſe ſtaling, if old, or of a weak conſtitution, are ſeldom cured; they ſoon loſe their fleſh and appetite, grow feeble, their coat ſtaring, and they die rotten. Of a young horſe there are more hopes; but he muſt not be indulged with too much water, or moiſt food. At the ſame time give him the following drink:

> Take jeſuit's bark, four ounces; biſtort and tormentil-root, of each two ounces: boil them in two gallons of lime-water to the conſumption of half, and give a pint three times a day.

Let the horſe drink two or three quarts a day of lime-water; and if theſe medicines ſhould not ſucceed, give a quart of ſtrong alum-poſſet, three or four times a day.

This method is proper alſo for a horſe who ſtales blood; or the following balls may be given for that purpoſe, if the bleeding is profuſe:

> Take bole armoniac one ounce, Japan earth half an ounce, roch alum two drams, elixir of vitriol one dram; make them into a ball with conſerve of roſes, and give it every ſix hours.

As this diſorder generally proceeds from too violent exerciſe, over-ſtraining, &c. repeated bleedings in ſmall quantities are abſolutely neceſſary, till the mouths of the veſſels cloſe up. *Bartlet's Farriery, p.* 165.

DIAPHRAGM, midriff, or ſkirt, as ſome call it in a horſe or bullock, is a muſcular ſubſtance that divides the upper cavity or cheſt from the lower belly.

DIBBLE, a ſetting-ſtick, or inſtrument to make holes in the ground, for ſetting plants, &c.

DIG, a mattock. *See* MATTOCK.

DIGGING, the act of turning up the earth with a ſpade.

Was labour conſiderably cheaper in England than it is at preſent, and a ſufficient number of hands could be found, it would doubtleſs be the beſt way to dig by hand all the ground deſtined for potatoes, carrots, lucern, &c. many advantages would accrue from this method of tillage; the earth would be looſened to a greater depth, and much better pulveriſed; nor would the weeds and graſs be ſo apt to grow as in ploughed lands.

DIGITATED, branched out into diviſions like fingers.

DIKE, a ditch. It alſo ſignifies a dam or mound to hinder inundations.

DILL, the name of an herb cultivated in the kitchen-garden, and nearly reſembling fennel.

Dill muſt be ſown where it is to remain, for it will not bear tranſplanting. The ſoil ſhould be light, and the ſeeds ſown in the autumn, ſoon after they are ripe; for they ſeldom grow well if they are kept out of the ground till ſpring. When the plants are come up, they ſhould be thinned to the diſtance of eight or ten inches from each other, that they may have room to put forth their lateral branches; and if they are afterwards kept clear from weeds by good hoeing, they will not require any farther care. When their ſeeds begin to be formed, ſuch of the pods as are intended to be put into pickle for cucumbers (for that is their chief culinary uſe) ſhould be cut; and when the ſeeds of the remainder deſtined for ſowing are ripe, they ſhould be dried upon a cloth, and then beaten out. If they are ſuffered to ſow themſelves, they will produce in the ſpring a multitude of young plants, which will want no other culture than thinning them with a hoe, and keeping them free from weeds.

DINGLE, a ſmall clough or valley between two ſteep hills.

DITCH, a trench cut in the ground, uſually round the fences of a field.

The mud of ditches affords an excellent manure, as it conſiſts of the putrid particles of animals and vegetables, mixed with the fineſt and richeſt mould; and therefore proves a great improvement to any ſoil, particularly the light and dry. But this mud ſhould be expoſed to the air for ſome time, that the ſeeds of the weeds generally contained in it may have time to vegetate or putrify, before it be laid on the land.

DOCK, the name of a weed, of which there are ſeveral ſpecies, and all of them remarkable for the largeneſs of their leaves; ſo that he muſt be a very ſlovenly farmer who ſuffers any of theſe plants to grow large. They ſhould be plucked up by the roots as ſoon as they appear, which may be eaſily done, as the roots are of the tap, or carrot kind.

DOCKING, the act of cutting off the tails of horſes.

This operation is in general very ſucceſsfully executed by the common methods, which are known to every farrier. But ſometimes a miſcarriage enſues by an inflammation and gangrene ſucceeding. Theſe accidents probably ariſe from the tendons of the tail ſuffering by an injudicious application of the knife or ſearing-iron, or in an improper ſeaſon for the operation. Neither the very hot or cold months are proper, for reaſons ſufficiently obvious. The operation ſhould always be performed by inciſion, or the chopping engine: the knife being paſſed through the tail from above, whilſt it lays on the block; for when the cutting inſtrument is applied underneath, the blow is given on the tail, which, by bruiſing the tendons, may be naturally ſuſpected to occaſion bad ſymptoms. The ſearing-iron ſhould be ſmooth, and better poliſhed than thoſe generally uſed, and ought to be rubbed clean on a woollen-cloth, before it be applied to the ſtump; otherwiſe the ſparks, which fly from the iron, are apt to occaſion great pain, attended with the ſwelling both of the ſheath and fundament: nor ſhould it ever be applied flaming hot, for then it brings the burnt part away with it, and requires a re-application, in order to form a freſh eſchar on the veſſels; by which means the bone is frequently left too much expoſed, ſo that it is often a conſiderable time before it is covered.

Farriers ſeldom apply any thing to the ſtump; which need only be anointed with the wound ointment, and when the eſchar is digeſted off, may be waſhed with allum or lime-water: but if an inflammation enſues, with a diſcharge of thin matter, a proper digeſtive, compoſed of Venice-turpentine, rubbed with the yolk of an egg and tincture of myrrh, ſhould be applied, with a poultice of bread and milk over it. The rump ſhould be frequently bathed with oil of roſes and vinegar, and a large quantity of blood taken away. If the fundament be at all ſwelled, and the inflammation at all ſuſpected to be communicated to the bowels, let cooling emollient clyſters be injected two or three times a day. Should a gangrene enſue, add Ægyptiacum to your dreſſings, and ſpirits to the fomentation: and apply over all the ſtrong-beer poultice, with London treacle, twice a day. *Bartlet's Farriery, pag.* 323.

DODDED *Sheep*, ſheep without horns.

DODDER, the name of ſo remarkable a plant, that it cannot eaſily be miſtaken. It is entirely without leaves, and does not depend upon the ground for nouriſhment; but when it is grown up, rots at the bottom, and lives upon the juices of other plants about which it entwines itſelf, by means of threads of a red colour, which it throws out. The flowers are ſmall, and come out in roundiſh heads or bunches, many of them together, here and there, from the ſtem.

DODMAN, a name given in ſome of the northern counties to the ſhell-ſnail.

DODRED *Wheat*, red wheat without beards.

DOG's *Graſs*. *See* Couch-Grass.

DOKE, a deep furrow.

DOLE, or *Dool*, a long narrow green in an arable field, left unploughed.

DOLPHIN-*Fly*, the name of an inſect very deſtructive to beans. *See the article* Beans.

DOOL, the ſame with dole. *See* Dole.

DOSOME, an epithet appplied to ſuch beaſts as improve apace. Thus a thriving beaſt is called, in the northern counties, a doſome beaſt.

DRAGS, a name given in ſome counties to the heavieſt pair of ox-harrows.

DRAFFE, the grains of malt.

DRAIN, a channel, or trench, cut in the earth, in order to carry, or drain off the water. *See the articles* Bog, Marsh, and Moor.

When coarſe graſs is produced, the ground is evidently over-charged with moiſture, proceeding either from cold, hungry ſprings, loaded with ſome mineral or acid, which want vent; or elſe from external floods, which, being confined by a ſtiff clay, impervious to water, remain upon it, and corrupt the natural nouriſhment proper for producing the ſweet and richer graſſes. When this laſt is the caſe, the remedy is eaſy, by making proper drains to carry off the ſuperfluous moiſture. But if the land be ſpouty or ſpewy, as it is commonly termed, and the moiſture ariſes from ſprings, a deep drain muſt be cut in the loweſt part, and ſmaller drains from that principal ditch to ſuch places as appear to be the heads of the ſprings, which will be known by their being wetter and looſer than other parts. The drains muſt be cut deep enough to reach the bed, whether gravel or ſand, through which the water flows; and upon the firſt touching of this, the water will be found to run off more freely, and in greater quantity.

The ſmaller drains, communicating with the main ditch, ſhould be left open for ſome time, until the quantity of moiſture abate. After this, to make them covered drains, by which the ſurface is rendered level, and no part of it is loſt, they ſhould be filled up with ſmall ſtones to within about a foot and a half of the ſurface, and then covered with turf, the green ſide downward, or with heath, broom, ſtraw, or any other thing that can moſt conveniently be had, proper to keep the earth from falling in among the chinks of the ſtones, through which, if no ſuch accident happen, the water will paſs eaſily, the drains will prove effectual, and the plough, after the earth that was turned out is laid above all, will go freely over, without being oppoſed by the ſtones. A foot depth of mould over the drain will be ſufficient in paſture-grounds; but this covering ſhould be at leaſt a foot and a half thick in ploughed lands. Where ſtones are ſcarce, faggots made of the branches of any kind of trees are ſubſtituted in their place: but they do not anſwer the purpoſe ſo well, becauſe they decay and rot, the earth falls in, and the drains are ſtopped: though it is highly proper, where theſe are uſed, to line the ſides of the drains with brick or ſtone, without mortar, to keep the earth from falling in there, and at the ſame time give free admittance to the water. It muſt be obſerved, that, where a great quantity of water is to be diſcharged, the main drain into which the ſmaller drains are to empty themſelves, ſhould not by any means be filled up, even with ſtones, unleſs it be both very deep and very wide, and there be a great quantity of ſtones to throw into it, leſt it ſhould not be able to diſcharge all the water; in which caſe the whole work will prove worſe than uſeleſs; a remedy being very difficult on account of the ſtones.

The beſt time for covering theſe drains is about Michaelmas; becauſe the earth is drieſt at that ſeaſon, before the winter rains begin to fall. The digging of them is indeed very laborious work, particularly in marſhes, the ſoil of which is always of a tough, ſtrong quality. It is therefore of great importance, that every means be uſed to leſſen that fatiguing labour. The ſhovels and ſpades univerſally uſed, are certainly too ſhort. Their length ſhould be ſuch as to give the labourer every advantage ariſing from his own ſtrength. In order to have this, he ſhould ſtand as erect as poſſible: for otherwiſe, he has not only the weight of the earth on the ſpade or ſhovel to raiſe, but alſo that of his own body; whereas, if the ſhovel be of a due length, an eaſy ſhifting of the lower-moſt hand becomes a prop, or point, on which the weight at the end is raiſed, almoſt without bending the body.

Where the ground in which the ſprings are lies on a gentle declivity, Mr. Tull very properly adviſes ploughing it nearly horizontally, by which means each furrow carries off the water, which would otherwiſe ſink into the next ridge. If the clay underneath be at ſo ſmall a depth that the plough can reach it, this will have a very good effect: and as the nearly horizontal direction of the furrow gives the water but a ſlow motion, it will not be ſo apt to waſh away the richer mould, as it would if the furrows were more perpendicular to the declivity. Theſe furrows ſhould, however, have ſlope enough to give the water a current ſufficient to prevent its ſoaking into the ridge underneath.

If the ſprings riſe only at the bottom of a ſloping ground, one large drain, reaching the whole length of the declivity, and cut down to the bed of clay underneath, may be ſufficient, with the help of a channel to carry off the water.

If there is any mineral in the earth, eſpecially a chalybeate, which Dr. Home has experienced to be very prejudicial to vegetation, ſuch mineral, being waſhed out by the ſprings, is lodged in the ſoil, towards the ſurface.

DRAINING *of Land*, the operation of carrying off the water from wet lands. *See the articles* BOG, MARSH, and MOOR.

A correſpondent of the editors of the Muſeum Ruſticum has obliged the public with the following obſervations on the uſes of draining.

"The firſt experiment, ſays he, I made, was upon a piece of ground of about four or five acres, in the front of my houſe, of the ſpringy kind; where the waters, collected from the rains and dews in a large plain of dry land above, broke out upon the declivity of the hill; and not having proper drains and channels, to carry them away, had, by long overflowing, rendered the ground ſo ſoft and boggy, as not to allow the tread of any ſort of cattle, (unleſs in very ſevere froſts;) and thereby made it intirely uſeleſs, and alſo very diſagreeable to the eye. I took the opportunity of a very hard and laſting froſt, to carry on a large quantity of ſtones for making the intended drains: which were laid out in the following manner. A main drain, or trench, was made through the middle of the ground, from a ſmall rivulet (into which it was to empty itſelf), to a little above where the ſprings made their firſt appearance: from thence two drains (one on each ſide) were carried along the ſide of a hill to the two extreme parts of the ground, emptying themſelves into the head of the firſt mentioned drain, which was only made about three feet deep till near the top of it. The branches or ſide drains were better than ſix feet, as I hoped thereby to have cut off all the ſprings: but the declivity of the land being conſiderable, I was obliged to add two drains more below: as ſome of the ſprings had eſcaped under the bottoms of the higheſt branches. I made the drains in the following manner. The bottoms were flagged with a thin tender ſtone (of no other uſe;) the ſides walled with rubbiſh ſtone (the walls being about five inches aſunder, and five inches high;) and the tops covered with a ſtronger kind of rubbiſh ſtone. Upon the covers, I laid ruſhes and reeds, (the then only produce of the ground) to prevent any dirt or ſoil from getting through the openings of them into the drains; and, laſtly, I filled them up with the moſt porous ſubſtances, dug out to near the height of the ſurface.

"I began this work about the end of March, and had finiſhed it about the end of Auguſt. I very ſoon found the good effects of my labour, the ground being grown ſo hard and ſolid before the middle of October, that I was able to carry on, with carts, a very large heap of compoſt, which I had prepared ready for that purpoſe; conſiſting of freſh litter from the ſtables, virgin earth, ſtreet dirt, coal-aſhes, and lime, well incorporated together by frequent turnings. The next ſummer moſt agreeably ſurpriſed me with as fine a crop of hay, both in reſpect of quantity and quality, as any of the neighbouring grounds could boaſt, (above three loads to the acre:) and the aftermath, or ſecond crop, was full as extraordinary as the firſt. In order to know the profit of the latter exactly, I hurdled it off in ſmall parcels: and, having taken in cattle by the week, found the profit better than twenty ſhillings a ſtatute acre. This ground has kept improving ever ſince; and now affords me three crops every year; viz. ſpring paſturage for my milch-cows and early feeders, a moſt plentiful crop of good hay, and an excellent aftermath; without having had any ſuperinduction beſtowed upon it ſince the firſt, which is eleven years ago. When ſtones cannot be conveniently had, the common flat tiles for the bottoms, and the common brick for the ſides, and covers of the drains, will do very well; and, as bricks are more expeditiouſly laid than the rubbiſh-ſtones, I think they will be full as cheap, if proper clay, and fuel for burning them, can be procured upon eaſy terms. The expence of draining this piece of ground was about five pounds per acre. I have drained many acres of the ſame kind of land ſince, with equal ſucceſs; and at a much leſs expence. Another kind of land, which has fallen within my practice of draining, is what I call the ſour ſpongy land; where there is upon the ſurface a tolerable good mould, for ſix or ſeven inches deep, and below that a ſtiff clay, that will not permit any water to paſs through it; by which means, the ſoil above is ſo ſoaked and chilled, with a conſtant ſurcharge of water, that it is not able to produce any thing but ruſhes, and all the worſt ſpecies of aquatic weeds. As this kind of land is often nearly level, or but gently declining, the firſt ſtep I take, is (by levelling) to find the greateſt fall I can get within any reaſonable diſtance. Then, by the means of iron-rods, (ſuch as are uſed in boring for coals) with a bitt or iron ſcoop at the bottom, I try in ſeveral places the depth of the clayey ſtratum, which ſo obſtructs the paſſage of the water; and alſo what the natures of the ſeveral ſtratums below it are, till I come as low as the level, where I propoſe to begin my drain. If I find, in ſuch ſearch gravel, ſand, ſoft-rock, pinnel, or other porous ſubſtance, I begin the good work immediately, and with full aſſurance of ſucceſs: making a good ſtone or brick drain (as before deſcribed) through the loweſt part of the ground intended to be drained; and then filling it up with all the light porous ſubſtances, that ariſe in the digging of it, or any rubbiſh that can be conveniently procured; taking great care that none of the clay, or hard ſubſtances, be thrown in again; and that the top and ſides of the drain be left lower than the reſt of the land; that the winter rains may eaſily deſcend to it, and ſo paſs (as through a ſieve) into the channel prepared to receive them. If there be any low parts in the piece of ground, from whence the rain-water cannot deſcend to the main drain, ſmall pebble, or wood drains, ſhould be made from thoſe low parts into it: taking care to fill them up with ſome rubbiſh or light mould. The clay, which is dug out, may be converted (either by burning or laying up in heaps with quicklime) into a moſt excellent tillage, either for corn or graſs land, for the improvement of the ſame ground, or any other where it is more wanted. For the fertility of ſuch land, after ſuch draining, is greater than can be well imagined by thoſe who have not tried it, even without any further improvement. I generally (indeed) ſet on lime immediately afterwards, if the ſeaſon of the year be proper for it: which, I ſay (from experience), is from the middle of April, to the middle of July; being certain, (notwithſtanding ſome great authorities, and the common practice are againſt me) that twenty buſhels ſet upon graſs-land, during that ſeaſon, are more than equal to thirty laid on in the autumn, or winter ſeaſons. About an hundred and ſixty buſhels to an acre are a proper dreſſing. The laſt kind of land, of which I ſhall now treat, is the black peat or mooriſh land, many thouſand acres of which, in this kingdom, are now intirely uſeleſs, though capable of being

Facing Draining Plough.

PLATE. VIII.

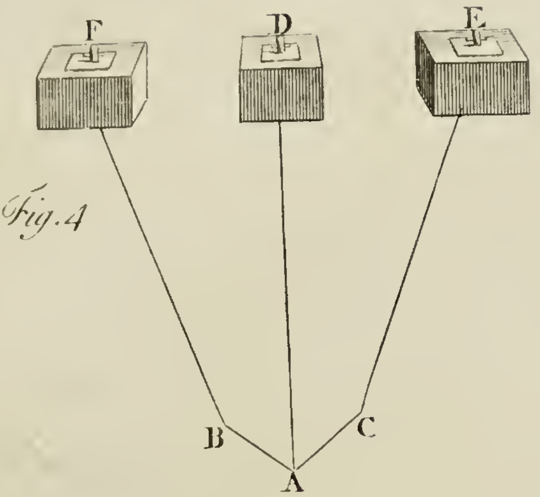


Fig. 4

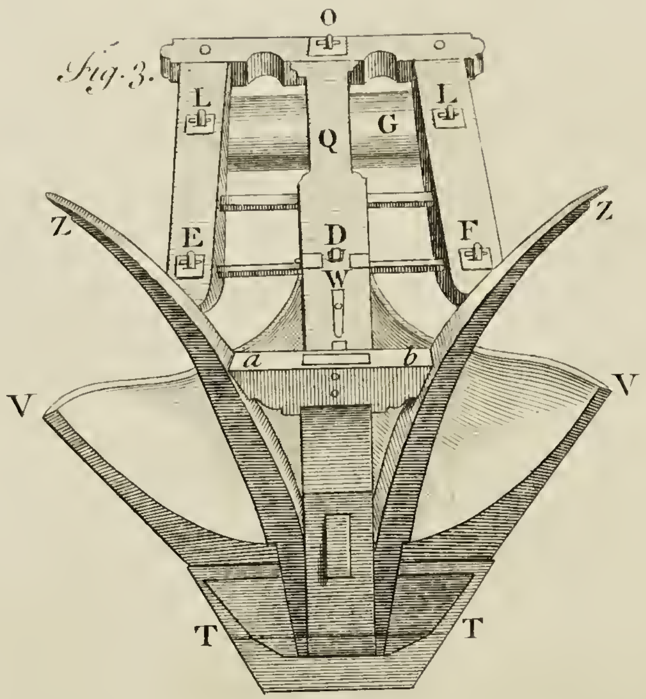


Fig. 3.

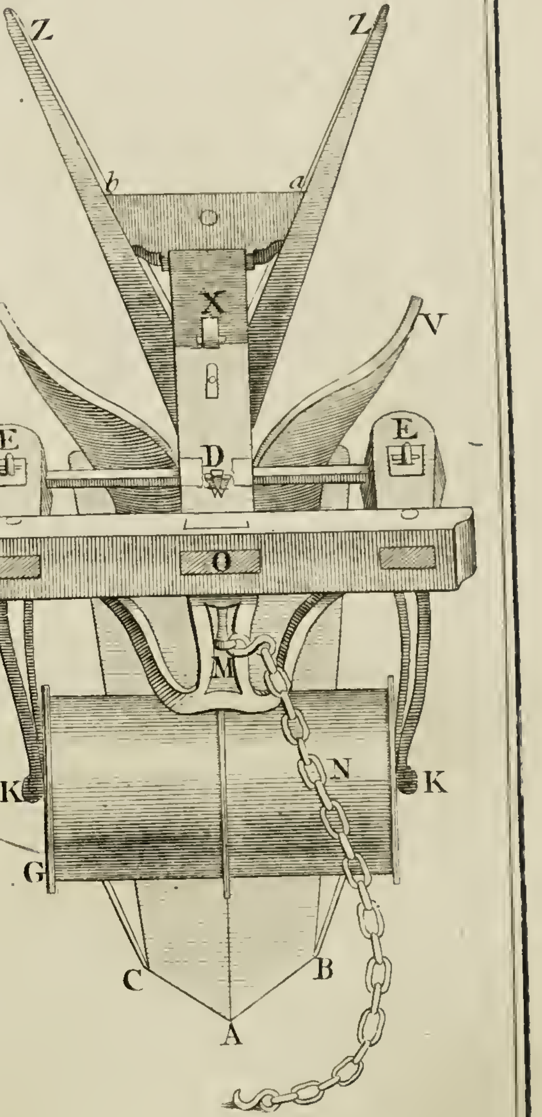


Fig. 2.

Mr. Cuthbert Clarke's Draining-Plough.

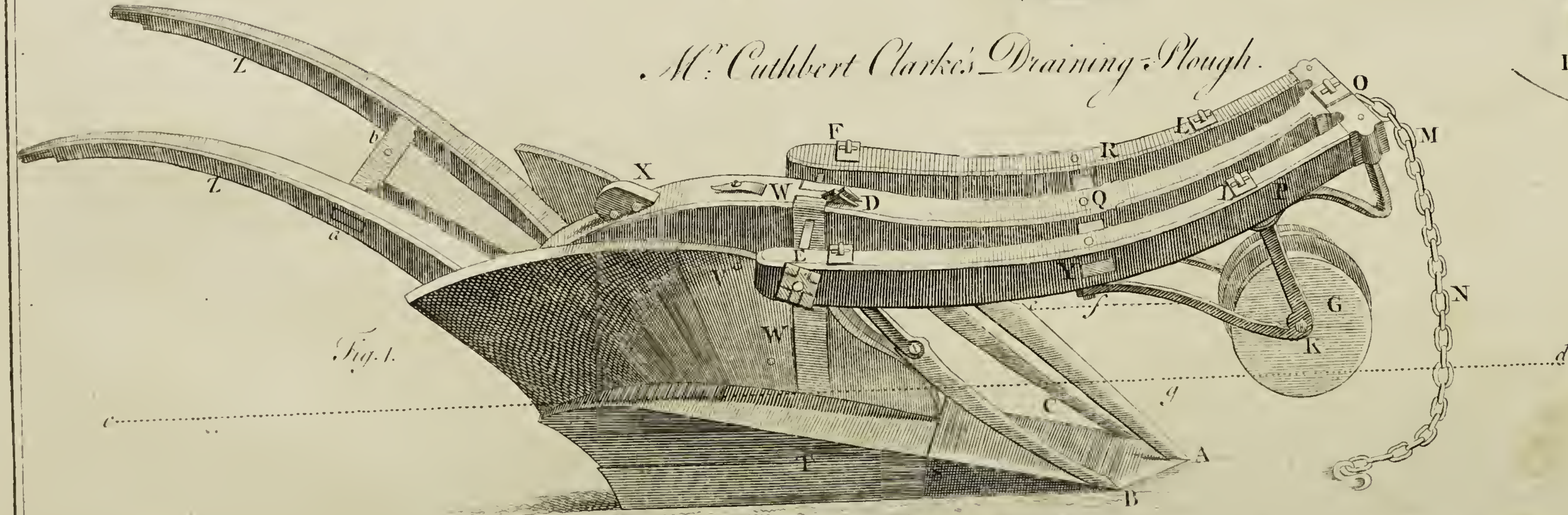


Fig. 1.

I. Barrow delin.

I. Hulett sculp.

being improved to great advantage. Nay, I will venture to affirm, that there is ſcarcely any ſo bad, but that it might, by proper means, and due induſtry, be converted to ſome uſeful purpoſe. For which aſſertion, I have a happy authority, in that beautiful teſtimonial of induſtry, given by Virgil, in his fourth Georgic, to the old Corycian farmer. If theſe kinds of land be nearly upon a level, I uſe the precautions mentioned in the laſt article; and, if I find my level will carry me below, or to the bottom of this black mooriſh or peat-earth, I do not regard the depth of my drains, as the digging is very eaſy, and what is thrown out will nearly pay the expence, by being either dried into peat for fuel, or burnt into aſhes; which, if properly managed, are an excellent dreſſing, either for ſpring-corn, or graſs-land. In the draining of this kind of ground, I make one principal drain through the middle of the piece, (of ſtone or bricks, as before mentioned); and, at about every eighty or a hundred yards, branches from it. Theſe I make rather better than two feet wide at the top; and continue them nearly of the ſame width, till within eight or nine inches of the bottom. Then, with a ſpade (about nine inches broad at the top, and narrowing down to three inches) I make a lower drain; and, upon the ſides or ledges (formed by the narrowing of it), lay large heath-ſods, cut ſquare, and exactly to the width of the upper part: by which means, a cavity is left for the water to run in. Upon thoſe ſods or covers, I throw bruſh-wood, or any kind of light trumpery: and, laſtly, I fill it up with the ſmalleſt of the black ſoil thrown out. Such is the preſerving nature of this black peat or earth, to all vegetables buried in it, that there is no doubt, but drains of this laſt kind will endure for ever, if they be laid deep enough. After the ground is drained and levelled, marl (if to be had near) ſhould be laid on; if not, ſand, gravel, or any kind of light earth. If the firſt, no other ſuperinduction will be required; but if any of the latter over it ſhould be ſpread, a cover of ſome of the fineſt black mould, that is pretty free from any ſtrings or fibres; and then a compoſt made of horſe-dung, coal-aſhes, earth, or clay and lime; and, laſtly, it ſhould be laid down either with graſs-ſeeds alone, or with barley (or oats) and graſs-ſeeds. I laid down a piece (drained and managed as above mentioned) about the beginning of Auguſt laſt, with white clover, yellow clover, and common hay-ſeeds, and though the ſeaſon was ſo remarkably dry and hot, yet the young plants came up very well, and very thick, and, in this preſent ſevere froſt, it affords a verdure, not to be ſeen any where elſe in the neighbourhood; and the piece is conſtantly covered by my cattle, tempted by the look, and the ſweet food it affords them. I am now preparing about five acres of the ſame kind of land, to be laid down with barley and graſs-ſeeds in the ſpring; and hope (if the ſeaſon proves favourable) to have a good crop of both. I had no marl (or even clay) near, ſo was obliged to make uſe of ſand and gravel for my firſt ſtratum.

DRAINING-PLOUGH, a plough for cutting drains, in order to carry off the water from wet ſoils.

Several inſtruments have been invented for performing this neceſſary operation; but as none were found ſufficient to anſwer the intention of the huſbandman, the Society for the Encouragement of Arts, Manufactures, and Commerce, propoſed a premium of fifty guineas for the beſt plough or machine, of the ſimpleſt conſtruction, that ſhould, with the leaſt force, cut a new drain one foot in depth perpendicular, one foot eight inches wide at the top, and ten inches at bottom; both ſides of the drain equally ſlooping, and the earth to be equally thrown out on both ſides. In conſequence of this premium, ſeveral inſtruments for effecting this purpoſe were ſent in to the Society; but upon trial one was found much ſuperior to the reſt, and anſwerable to the Society's advertiſement: and in conſequence of which the premium was adjudged to the author.

This plough, of which we have given four figures on Plate VIII. was made by Mr. Cuthbert Clarke, at Belford, in Northumberland; and anſwered exceeding well in meadow-ground; but could not be drawn in a ſtiff clay with the force of eight horſes. Fig. 1. is a perſpective view of the whole inſtrument ſeen on one ſide. Fig. 2. another view ſeen in front. Fig. 3. a third view ſeen at the tail. Fig. 4. a ſection of the plough, to ſhew the diſpoſition of the three coulters.

Note. The ſame letters refer to the ſame parts in all the four figures; ſo that where any of the parts cannot be ſeen in that figure, the letters will not be found.

A, B, C, are the three coulters.

D, E, F, the nuts and ſcrews that faſten the coulters to the beams.

G, H, I, a wheel, or rather roll, which prevents the plough from going any deeper in the earth. This roll is divided into three parts, by circular pieces of iron, which project beyond the roll; and cut the turf into three parts. The coulters follow in the ſame tract, and finiſh that part of the work.

K, K, the centers on which the roll turns.

L, L, the nut and ſcrews which faſten the iron arbour in which the pivots of the rolls turn to the beams. Theſe arbours are kept in their proper places by means of the two iron braces *f*, *f*.

M, a large iron-hook, to which the chain by which the inſtrument is drawn is faſtened.

N, the tow-chain, or that by which the plough is drawn.

O, the head of the plow into which the beams are mortiſed.

P, Q, R, the three beams.

S, a ſhoe of iron, (the whole part from S to A being of that metal) and into which the hoof of the plough is inſerted.

T, a ſhelf on which the mould riſes after it is cut up by the coulter and fore part of the ſhare, till it is thrown out of the trench by the mould-boards.

V, V, the mould-boards, which throw the earth out on each ſide of the trench.

W, W, a band of iron, which faſtens the after-part of the plough to the main or middle beam.

X, the head of a tenon, which faſtens the mould-boards, and hoof of the plough to the main beam.

Z, Z, the two handles, like thoſe of a common plough.

a, *b*, a piece of board tenoned into the handles, in order to keep the handles in their proper poſition.

c, *d*, repreſents the ſurface of the ground when the plough is at work. Therefore all the parts below that dotted line are under the ground when the drain is cutting.

f, *e*, *g*, ſhews the angle which the coulters make with a line drawn parallel to the horizontal plane; and is nearly equal to forty-five degrees.

The figures are drawn on a ſcale of an inch to a foot; but many of the parts, being drawn in perſpective, cannot be meaſured.

We imagine it will be unneceſſary to ſay any thing farther with regard to the manner of working this plough, as the operation is the ſame as that with the common plough. But it may not be amiſs to obſerve, that the angle *f*, *e*, *g*, being greater than that by which the horſes draw upwards, the plough has too great a tendency to get into the earth; the conſequence of which is, that, when the ſoil is very ſtiff, and conſequently requires a very great force to draw the plough, the inſtrument cannot be held properly by the handles, the force of ſix men not being ſufficient to do this, but the plough will turn entirely over. This was ſufficiently apparent to the committee of the Society, at the firſt experiment, when the ploughs were tried in a ſtiff clay; for the tail of this very plough could not be kept down by ſix men at the handles. If therefore the angle *f*, *e*, *g*, were leſſened to about thirty-three degrees, this difficulty would, in a great meaſure, be removed. However, in marſhy, boggy, and moory ſoils, it will anſwer the intention extremely well, and make a clean trench of the dimenſions required by the Society; and therefore cannot fail of being a very valuable acquiſition in the practice of agriculture.

DRAPE, a farrow cow, or one whoſe milk is juſt dried up.

DRENCH, phyſick, &c. given to a brute by means of a horn, cut properly for that purpoſe.

DRILL-PLOUGH, an inſtrument for ſowing corn in drills, or rows, which is an eſſential part of the new huſbandry.

The two firſt inventions for ſowing in this manner were Mr. Worlidge's drill-plough, and Don Joſeph de Lucatello's ſembrador, both of which may claim the merit of inventions, and therefore muſt not be omitted in this work.

" Beſides the uſual method of ſowing corn, there are, ſays Mr. Worlidge, ſeveral other ways of diſperſing it, as by ſetting, and hoeing of it in, &c. This art of ſetting corn ſeems to be very ancient, as appears by Virgil, *Unguibus infodiunt et ipſis fruges.* And hath been a long time attempted to be brought into practice again, as appears by Mr.Platt' Adam's Tool revived." Mr. Worlidge then points out the defects in Mr. Platt's inſtruments, and proceeds thus:

" But to remedy and remove all manner of errors and inconveniencies that can be found in ſetting of corn, I ſhall here give you a plain and perfect deſcription of an eaſy and feaſible inſtrument that ſhall diſperſe your corn, grain, pulſe, of what kind ſoever, at what diſtance, and in what proportion you pleaſe to deſign, and that with very great expedition, and very little extraordinary charge, expence, or hazard.

" Firſt, make a frame of timber, of about two or three inches ſquare, the breadth of the frame about two feet, the height about eighteen inches, the length about four feet, more or leſs as you pleaſe, as at *u u u u*, Fig. 1. Plate IX. Place this frame on two pair of ordinary wheels, like plough-wheels. The axle-tree of the two foremoſt wheels is to lock on either ſide, as doth the fore axle-tree of a waggon, for reaſons hereafter ſhewn. The hindermoſt axle-tree, being of iron, and ſquare in the middle, muſt be fixed to the center of the wheels, that the axis and wheels may move together: then, about the middle of the frame, in the bottom, let there be fixed an iron inſtrument, or of wood pointed with iron, like unto a coulter, made a little ſpreading at the bottom, in the nature of a ſhare, made to paſs through two mortiſes on the top, for its greater ſtrength; and made alſo to be wedged higher or lower, according as you will have your furrow in depth, as at *o o*; the uſe whereof is only to make the furrow: ſo that you muſt make the point thereof of breadth only to move the earth, and caſt it, or force it, on either ſide, that the corn may fall to the bottom of the furrow. Then, over this ſhare, or coulter, a little behind it, may a wooden pipe be made, to come from the top of the frame to the lower end of the ſhare, tapering downward, as at *p*, and as near as you can to the ſhare: to deliver the corn immediately, as the ground is opened, and before any earth falls in; that what earth does afterwards fall in, may fall on the corn. This pipe is to proceed out of a large hopper fixed on the top of the frame, that may contain about a buſhel, as at *q*: but ſo that the corn may gradually deſcend, according to the quantity you intend to beſtow on an acre. At the very neck of the hopper, underneath, in the ſquare hollow thereof, muſt be fitted in the edge of a wheel of wood, about half an inch thick, and proportioned to the cavity of the neck, as behind the letter *r*. The wheel need not be above two or three inches diameter, and fixed on an axis extending from one ſide of the frame to the other: on which axis is alſo to be another wheel, with a groove on the circumference thereof, like the wheel of a ſpit or jack, as at *r*, which muſt anſwer to another wheel of the like nature and form, fixed on the axis of the hindermoſt of the wheels, as at *s*: then fit a line (of ſilk is beſt, becauſe it will not be ſo apt to ſhrink and reach as hemp) about theſe two wheels, that when the inſtrument moves on the hindermoſt wheels, by the means of the line, the ſmall wheel at the neck of the hopper, may alſo move; which leſſer wheel in the neck of the hopper, may have ſhort pieces of thick leather fixed in the circumference thereof, like unto the teeth of a jack-wheel, that upon its motion it may deduce the corn out of the hopper, in what proportion you pleaſe: for in caſe it comes too faſt, then you may by a wedge at the tenon of the piece whereupon the hopper reſts, as at *t*, or at the end of the axis of the leſſer wheel, force the wheel and hopper together; as, in caſe it feeds too ſlow, then may you remove them by the ſame wedges to a farther diſtance; alſo in caſe your line be too ſlack or too hard, you may prevent either extreme by a wedge in the place where the axis of the wheel moves; or by a third wheel, about the middle of the line, made to move farther or nearer, as you ſee cauſe.

" Alſo by means of the iron-rod *v v*, fixed to the foremoſt axis that is made to lock, may you guide your engine at pleaſure; which rod is made crooked at the end of the hopper, leſt that ſhould injure its motion.

" And at the turning, you may lift up your engine by the handles at *x*: for whilſt you lift it up, the corn feeds not until you ſet the ſame down again.

" One horſe and one man may work with this inſtrument, and ſow land as faſt or faſter than ſix horſes can plough; ſo that you may with eaſe compute the expence, in caſe your inſtrument be ſingle: but you may in the ſame frame have two ſhares at twelve inches diſtance, more or leſs, as you will have the rows of corn diſtant the one from the other; and two pipes out of the ſame hopper, and two ſmall wheels on the ſame axis, with other wheels anſwerable, every whit as eaſy to be performed as one; and then you may double your proportion of land in a day.

" This inſtrument will always keep the ſame proportion you firſt ſet it to, which you muſt thus contrive. Firſt, know the length of the furrow you ſow: then caſt up how many of theſe furrows at ſuch diſtance your inſtrument is made for (whether a foot, more or leſs) will amount to an acre: then conclude how much to ſow on an acre; as ſuppoſe a buſhel: then divide that buſhel into ſo many parts as you have furrows or diſtances in that acre: then take one or two of thoſe parts, and put into your hopper, and obſerve whether it will hold out, or ſuperabound at the end of one or two furrows, and accordingly proceed and rectify the feeder: or you may judge by your own reaſon, whether it feed too faſt or too ſlow.

" In caſe it feeds too faſt, notwithſtanding they be cloſe placed together, you may make that wheel at the loweſt axis, wherein the line moves, to be leſs than the upper; then will the motion be ſlower: and thus may you make it move as ſlow as you will, by augmenting the upper, and diminiſhing the lower wheels wherein the line is; and make it move faſter by the contrary rule.

" In caſe you drive apace, it feeds apace: in caſe you drive but ſlow, it feeds but ſlowly: here is no error.

" When you come to any turning at the land's end, by lifting up the hindermoſt part of the inſtrument, that thoſe wheels touch not the ground, the feeding of the corn immediately ceaſeth, until you ſet it down again.

" Alſo all the corn you ſow lies at a certain depth, none too deep, nor any too ſhallow.

" You may place a kind of harrow to follow; but the beſt way is to have on each ſide of each furrow, a piece of wood, a little broad at the end, ſet aſlope to force the earth rounding on the corn. This may be well placed and fitted to the bottom of this inſtrument, juſt behind the ſhare and feeding pipe.

" By this method of ſowing any ſort of grain or pulſe, may be ſaved the one half, and in ſome places more, which by the other way is either buried ſo deep under clods, that it cannot come up, or elſe is ſo ſhallow, that the cold in the winter, or drought in the ſummer killeth it, or elſe lies on the ſurface as a prey to the fowls of the air: much alſo thereof falls in cluſters, twenty or thirty grains where one or two might ſuffice, which are common inconveniencies, and uſually happening to the vulgar way of ſowing corn: the greater half by far is loſt, which in all probability may be ſaved by the uſe of this very inſtrument, which will doubly requite the extraordinary charge and trouble thereof: for here is no corn ſowed under clods, but in rows, as the earth is ſtirred and moved: it is all at one certain depth and at one certain diſtance, and equally covered, below the injury of froſt, and heat, and rapine of birds. Alſo by this way corn may be ſown in the very middle or con-

PLATE IX.

Fig. 1.

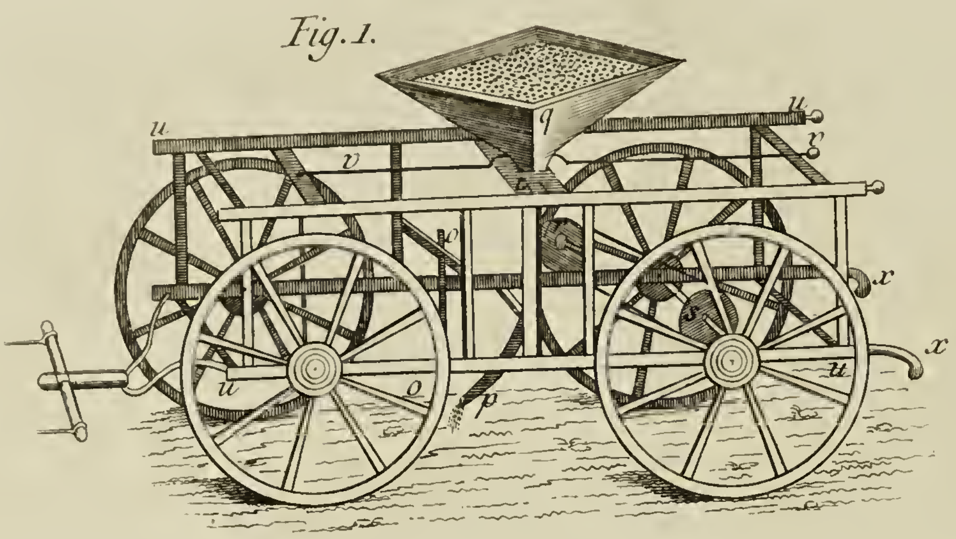


Fig. 2.

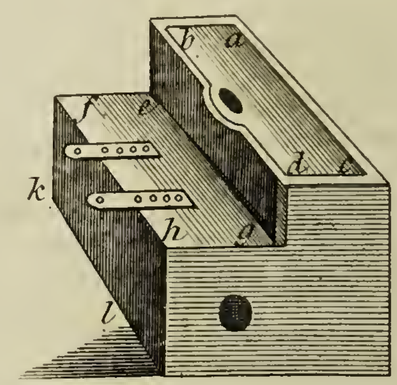


Fig. 3.

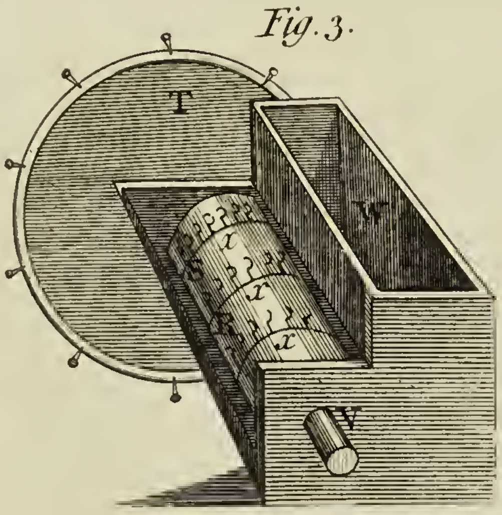


Fig. 4.

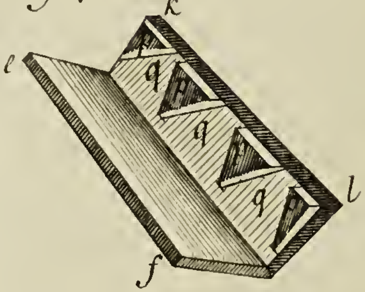


Fig. 6.

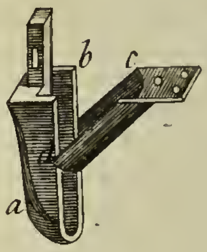


Fig. 5.

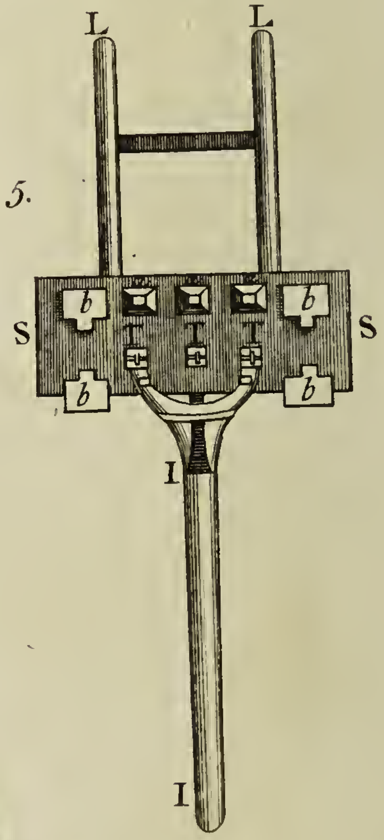


Fig. 8.

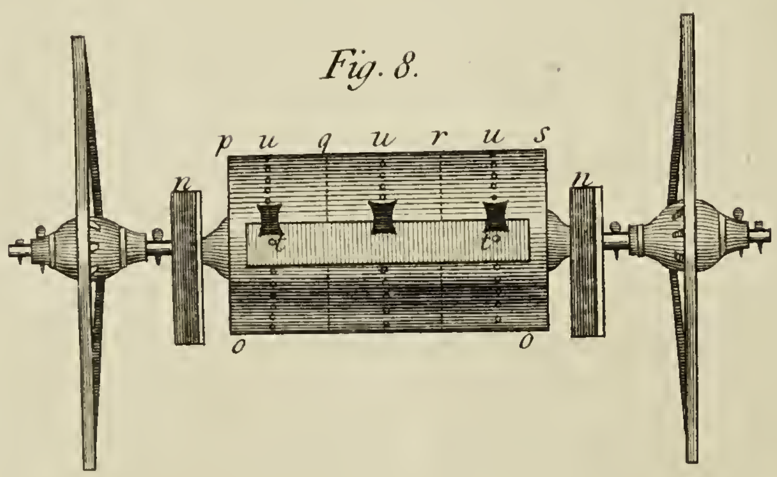
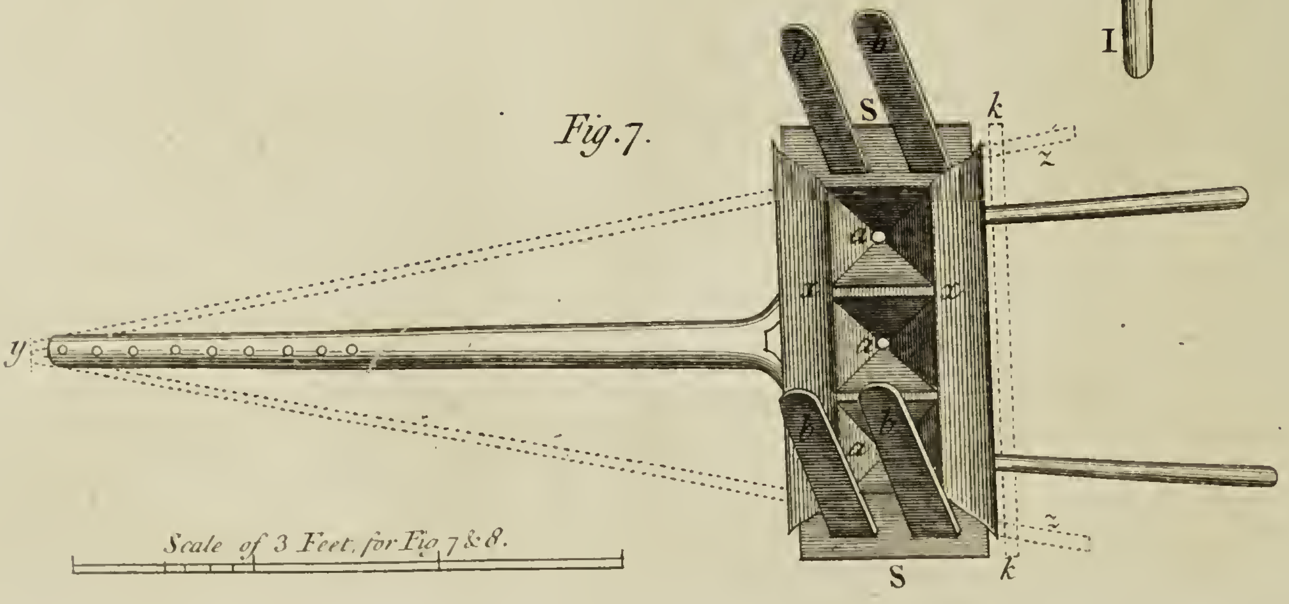


Fig. 7.



Scale of 3 Feet, for Fig. 7 & 8.

J. Hulett sculp.

venient depth of the mould, that it may have the ſtrength of the land both below and above the root; whilſt in the other more uſual way, the corn falls to the bottom of the furrow on the gravel, clay, or ſuch like hard ground, where it ſeldom thrives ſo well as what happens to be in the midſt. This way alſo exceeds the way of ſetting corn, where the pins thruſt into the ground harden and faſten the mould, ſo that, unleſs the land be very light, it confines the roots to too narrow a place, which in this way is prevented; as I have obſerved in garden beans, that thoſe hoed in proved better than thoſe ſet with a ſtick.

"By the uſe of this inſtrument alſo may you cover your grain or pulſe with any rich compoſt you ſhall prepare for that purpoſe, either with pigeon-dung dry or granulated, or any other ſaline or lixivial ſubſtance, made diſperſeable, which may drop after the corn, and prove an excellent improvement: for we find experimentally, that pigeon's-dung ſown by the hand on wheat or barley mightily advantageth it in the common way of huſbandry: much more then might we expect this way, where the dung, or ſuch like ſubſtance, is all in the ſame furrow with the corn; whereas in the other vulgar way, a great part thereof comes not near it.

"It may either be done by having another hopper on the ſame frame behind that for the corn, wherein the compoſt may be put, and made to drop ſucceſſively after the corn: or it may be ſown by another inſtrument to follow the former, which is the better way, and may both diſperſe the ſoil, and cover both ſoil and ſeed.

"The corn alſo thus ſown in ranges, you may with much more conveniency go between, and either weed it or hoe it, and earth it up as you think good, and at harveſt it will eaſily repay the charges.

"Alſo the fore-wheels being made to lock to and fro on either ſide, you may have an upright iron-pin fixed to the middle of the axis, extended to the top of the frame: and from thence a ſmall rod of iron to come to your hand, with a crooked neck juſt againſt the neck of the hopper; by means of which iron rod, you may lock or turn the wheels either way, and guide your inſtrument, and rectify it, if it deviate out of its right courſe.

"The hopper muſt be broad and ſhallow, that the ſeed preſs not much harder when it is full, than when it is near empty, leſt it ſow not proportionably.

"Though this inſtrument may at firſt ſeem myſterious and intricate to the ignorant, yet I am confident it will anſwer to every particular of what I have written. Any ingenious wheelwright, joiner, or carpenter, may eaſily make it with very little inſtruction, and any ordinary ploughman may uſe it."

The chief inconvenience in this inſtrument ſeems to be, that the ſeed is liable to be bruiſed as it drops from the hopper, by the wheel in the neck of that hopper.

In the account which is given of the ſembrador, in the Philoſophical Tranſactions, it is juſtly obſerved, that the perfection of agriculture conſiſts in ſetting the plants at proper diſtances, in ground well looſened to a ſufficient depth, that their roots may be able to ſpread, in order to collect the nouriſhment which is neceſſary to produce and ripen their fruit. But this is ſo little obſerved, that almoſt all ſorts of ſeed are commonly ſown by handfuls at random; whence it happens, that corn is ſowed too thick in ſome places, too thin in others, and, frequently, the greater part of it is either not covered at all, or not deep enough; by which means it is not only expoſed to be eaten by birds, but alſo in cold countries to be ſpoiled by froſt, and in hot climates, by the ſun. To remedy theſe inconveniencies, Don Joſeph de Lucatello invented an inſtrument, which, being faſtened to the tail of the plough, drops the ſeed regularly in the furrow, ſaves four parts in five of the quantity which is generally uſed, and becomes the means of procuring a conſiderable increaſe, without employing a perſon purpoſely to ſow.

As a few words will explain the mechaniſm of this inſtrument, which has its merit, though it has not been found to anſwer in common practice, we ſhall venture to give the following ſhort deſcription of it; becauſe ſome of the principles of this may poſſibly ſuggeſt an uſeful hint to an ingenious artiſt.

Fig. 2. Plate IX. is a box of wood: *a*, *b*, *c*, *d*, the cover of that part into which the corn is put, and which is open in Fig. 3. at W: *e*, *f*, *h*, *g*, *k*, *l*, Fig. 2. are the two ſides which cover that part of the box where the cylinder, which is ſtuck round with three rows of little ſpoons to throw out the grains, is turned round. Theſe ſides are taken off in Fig. 3. to ſhew the cylinder R S, and the ſpoons *x*, *x*, *x*. The internal ſhape of theſe ſides is expreſſed in Fig. 4. where may be ſeen the four triangular pieces *p*, *p*, *p*, *p*, and the triangular interſtices *q*, *q*, *q*, which ſerve to convey the corn diſcharged by the ſpoons, to holes which let it out at the bottom of the box. T, is one of the wheels which turn the cylinder; and V the other end of the cylinder, on which the other wheel is to be fixed. The furrow in which the grain has been dropt is to be covered by the next turn of the plough; to which end the mould-board muſt project conſiderably.

In uſing this inſtrument, according to Don Lucatello's method, it muſt be faſtened to the beam of the plough, at ſuch a height that the long projecting nails in the wheels may touch the ground ſufficiently to make them turn round, but not enough for the wheels to reſt upon it, and drag along without turning.

This way of turning the wheels, and conſequently the cylinder, muſt occaſion an unequal diſtribution of the ſeed, wherever the ground is rough and ſtony. For this reaſon, and on account of ſome other inconveniencies attending the uſe of it, the ſembrador is not an inſtrument to be recommended to farmers: but we would here refer to the conſideration of ſuch as are better ſkilled in theſe matters whether an inſtrument leſs liable to this objection, or to the fault which is found in Mr. Worlidge's drill, may not be formed, by placing the ſeed-box of the ſembrador in a frame like that of Mr. Worlidge, with (inſtead of the wheels of the ſembrador, which turn upon the ground) two wheels, grooved like pullies, fixed upon the axis of the cylinder, to be turned with cords, like the ſmall wheel at the neck of Mr. Worlidge's hopper. A ſquare frame, like that, will keep the box more ſteady, and therefore render the diſcharge of the ſeed more regular, than it can be in Don Lucatello's manner.

M. Duhamel obſerves, that the drill-plough invented by M. de Chateauvieux delivers the grain with the greateſt exactneſs, and therefore deſerves much commendation; but that the price of it is too great for moſt farmers. His own, which we ſhall now deſcribe, has, for that reaſon, been the moſt generally uſed.

M. Duhamel's drill is faſtened to the fore-carriage of a common plough. The hind part conſiſts of a plank S S, Fig. 5. Plate IX. at leaſt three inches thick, which is called the table. Underneath this table, and to the bottom part of it, are ſtrongly fixed, as at T, T, T, three ſhares. The beam I, I, is faſtened to the fore-part of the table: and the handles L, L, are let into mortiſes in the back part of the table, in which they are fixed. *a*, *a*, *a*, are three ſloped cavities cut in the table, to receive the ſeed from the cylinder, and convey it through a hole, about an inch in diameter, in the center of each of them, into the hollow *c*, at the back of the ſhare Fig. 6. The form of theſe cavities is more clearly expreſſed by *a*, *a*, *a*, Fig. 7. At *b*, *b*, *b*, *b*, Fig. 5. are fixed four ſtrong ſtandards, to hold the drill-box ſteady.

The ſhares Fig. 6. are made of wood, and terminate at the bottom of their fore-part *a*, in a circular form, covered with iron. In their hind-part *b* is a groove, through which the ſeed drops to the bottom of the furrow. The ſeed is conveyed from the cavities *a*, *a*, *a*, Fig. 7. to this groove *b*, Fig. 6. by means of a thin plate of iron *c*, rounded and fixed to the ſhare, as at *d*. Theſe ſhares are about an inch and a half thick, and their height from *a* to *b* is at leaſt a foot.

As theſe ſhares terminate in a curve at bottom, if they meet with any roots, dung not thoroughly rotted, or any other ſubſtance which they cannot eaſily divide, they force it down to the bottom of the furrow, and by that means are never liable to be choaked: and to prevent this ſtill more effectually, the middle ſhare is placed ſomewhat more backward than the two others. It is likewiſe made ſhorter, when uſed in land laid out in ridges, in proportion to the greater height of the middle of the ridges. The ſhares are generally ſeven inches aſunder.

The four ſtandards *b*, *b*, *b*, *b*, Fig. 5 and 7, are placed in ſuch a manner, that the blocks *n*, *n*, Fig. 8, in which a groove is cut, anſwer to the middle of this table. On an iron axle-tree which anſwers to the wheels, and which paſſes through the centre of the blocks, is fixed the cylinder, or barrel *o*, *o*, which is cloſed at its ends, *p*, *s*, and is likewiſe divided by two partitions *q*, *r*. This barrel is made of thin ſplit deal, as are alſo the ends and partitions. *t*, *t*, is a thin board, or plate of tin or thin iron, faſtened with hinges, that it may be opened to put the ſeed into the three partitions *p q*, *q r*, *r s*. In the middle of each of theſe partitions, the barrel is pierced with holes three or four inches aſunder, and about a quarter of an inch in diameter. The barrel and the wheels are ſo fixed on the iron axle-tree, that they all turn together.

To know whether the holes *u*, *u*, *u*, in the three partitions of the barrel are of a proper ſize and number to diſtribute the ſeed in the manner that is deſired, let ſome, ſuppoſe half a buſhel, be put into each partition. The blocks *n*, *n*, being placed on each ſide, between the two ſtandards, whoſe inner ſides are rounded ſo as to fit the groove in the blocks, and the table *S*, *S*, being raiſed ſo that the wheels do not touch the ground, any one may eaſily ſee, by giving the wheels a turn or two round with the hand, whether the proper quantity of ſeed drops behind the ſhare; and alter it accordingly.

The barrel being properly fitted, the beam is faſtened to the fore-carriage of this drill. As it moves, the barrel turns with the hind wheels, and the ſeed drops out of the holes *u*, *u*, *u*, Fig. 8. into the cavities *a*, *a*, *a*, Fig. 7, and from thence into the hollow *c*, Fig. 6. in the hind part of the ſhare.

When the plowman comes to the end of the field, he lifts up the hind carriage, which is light, and carries it till the horſes are turned for the next furrow.

M. Duhamel does not fix the diameter of the hind wheels, but leaves that to be determined by the length of the ſhares. His were ſo proportioned, that when the ſhares touched the ground, the wheels did not touch it by two inches. He obſerves, that this drill anſwered extremely well, where the ground was plowed into an even or level ſurface: but that the wheels were too ſmall when the middle of the ridges was raiſed high; becauſe the ſhares were then on the higher part of the ridge, while the wheels were in the furrows.

In Fig. 7, are two thin boards *x*, *x*, ſomewhat bending, which riſe up to about half the height of the barrel. The uſe of theſe is to catch the ſeeds that may chance to drop from the oblique holes, and guide them into the cavities *a*, *a*, *a*.

It is well known, that when the fore-part of the ſhare terminates in a point, it pierces the deeper into the earth, the farther back the beam is placed on the fore-carriage: but as the bottom of theſe ſhares is round, they pierce neither more nor leſs when the beam is placed more forward. It is therefore adviſeable to place the fore and hind carriage as near as poſſible to each other, becauſe the plough then goes eaſier, and the draught is lighter to the cattle.

This inſtrument is eaſily tranſported from place to place by means of two poles *y*, *z*, *z*, Fig. 7. The ends *y* are placed on the fore-carriage, together with the beam, and from thence paſs under the table, ſo as to raiſe the whole from the ground, on which their other ends *z*, *z*, reſt. The croſs-bar *k*, *k*, ſecures thoſe ends, and keeps them at a proper diſtance.

M. Duhamel took the firſt hint of his ſeed box from an invention of Mr. Grenville, a gentleman belonging to the king of France's ſtables. This was a hollow ball, fixed upon the axle-tree of two wheels, and pierced round the middle with a row of holes, through which the ſeed dropt as the wheels turned round. Upon a ſimilar principle, another gentleman, inſtead of ſowing under furrow in the common way, contrived a box to turn behind his plough; and that no more than the due quantity of ſeed ſhould be dropped, the lower half of the box moved upon a belt of leather, in the middle of which was fixed a piece of braſs pierced with a hole ſuited to the ſize of the ſeed intended to be ſown. By this means, the holes in the box could not drop any ſeed, but when they came oppoſite to the hole in the belt. A few grains were indeed ſometimes bruiſed in their paſſage; but, upon the whole, there was a great ſaving of ſeed.

According to the above conſtruction of M. Duhamel's drill, the ſhares muſt always pierce to the ſame depth, becauſe the whole weight of the hind part of the drill reſts continually upon them: conſequently, it would be neceſſary to have ſhares of as many different lengths, as there are depths at which each kind of ſeed ſhould be ſown.

We likewiſe apprehend, that when the ſhares have pierced to the depth intended, the weight of the drill may be made to reſt on the wheels, by preventing the axle-tree from riſing between the ſtandards, beyond ſuch a height as ſhall exactly regulate the depth to which the ſhares are to pierce. This may be effected, by bringing the ſtandards *b*, *b*, Fig. 7, nearer to each other; and placing between them, inſtead of the blocks *n*, *n*, Fig. 8, two thick pieces of wood, made to ſlide up and down, with grooves, as in the blocks. Theſe pieces of wood may be fixed between the ſtandards, by means of two ſtrong iron pins run through the ſtandards into them: and to take off the friction of the axle-tree againſt theſe pieces of wood, it may be made to turn on two friction wheels, placed in the lower part of them; or rather on four or ſix ſmall iron rollers turning on their axis in a box inſerted in each of theſe pieces, which may be raiſed or lowered, by means of a row of holes in the ſtandards, through which the iron pins are put, ſo as to give the axle-tree room to riſe to the height that ſhall be thought neceſſary to make the ſhares pierce to the intended depth, before the weight of the drill ſhall reſt upon the axle-tree.

That the axle-tree, moving on ſuch rollers, will have leſs friction, or require leſs ſtrength to make the wheels turn round, even when the weight of the whole inſtrument lies upon it, than it has in the blocks, with only the weight of the grain, is evident from the following fact. The gentleman who firſt thought of this invention applied it to a roller of four tuns weight, which is now drawn with eaſe by two ordinary horſes, even acroſs his plowed grounds.

It appears from this eaſy motion of the roller, that there can be no danger of the axle-trees turning, though loaded with the weight of the whole inſtrument. Other conſiderable advantages will alſo ariſe from the drill's reſting thus upon the wheels; for the labour of the plowman will be greatly leſſened, the inſtrument will move ſteadier and more uniformly, and the draught will be much eaſier for the horſes.

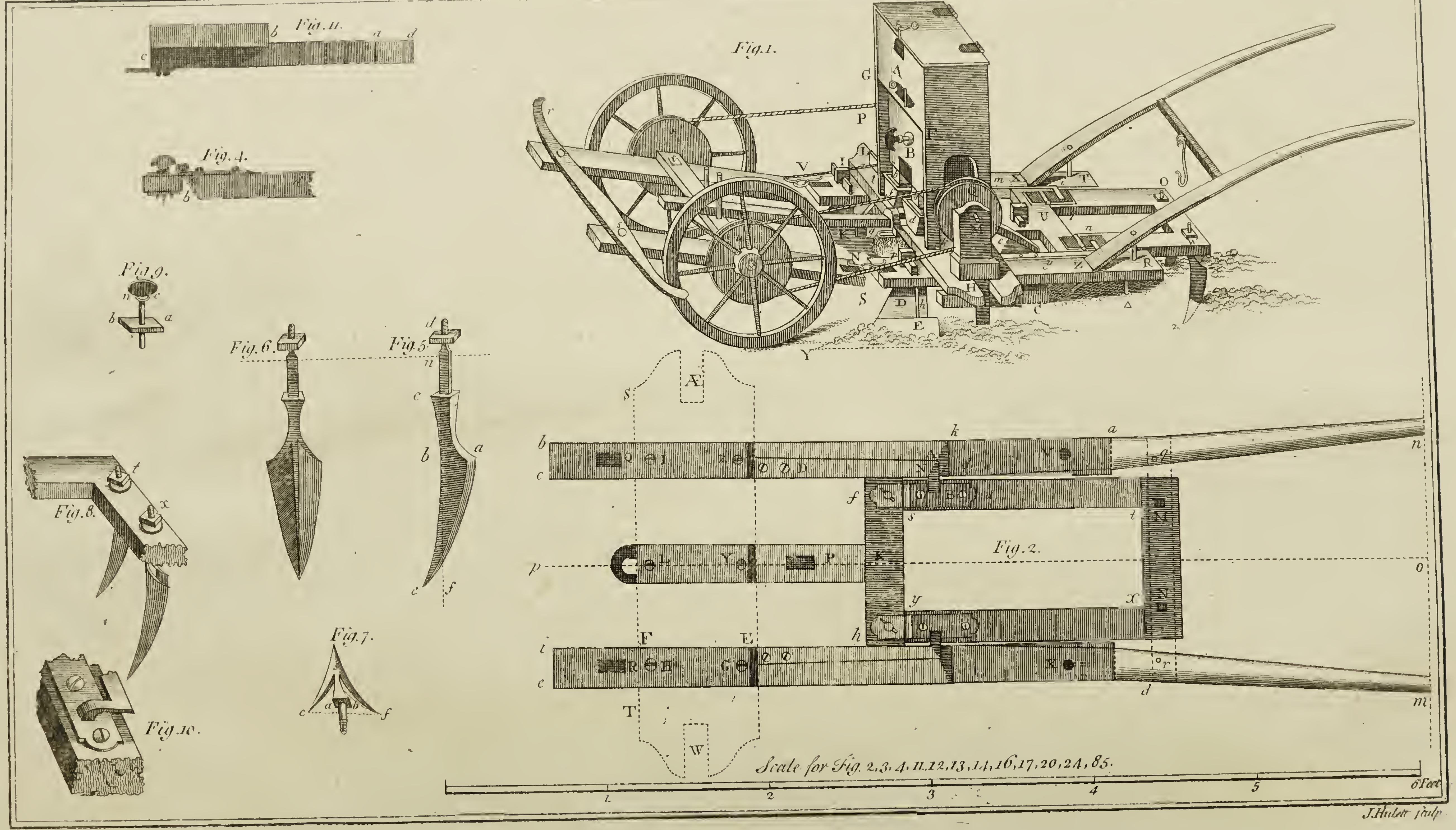
Deſcription of M. de Chateauvieux's DRILL-PLOUGH, *and of its manner of working. Written by himſelf.*

" When I firſt ſet about conſtructing this drill-plough, my deſign was to make an inſtrument which ſhould diſtribute the grains of corn one by one, at the diſtance of ſix inches from each other. I attained this preciſion; but ſoon perceived that it was not the only thing requiſite, or even ſo neceſſary as I had imagined.

" I could, indeed, make my drill diſtribute ſome grains more than it did in its firſt ſtate: but I plainly found that the quantity of ſeed would not yet be ſufficient to produce a proper number of plants; eſpecially as it muſt not be expected that every ſeed will grow; 1, becauſe, whatever care he taken in chuſing the ſeeds, there will always be among them many which will not ſprout at all; 2, becauſe a great number of them will be deſtroyed by inſects, either before they vegetate, or ſoon after they ſpring up; and 3, becauſe the winter's cold will frequently deſtroy ſeveral of the young plants, and greatly weaken others. Experience taught me, that, to guard againſt the effect of theſe caſualties, it was neceſſary to ſow more ſeed than I did at firſt.

" To this end, and that I might be enabled to increaſe the quantity to whatever degree ſhould be found moſt proper, I enlarged the cavities of my cylinder, ſo that I can now ſow either more or leſs ſeed, with equal eaſe, by means which ſhall be explained in the deſcription of this inſtrument.

PLATE . X.



J. Hulett sculp.

" Each of theſe cavities in the cylinder of my firſt drill-plough could contain but one grain of corn ; but in the preſent, they are large enough to hold three or four, which, though they touch one another there, are ſo ſeparated when they fall from thence, and in their paſſage through the pipes, that they drop at diſtances from each other in the furrow ; for they are not all turned out of the cavities in the cylinder at the ſame time : beſides which, I have obſerved, that the ground upon which they fall is always more or leſs uneven, and that this circumſtance conſequently contributes effectually to ſeparate them.

" I confeſs that the deſcription which I am going to give is very long, and that this, together with the ſight of ſo many figures as are here repreſented, may, at firſt, make people think that my drill is a very complicated machine, and that this complication muſt render it very defective : but I beg of them not to give way to this prejudice, and to ſuſpend their judgment, till they have ſtudied the inſtrument thoroughly ; after which, I hope they will be ſenſible that all its mechaniſm is employed only to procure the movement of the axis, and the play of the valves. I even flatter myſelf that it will be deemed a ſimple inſtrument, by thoſe who rightly conſider how few of its parts are moved ; a circumſtance which prevents its being put out of order in working. The great quantities of land which were ſowed in the autumn, with perfect ſucceſs, ought to remove the diffidence of thoſe who may ſtill incline to doubt whether this drill will always and regularly perform equally well.

" It will perhaps be objected, that the expence of making this drill-plough is too great, and that numbers of farmers, who have not much land, may not be able conveniently to purchaſe it.

" It is very true that if this inſtrument could be conſtructed for a ſmall price, the benefits reſulting from it would be the more extenſive : but it muſt alſo be allowed that this objection does not hold good with reſpect to all farmers, or to gentlemen who keep ground in their own hands. Theſe will ſoon be repaid the expence of ſuch a drill, by the ſaving of ſeed : and as to the poorer ſort, who have, for example, but ten or twelve acres of arable land, the expence will be but trifling, if four or five neighbours, in that caſe, join to purchaſe ſuch a drill, which will be more than ſufficient to ſow all their ground. Or, each pariſh may come to an agreement, that he who can afford to buy ſuch a drill, may let it out for ſo much an acre : a method which would be advantageous to all ; but particularly to thoſe who, by uſing it, would ſow their land with very little charge.

" But I think, and hope, that when the great advantage of uſing this inſtrument is known, no huſbandman will be without it merely becauſe of the price ; as this conſideration can never out-weigh the benefits which will accrue from it in all reſpects, by leſſening the expence of every article in the operation of ſowing, and by the farther emoluments which will be reaped at harveſt.

" I therefore, in conſtructing this inſtrument, paid leſs regard to the price which it might coſt, than to the means of rendering it very ſolid, by a firm aſſemblage of all its parts ; which was eſſential, in order to prevent the frequent accidents it would otherwiſe have been expoſed to, in the hands of ignorant peaſants, who have no idea of handling things gently, and are ſtill leſs capable of repairing any miſchief done to a very nice machine.

At the ſame time that I ſtudied ſtrength and ſolidity in the conſtruction of this inſtrument, it was not leſs neceſſary to take particular care that it ſhould execute well and regularly the purpoſes for which it is intended, both with reſpect to the manner of its diſtributing each grain, and to the movement of the axis, which is always in motion from the moment that the horſe ſtirs, ſo that the ſeed runs inceſſantly.

In deſcribing this inſtrument, I have firſt given a general idea of its make and manner of working, that the reader may be thereby enabled the more eaſily to underſtand the ſubſequent minute deſcription of all its parts, with their relation to, and connection with, each other. The method of uſing it will then follow.

General idea of M. de Chateauvieux'ſ DRILL-PLOUGH, *Plate* X.

A (Fig. 1,) is a wooden-box, or hopper, whoſe bottom is at the height of the line F G. This hopper has four feet, two of which are ſeen at *k* and *l*. Theſe four feet, which may be called tenons, are fitted into four mortiſes in the table H L. The bottom F G of this hopper reſts immediately upon the ſeed-box B, which is made of thin plates of braſs, and is placed between the bottom of that upper box or hopper, its two ſides which have the four feet, and the table H L. B is the front of this ſeed-box. The corn drops through a hole in the middle of the bottom of the hopper A, into the ſeed-box B. This ſeed-box B contains a braſs cylinder, which traverſes it, and is pierced by and fixed to an iron axis M P, at the two ends of which are firmly faſtened two pullies Q and P. The two pivots of the axis are ſupported by two ſtandards, one of which is ſeen at M H, and a part of the foot of the other at L. Theſe two ſtandards are fixed to the two ends of the table by two keys, like thoſe of a turner's lathe.

The table upon which all theſe pieces reſt, is itſelf, at its two ends, ſupported by, and faſtened to the two beams T V, R S. Theſe two beams are fixed in parallel lines, by a traverſe X Z. In the middle, U, of this traverſe, is pinned the end of another piece of wood, which paſſes from thence under the table, in a parallel direction with the two beams, and upon which alſo this table is faſtened by two ſcrews.

This inſtrument has three exactly ſimilar ſhares, D, K, *e*. Two of theſe ſhares, K and D, are faſtened to the two beams, at I and *p* ; by a tenon and a peg, and the third is faſtened in the ſame manner, towards U, to the piece which runs parallel to the beams. Each of theſe ſhares is covered at the bottom with a plate of iron, N, E, C ; and the point of one of them, ſuppoſed to be in the earth, is ſeen at Y.

The harrow is compoſed of three pieces of wood *q* O, O W, W *n*, jointed together by mortiſes and tenons at O and W, and of two ſimilar iron teeth W *z*, O R. Theſe two teeth are faſtened to the harrows by the ſcrews W and O, and the harrow is faſtened to the traverſe X Z by two hinges near *q* and *n*. Upon the two beams are faſtened by two ſcrews, at *m* and *e*, two ſquare ſprings *m i q* and *e Z n*, of which the two ends *q*, and *n*, preſs upon the harrow, to make its two teeth enter into the earth.

The fore-carriage is compoſed of two ſimilar and parallel pieces V *r*, S *s*, upon which is faſtened the ſpring-tree bar *r s*, and the axle-tree *u t* of the two wheels. The drill (of which the manner of working will be explained hereafter) reſts upon this fore-carriage, whenever there is occaſion for its ſo doing, by means of a wooden bar *d x*, one of the ends of which, towards *a*, paſſes through two belts which are faſtened to the table, and of which only one is ſeen here. The other end *x* of this bar, reſts upon the middle of the axle-tree of the fore-carriage, between two pins driven into the upper part of that axletree. The fore-carriage is likewiſe faſtened to the drill by hooks and rings, as at *v* and S.

At *t* and *u* are two pullies, which are faſtened to the ſpokes of the wheels by three or four ſcrews. The pullies Q and *u* are encircled by a thong of leather, of the ſame breadth as the grooves of the pullies, and of which the two ends are buckled together, like a garter. The two other pullies P and *t* are encircled in the ſame manner by another ſimilar thong.

Manner in which the DRILL *works*, *Plate* X.

The ſeed being put into the hopper A (Fig. 1.) the whole machine being drawn by the horſe harneſſed to the ſpring-tree bar *r*, *s*, and guided by the ſeedſman, who holds the two handles ; then the three ſhares D, K, *e* C, open each of them a furrow, and at the ſame time the pullies *u*, *t*, by their turning, turn, by means of the thongs, the two other pullies Q, P, and conſequently likewiſe the cylinder, which is in the box B, and which, in turning, diſtributes the ſeeds equally into three pipes which come out at the bottom of the ſeed-box. This diſtribution of the ſeed is performed by a mechaniſm which cannot be repreſented here, but will be particularly explained hereafter. The ends of theſe pipes are ſeen here at *a* and *b*. Theſe pipes *a* and *b* drop the ſeeds into two other pipes *d* and *f*. The pipe *a* tranſmits its contents into the pipe *d*, which terminates behind the ſhare D, at *h*, where it depoſits the ſeeds in the furrow made by this ſhare. In the ſame manner, the end of the pipe *b* of the box conveys the ſeed which paſſes through it into the pipe *f*, which terminates at *g*, behind the ſhare K. And likewiſe in the ſame manner, the third pipe of the box, which cannot be ſeen in this figure, empties its contents into a third pipe, of which part is ſeen here at *v*, *y*, and which terminates behind the third ſhare *e*, C. The two teeth of the harrow, paſſing afterward each of them between two of theſe furrows, cover the ſeeds which have dropped into the three furrows.

According as ſcrew B, in the fore-part of the box is turned more or leſs from the right to the left, or from the left to the right, a greater or leſs quantity of ſeed drops into each furrow, by a means which will be explained hereafter. But ſo long as this ſcrew remains in the ſame ſituation, the quantity of the ſeed that is dropped will be conſtantly the ſame.

To render the deſcription of this firſt figure the more diſtinct and intelligible, ſome things are paſſed over here, which will be ſpoken of hereafter, and among others two traverſes which faſten together the two pieces V *r*, S *s*, of the fore-carriage. Alſo the box B is here made larger than it ſhould be according to the deſcription which will be given of it, in order that the pipes *a* and *b*, *d* and *f* might appear the more diſtinctly. For the ſame reaſon alſo the out-lets of the pipes *a* and *b* are not here repreſented as let into the mouths *d* and *f* of the two other pipes, as they ſhould be in fact.

In the following deſcriptions, that part of a piece which immediately faces the horſe, is always called the fore-part of the piece, excepting only the piece named the bin, and its valves, in ſpeaking of which the contrary rule is obſerved. But, every where, the right or the left ſide of a piece, is to be underſtood as of the ſame ſide of the horſe.

When a machine is to be made from drawings, thoſe drawings, eſpecially when ſmall, cannot, by their ſcale, point out preciſely the exact dimenſions of every nice, and oftentimes very important, piece, ſo as to enable a workman to conſtruct it perfectly. To remedy this defect, all the meaſures of every piece, and their connection with each other, are here particularly ſpecified in the written deſcription, which is to be looked upon as a ſurer guide than the meaſures reſulting from the engraved figures: and to render this ſtill more certain, the weight of the niceſt pieces is alſo given.

Deſcription of the two Beams which ſupport the Table and the Hopper, Plate X.

The two beams T V, R S, (Fig. 1,) are repreſented as if ſeen from above at *a*, *b*, *d*, *e*, (Fig. 2.) They are exactly ſimilar. Each of them is three feet five inches and a half long, two inches and five-ſixths wide (for example from *b* to *c*), and one inch five-ſixths thick. All their ſides are at right angles to each other.

Theſe two beams are joined by a traverſe *f h* (Fig. 2.) and X Z (Fig. 1.) This traverſe is two inches and five-ſixths wide, meaſuring it horizontally, one inch and three-twelfths thick, and one foot and a half long, excluſive of two tenons, one at each end, by which it is mortiſed into the two beams, which are parallel to each other. The upper ſurface of theſe beams, and that of their traverſe, are exactly even. The diſtance from *c* to *f* (Fig. 2, Plate X.) is one foot eleven inches and a quarter; and the ſame from *i* to *h*.

Underneath each beam, and at the diſtance of five inches from the extremity *a* (Fig. 3.) an iron-pin, ſeven-twelfths, or two-thirds of an inch in diameter, projects to the length of four inches and one-third. One of theſe pins is ſeen at △ (Fig. 1.) Its other end is driven faſt into the middle of the breadth of the under ſurface of the beam, from which it projects perpendicularly. Theſe two pins are to enter into two holes in the axle-tree of the hind-carriage, which will be ſpoken of hereafter.

Of the two Handles, Plate X.

Two handles, *k n*, *l m* (Fig. 2.) are faſtened to the two beams, each of them by a tenon *d*, (Fig. 3. Plate XI.) five-ſixths of an inch thick, which paſſes through the beam, and is ſecured underneath it by a wooden pin or peg *d*, about half an inch in diameter. Each handle is likewiſe ſupported upon the beam by a wooden prop *p l*, which is ſeen at R and T (Fig. 1.) Each of theſe props is three quarters of an inch in diameter, and is driven very tightly into the handle and the beam, at *p* and *l* (Fig. 3, Plate XI.) ſo as to paſs quite through them. The upper end *c* of thoſe props is ſeen at V and X, in Fig. 2. From the extremity *k* of the handle (Fig. 2, and 3.) to the extremity *a* of the beam, is one foot, and one-third of an inch, and the diſtance is the ſame from *d* to *l*, in Fig. 2. The breadth and thickneſs of the lower end of the handles at *g k* (Fig. 2, Plate X. and 3, Plate XI.) is nearly the ſame as the breadth of the beams, upon which they reſt: but they leſſen by degrees from *k* to *n*, and are rounded off, in ſuch manner that the diameter of their upper end *n* is but one inch and a third.

With reſpect to their poſition, they form, with the beams, an angle of 40 degrees, as at *c k a* (Fig. 3, Plate XI.) The handle is nearly ſtrait from *k*, to about a third part of its length, and from thence it bends more and more downward, to its end *n*, which is perpendicularly two feet higher than the upper ſurface *k m* of the beam. This height is expreſſed by the pricked line *n m*. The ſpace between the handles likewiſe increaſes with their length, ſo that, at their ſmalleſt ends, the diſtance from the outſide *m* of the one, to the outſide *n* of the other (Fig. 2, Plate X.) is one foot eight inches and a half, and each of them is equally diſtant from the middle line *o p*.

Theſe two handles are faſtened to each other by a traverſe *q r*, which is repreſented in Fig. 1, but is expreſſed here only by two pricked lines, in order to ſhew a piece which is under it, and which will ſoon be ſpoken of. This traverſe is one inch and five-ſixths broad, and two-thirds of an inch thick. Its ends, being tenons, are let into mortiſes in the beams, and faſtened there by wooden-pins, at *q* and *r*. One of theſe ends appears at *q* (Fig. 3, Plate XI.) From the middle of the length of this traverſe hangs an iron-hook, as in Fig. 1, Plate X. This hook is about a quarter of an inch thick, and five inches and a half long, from its extremity *e* (Fig. 3, Plate XI.) to its other end, which is faſtened to the traverſe. The lower end of this hook is put through a ſmall ring faſtened to the harrow between the ſcrews of the two teeth, and ſerves to hold up the harrow when the drill is placed upon its hind-carriage, in order to be removed, as will be ſaid hereafter. The traverſe is fixed in the handles at the diſtance of thirteen inches from their extremity *k* (Fig. 2, Plate X. and 3, Plate XI.) The two handles, which the ſeedſman holds in his hands by their ends *m n*, ſerve to direct the drill.

Of the Harrow, Plate X.

The harrow is compoſed of three pieces of wood *s t*, *y x*, *t x*, (Fig. 2.) and of two teeth faſtened to this laſt. Theſe three pieces are repreſented at *q* O, O W, and W *n*, and the two teeth at W *z* and O R, in Fig. 1. The two pieces *s t*, *y x*, (Fig. 2.) are each of them faſtened to the traverſe *s y*, by an iron-hinge, in ſuch manner that the upper ſurface of the ends *s* and *y* of theſe two pieces is exactly level with the upper ſurface of the traverſe *s y*. Their two other ends, *t* and *x*, are terminated by a tenon which is pinned into the ends of the traverſe *t x*. The upper ſurface of theſe three pieces *s t*, *y x*, *t x*, is perfectly even.

The two pieces *s t*, *y x*, are each of them one foot eight inches long, from the end *s*, to the traverſe at *t*. They are two inches and one-third broad, meaſuring over their upper ſurface, and one inch and two-thirds thick. The fore-end of theſe pieces towards the hinge makes an angle of about ſixty-five degrees, with the upper ſurface, as is repreſented in the profile (Fig. 4.)

where the lines *d a*, *a b*, expreſs this angle. This ſlope is made, in order that the harrow may the more eaſily preſs upon the ground, by moving on its hinges; and for the ſame reaſon all friction between the ſides of the harrow and thoſe of the beams is avoided, by leaving an interval of about one-ſixth, or one quarter of an inch between them. The lines, or edges *t s*, *x y*, (Fig. 2.) are parallel, and the diſtance between them is one foot and five-ſixths of an inch. The traverſe *t x* is two inches and nineteen twenty-fourths wide, and one inch and two-thirds thick.

In the middle of the breadth of the upper ſurface of this traverſe, and cut perpendicularly to that ſurface, are two ſquare holes, M and N, diſtant from each other ſeven inches and a half, from the centre of one to the centre of the other, and both equally diſtant from the middle line *o p*.

Of the Teeth of the Harrow, Plate X.

In theſe two holes M N in the traveſe of the harrow are faſtened, as will ſoon be ſeen, two iron-teeth, perfectly alike, ſo that it will be ſufficient to deſcribe one of them. This tooth is ſhaped almoſt like the head of a lance, if we ſuppoſe its two ſides to be bent towards each other, ſo as to form a kind of groove or channel. Theſe two ſides, or fins, are ſeen in perſpective, ſideways in Fig, 5, behind in Fig. 6, from above, and from before, in Fig. 7.

The ſhank *b d* (Fig. 5.) is five inches and an half long, from its riſe at *a b*, to its end *d*; and three quarters of an inch thick at *a b*, where it is made ſquare. This thickneſs is increaſed a little at *c*, in order to form the ſhoulder repreſented at *a b* (Fig, 7.) The diſtance from *a b* (Fig. 5.) to this ſhoulder *c*, is three inches. The ſquare thickneſs of the ſhank, from *c* to *n*, is half an inch; which is likewiſe the ſize of the holes M N (Fig. 2.) The reſt of the ſhank is round, and half an inch in diameter. Its upper end is a ſcrew, fitted to receive a nut about half an inch thick, and a little more than an inch ſquare. The point *e* does not vary from the direction of the ſhank, either to the right or the left, as appears by Fig. 6: but the ſide *b e* (Fig. 5.) bends a little forward, ſo that the point *e* advances one inch and a quarter beyond the pricked perpendicular *n b f*. The upper and outer extremities *c* and *f* of the fins (Fig. 7.) are two inches and one-twelfth diſtant from each other, and equally diſtant from the middle of the ſhank. The width of each fin, in this part, from *s* to *f*, or from *s* to *c*, is one inch and a half. From thence they leſſen by degrees down to their point. The edges of theſe ſides, or fins, are almoſt ſharp, but their thickneſs and ſtrength increaſe towards their back.

The two teeth of the harrow are placed exactly in the middle of two parallel lines ſuppoſed to be drawn from the point of the ſhares; by which means theſe teeth will enter into the ground at equal diſtances from the ſmall furrows made by the ſhares, into which they will throw back the quantity of earth neceſſary to cover the ſeeds perfectly.

As to the poſition of theſe two teeth, they are faſtened in the two holes M and N of the traverſe *t x* (Fig. 2.) as is repreſented by the perſpective view of them in Fig. 8. The ſhank of each tooth is run through the holes in the traverſe *x t*; its ſhoulder is thruſt up cloſe to the under ſurface of this traverſe; and a nut, under which is placed a very thin plate of iron, fixes at the top. The back and point of theſe two pieces ſhould face exactly the fore-part of the drill.

Hinges of the Harrow, Plate X.

To return to the hinges *s* and *y* (Fig. 2.) which are exactly alike, and which are ſeen at *q* and *n* in Fig. 1. Their breadth is one inch and two-thirds, during their whole length, from *v* to *f* (Fig. 2.) The joint *s*, of this hinge, is half an inch in diameter. The claw, from the joint *s* to *f*, is two inches and a quarter long, and is faſtened to the traverſe *f h* by a thumb-ſcrew repreſented in perſpective in Fig. 9, and which ſcrews into a nut *a b*, which is faſtened to the bottom of the traverſe, by two nails. This ſcrew (Fig. 9.) is one-third of an inch in diameter. It is ſcrewed down, by means of a correſponding ſcrew in the nut under the traverſe, till its ſhoulder *c n*, which is two-thirds of an inch in diameter, preſſes upon the claw of the hinge: for which ſee alſo Fig. 4. The length of the other claw of the hinge *s v* (Fig. 2.) from the joint *s* to its end *v*, is four inches and a half. The thickneſs of each claw towards the joint, is a quarter of an inch, and from thence that thickneſs leſſens by degrees to the end *v*. The claw *s v* is faſtened to the piece *s t* by two flat-headed ſcrews.

Spring of the Harrow, Plate X.

Upon this claw, and between theſe two ſcrews, preſſes the end B of a ſpring A *z* (Fig. 2.) which forms an angle at A, and is faſtened to the beam *a b*, between D and *z*, by two flat-headed ſcrews, of which the laſt D is two inches and an half diſtant from the end *z* of the ſpring. Theſe two ſprings are ſeen at *m i e* Z *n* in Fig. 1. The length of this ſpring from *z* to A (Fig. 2.) is thirteen inches and a half, and from the angle A to B two inches and a quarter. Its breadth at *z* is one inch and a half; at N it is one inch and one-twelfth; and at B it is thirteen twenty-fourths of an inch. Its thickneſs at *z* is five twenty-fourths of an inch, and from thence that thickneſs diminiſhes to A, where it is but one-ſixth of an inch. The part A B increaſes in thickneſs from A to B, where it has a head, which alone preſſes upon the claw of the hinge between the two flat-headed ſcrews. This part of the ſpring, with its head, is repreſented plainly, in perſpective, in Fig. 10. When this ſpring is in its ſtate of reſt, the whole of its under ſurface from N to *z* (Fig. 2.) lies exactly flat upon the upper ſurface of the beam. The end *z* of this ſpring is fifteen inches from the end *b* of the beam *a b*. Theſe ſprings ſhould be made of good well-hammered ſtuff, prepared like that which is uſed for the ſprings of coaches; by which means they will have a body, and not be ſubject to break or bend. If they appear to be too weak, they may be placed a little farther from the joint of the hinge, in which caſe they will the better preſs the teeth of the harrow down into the ground.

Connection of the Beams, with the Table and the Shares, Plate X.

The thickneſs of a quarter of an inch is taken off from the upper ſurface of each of the two beams, from *z* (Fig. 2.) immediately adjoining to the end of the ſpring, to Q, in the one; and from E to F in the other; being, in length, eight inches and two-thirds. In theſe lowered ſpaces is placed the table, which will ſoon be ſpoken of, and of which the extent is here indicated by pricked lines. This table is ſeen at H and L, in Fig. 1. It is faſtened to the beams, by four ſtrong flat-headed ſcrews, at *z*, I, G, and H (Fig. 2.) and is ſeen in profile in Fig. 3, Plate II. at *i* and *r*. This table reſts likewiſe upon a piece K L (Fig. 2.) of which the end K, being a tenon, is pinned into the middle of the length of the traverſe *f h*; as is alſo ſeen at U (Fig. 1.) This piece K L (Fig. 2.) is two inches and five-ſixths broad, meaſuring it horizontally, and one inch and five-ſixths thick. Its length is ſuch, that its end L reaches, at moſt, no farther than the edge Q F of the table. At the end of this piece appears a ring, which is faſtened under it, and of which the deſcription and uſe will be ſeen hereafter. The upper ſurface of this piece K L, from K to Y, is level with the upper ſurface of the two beams, and the traverſe *f h*: but from Y to its end, a quarter of an inch is taken off from its thickneſs, in the ſame manner as from the oppoſite parts of the two beams, to fit it for the reception of the under ſurface of the table. A ſide view of this is given in Fig. 11. where *a b* is the profile of this ſurface, which, from *a* to *b*, is level with the ſurface *d a* of the traverſe, and from *b*, to its end *c*, is a quarter of an inch lower, that the table may reſt upon it.

In the middle of the breadth of the upper ſurface of this piece K L (Fig. 2.) and perpendicular to that ſurface, a mortiſe P is cut quite through it, to receive the tenon which is ſeen at U, Fig. 1. This mortiſe is throughout two inches long, and one inch wide. Its end P (Fig. 2.) is three inches and eleven twelfths diſtant from the traverſe *f h*. The two beams are pierced in the ſame manner by two ſimilar mortiſes Q and R, of which the ends Q and R are one inch and eleven twelfths diſtant from the ſide S T of the table. The tenons which paſs through theſe two mortiſes are ſeen at I and *p* in Fig. 1. Theſe three mortiſes are to receive the tenons of three exactly ſimilar ſhares, of which the following is the deſcription. Theſe three ſhares are ſeen at D, K, and *e* in Fig. 1.

Of the Shares, Plate XI.

The ſhares are cut out of a plank, and Fig. 12 repreſents one of their two ſurfaces. The lines which limit this ſurface are perpendicular to each other, excepting *i d*; the line *d c* is ſix inches long; *c f*, nine inches; *f g*, two inches and a quarter; *g l*, five inches and a half; *l m*, two inches; and *h i*, half an inch. This plank is every where an inch thick, except at the edge *e d*, where it forms an acute angle, as at *b*, Fig. 13. which repreſents the bottom of the plank *c d* (Fig. 12.) The part *g l*, in which is the hole *k*, is the tenon which enters into the mortiſes P, Q, R, (Fig. 2.) before deſcribed. Fig. 14. repreſents the top of this plank, and of its tenon.

Fig. 15, is a perſpective view of an iron ſhare which is fixed under the plank, as in Fig. 17. Its point (Fig. 15.) extends from *e h* to *f*. Its ſole, which extends from *c h* to *a c*, and the ears *a b*, *c d*, are all of one piece. Fig. 16 repreſents a geometrical plan of this ſhare, in which *d f*, and *g h*, are the places from whence the two ears ariſe.

The length of the point from *e h* to *f* (Fig. 15.) and from *a b* to *c* (Fig. 16.) is four inches. Its height towards *h*, or towards *e* (Fig. 15.) is about one inch and a quarter, and from thence it leſſens gradually to *f*, which is the point. Its breadth *a b* (Fig. 16.) is the ſame as the thickneſs *c o* (Fig. 13.) of the plank of the ſhare, and it leſſens gradually from thence to its point *c* (Fig. 16.) A notch is made in the upper part of this point, between *e* and *h* (Fig. 15.) or between *a* and *b* (Fig. 16.) to receive the lower end of the angular ſide, *o b c* (Fig. 13.) of the plank.

The ſole *e a* (Fig. 15.) or *a d* (Fig 16.) is of the ſame length and breadth as the bottom *c m*, or *o n* (Fig. 13.) of the plank which it covers. It is about, but not more than two thirds of an inch thick towards *e h* (Fig. 15) and half an inch thick at its end *a c*.

Towards this end are the two thin iron ears, which lie cloſe to the two ſides of the plank, to which they are faſtened by a ſingle nail, which paſſes through the plank, as at *h*, Fig. 17.

This ſhare is alſo faſtened to the bottom of the plank by a flat-headed iron pin, *g h*, Fig. 15. which goes through the ſhare at *n*, and enters into the middle of the thickneſs of the plank. The head *h* of this pin is flat, and lies even with the bottom of the ſole, in the manner indicated by the pricked lines at *a*, Fig. 17. Towards the flat end *c* of this pin is a hole, through which, and through the plank, a ſmaller pin or nail is driven, as is denoted by the pricked circle in the ſame figure.

The point of the ſhare, and the bottom of the ſole, which rubs upon the ground, ſhould be of ſteel. The different thickneſſes given to the ſole, ſhew that its point inclines a little downward, by which means it enters into the earth very eaſily.

Fig. 18. repreſents a perſpective view of a thin plate of iron, which is to cover the plank of the ſhare, as in Fig. 20. to preſerve it from the friction of the ground, which would otherwiſe ſoon wear it out. The thickneſs of this plate, which ſhould be equal every where, is at moſt one twelfth of an inch. It is bent at *a b*, Fig. 18. in ſuch manner, that this bending fits cloſe to the ſharpened edge *c d*, Fig. 20. of the plank; the angle *b*, Fig. 18. being fitted to the notch *c* (Fig. 20.) in the iron part of the ſhare, and the lower edges *b c*, *a d*, of this plate (Fig. 18.) joining on both ſides to the upper edges of the ſole of the ſhare, as in Fig. 20. The breadth of this plate from *a* to *b* (Fig. 20.) is about four inches, and each half of its length, from *c* to *a*, or from *d* to *b*, is about ſeven inches and a half. Fig. 19 is the plan, or bottom, of this plate.

As this plate covers the ears of the ſhare, and at the ſame time its own angle *c* (Fig. 20) is covered by the point of the ſhare, theſe two pieces muſt be put on together. This plate is nailed to the two oppoſite ſides of the plank.

The two ends of this plate extend beyond the hindmoſt part of the plank of the ſhare, in the proportion of *b h*, Fig. 20: and in this ſpace, between theſe two ends, is the opening of the pipe through which the ſeed drops into the ſurrow, as was ſaid before.

The tenon *l g* (Fig. 12) of the ſhare now deſcribed, (and there are three ſuch) enters into one of the three mortiſes, P, Q, R (Fig. 2) through the bottom of which it is paſſed, and is fixed above by a wedge driven into the hole *k* (Fig. 12). Theſe ſhares are ſituated in ſuch manner, that their point faces directly the fore-part of the drill. One of them is repreſented as fixed towards the end *b* of one of the beams, in Fig. 3, which exhibits the profile of that beam.

Of the Piece which is placed under the Middle of the Table, and which bears the Middle Share, Plate XI.

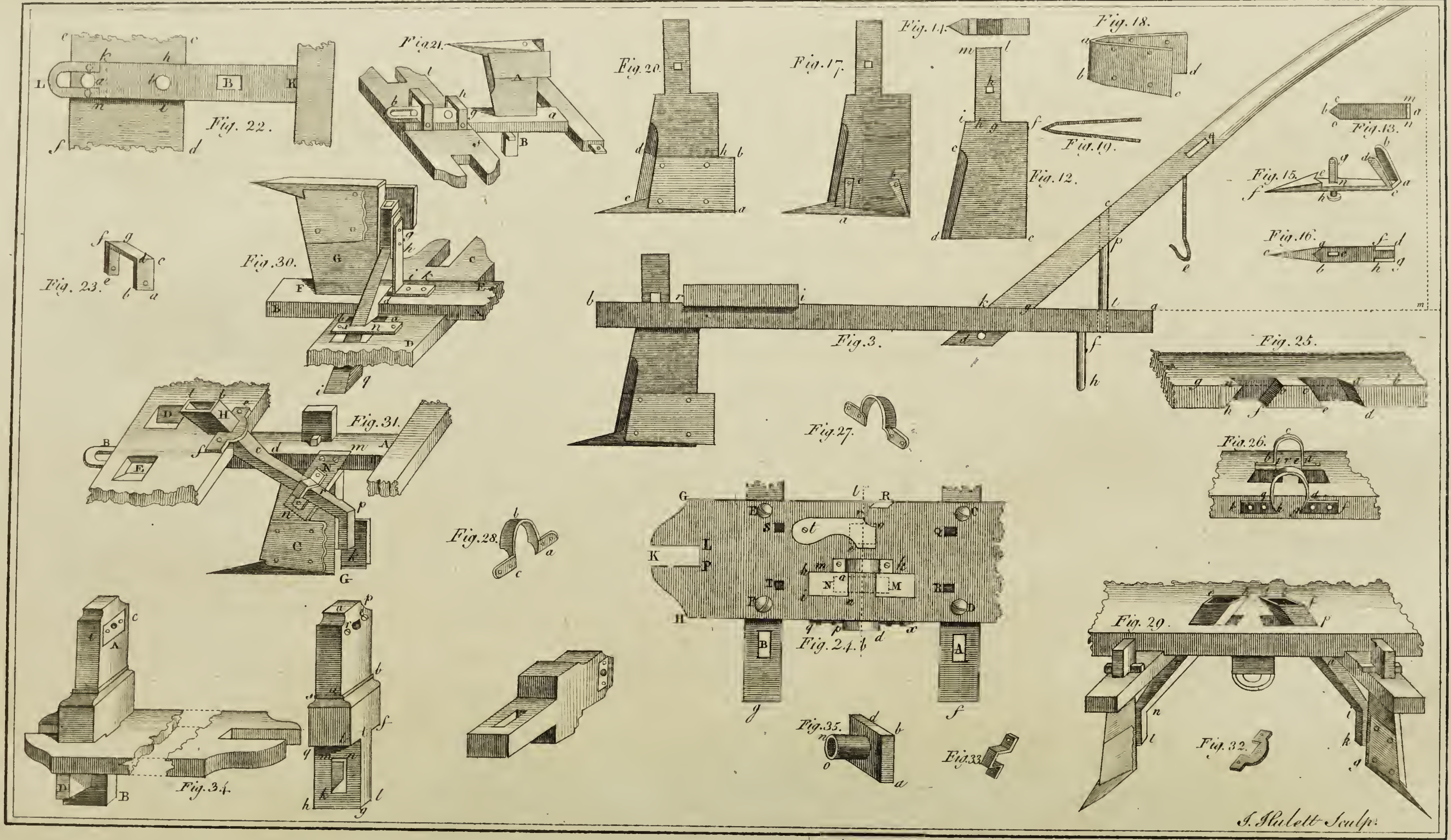
The piece K L (Fig. 2, Plate X.) which as been already ſpoken of, is repreſented with its bottom upward, and in perſpective, at *a b*, Fig. 21. Plate XI. with the ſhare A, and its tenon B, and with the table, which are alſo inverted in the ſame manner. Fig. 22. is a geometrical repreſentation of the under ſide of the ſame piece, and of part of the table, excepting the ſhare, which is omitted here, and of which only the bottom of the mortiſe is ſeen at B.

To the end L of this piece (Fig. 22.) is faſtened the reign, or bridle before mentioned. This bridle is ſhaped nearly like a horſe ſhoe; the breadth of each of its branches is three fourths or five ſixths of an inch; its total breadth is the ſame as that of the piece to which it is faſtened; its total length is three inches and a half, and its thickneſs every where is about one ſixth of an inch. The whole thickneſs of the two branches of this bridle is let into the piece of wood to which it is faſtened; ſo that it forms an even ſurface. This bridle is faſtened to the piece by two flat-headed ſcrews, which lie even with the branches of the bridle, through and into which they are ſcrewed. It is placed in ſuch manner, that the outſide of its circular part L, is one inch and a quarter diſtant from the edge *e f* the table. It is uſed only when the drill is put upon its hind-carriage.

a and *b* are the heads of two large flat-headed ſcrews, which paſs through the piece K L, and fix it to the table. From the centre of the head *b*, to the edge *c d* of the table, is one inch and two thirds. From the centre of the head *a*, to the edge *e*, *f* of the table, is one inch and one third. Theſe two ſcrews are placed in the middle of the branch of this piece K L. Their diameter is five twelfths of an inch, and that of their head is an inch and a twelfth. Theſe heads are flat, and ſcrew in a level with the wood.

Of the two Bridles which receive the End of the Bar which ſupports the Drill upon its Hind-carriage, Plate XI.

Underneath this piece K L, are likewiſe faſtened two bridles very like each other. They are repreſented in perſpective by the ſingle figure 23; but both of them may be ſeen in their proper places, at *g h* and *e f*, Fig. 21. Their place in Fig. 22 is marked only by pricked lines, in order to let the pieces under them be ſeen. Theſe two bridles are made of a flat piece of iron, one inch and a ſixth wide from *a* to *b*, or from *c* to *d* (Fig. 23.) and a very little more than one ſixth of an inch thick. They are bent ſquare at *c d* and *f g*, and are pierced with two holes, *b* and *e*, one fourth of an inch in diameter, of which the centers are three fourths of an inch from the ends of the iron. Thus far theſe two bridles are like each other. What they differ in, is as follows. That which is placed at *g h* (Fig. 21.) is three inches and one ſixth high, from its bottom *a*, to the upper ſurface of its



J. Hulett Sculp.

top *c*, or from *e* to *f*, Fig. 23; and this height in the belt which is placed at *e f* (Fig. 21.) is three inches and five twelfths: That which is placed at *g h*, is two inches and five ſixths long, from its outſide at *c d*, to its outſide at *g f* (Fig. 23.) and this part of the bridle placed at *e f*, is three inches and one third.

Both theſe bridles placed at *g h* and *e f* (Fig. 21.) go over the piece of wood *a b*, to which their ends are faſtened by flat-headed ſcrews, which paſs through the holes *b* and *e* (Fig. 23.) beforementioned. Theſe ends reſt immediately upon the table. As the diſtance between the ends of the bridle *e f* is exactly equal to the breadth of the piece to which they are faſtened, they are applied to the two lateral ſurfaces of that piece, without being let into it: but as the bridle *g h* is not quite ſo long, the ends of this are let into thoſe ſurfaces, as is ſeen in Fig. 21. and in the pricked plan of theſe two bridles, *h i*, *k n*, Fig. 22. The end of theſe bridles ſtand perpendicular to the table. The bridle *g h*, Fig. 21. is one inch and fifteen twenty-fourths from the edge *t s* of the table; and the bridle *e f* is five inches and eleven twelfths diſtant from the ſame edge *t s*.

The uſe of theſe two bridles is to receive the end of the bar hereafter deſcribed, which ſerves to ſupport the drill upon its fore-carriage, when the hind-carriage is joined to it: and to prevent this end of the bar from ſlipping out of theſe bridles, a moveable iron pin is put through it. This pin is ſuſpended by a piece of pack-thread. It paſſes through the bridle L (Fig. 2. Plate X. and 22. Plate XI.) and *b* (Fig. 21.) before deſcribed.

Of the upper Surface of the Table, Plate XI.

Fig. 24. repreſents a geometrical plan of the upper ſurface of the table, one end of which is omitted, as ſuperfluous in this figure, becauſe both its ends are alike. The pricked line *l b* is traced here only to mark the middle of the table, and determine ſome meaſures. The fore-ends of the beams appear here at *f* and *g*, with their mortiſes A and B, into which their ſhares are faſtened. C, D, E, F, are the four large flat-headed ſcrews which faſten the table to the beams. The diameter of theſe ſcrews towards their head is five twelfths of an inch, that of their head is one inch and a twelfth, and their length is three inches and ſeven twelfths. They enter into the middle of the breadth of the beams, and the centers of the holes in the tables through which they paſs, are eleven twelfths of an inch diſtant from the neareſt edges of the table. The whole breadth of the table, at C D, or E F, is eight inches and two thirds. The two corners G and H are thirteen inches diſtant from the middle line *l b*, and the end K is one foot three inches and three fourths diſtant from the ſame line *l b*. The thickneſs of this table is every where one inch and two thirds.

At each end of the table is a notch K L P, of which the inner ſurfaces are perpendicular to each other. Theſe notches are at H and L in Fig. 1. Plate X. Each of them is three inches and three quarters long, from K to L, Fig. 24. and one inch ſeven twelfths wide from L to P. They are ſituated in the middle of the breadth of the table. Their uſe is to receive the lower end of two ſtandards hereafter deſcribed (Fig. 34.) of which one is ſeen at M H, Fig. 1. and the baſe of the other towards L.

This table has two holes, M and N (Fig. 24.) of which the upper openings are exactly equal, and alike ſituated, each of them forms a right-angled parallelogram *a h i n*. The ſide *h i* is parallel to the edge D F of the table, from which it is one inch and a half diſtant, and its length is three inches and a quarter.

The upper edge of the end *a n* is eleven twelfths of an inch diſtant from the middle line *l b*, and its length is one inch and eleven twelfths. The inner and parallel ſides *a h*, *n i*, of theſe holes are perpendicular to the upper ſurface of the table; but their ends *a n*, *h i*, are ſloped, in ſuch manner, that each of them forms an angle of fifty or fifty-five degrees towards the line *l b*. This is expreſſed in the profile of theſe two holes (Fig. 25.) by the angles *l a d*, *b c e*, and *g o f*, *g n h*, each of which has that meaſure.

Q, R, S, T, are four mortiſes, of equal ſize and depth, cut perpendicularly to the upper ſurface of the table. Each of them is nineteen twenty-fourths of an inch long, in the ſame direction as the length of the table, two thirds of an inch wide, and about one inch deep. They are intended to receive the four feet of the hopper, which will be deſcribed hereafter. Two of theſe feet are ſeen in their mortiſes at *k* and *l*, Fig. 1. Plate X The centre of each of theſe mortiſes is ſix inches and five twelfths diſtant from the line *l b* (Fig. 24.) and an inch and three quarters from the edges C E, D F, of the table.

Of the Bridles which receive the End of the Bar which ſupports the Drill upon its Fore-carriage, Plate XI.

From *k* to F, Fig. 24. is a bridle which is ſeen in front in Fig. 26. It is made of iron, one inch, or one inch and a twelfth broad, and one ſixth of an inch thick. It is bent in a ſemi-circle at *a c b*, and lies flat upon the table at its end *a* and *b*, which are faſtened to it by two flat-headed ſcrews *a* and *b*, Fig. 26. and *k m*, Fig. 24. This bridle is perpendicular to the upper ſurface of the table. The higheſt part of the upper ſide of its arch *c*, Fig. 26. is two inches above the table; and its width, from outſide to outſide, from *e* to *i*, is two inches and a half. The length of each ſtrait part, or claw, which is faſtened to the table, is one inch and a quarter. The centres of the ſcrews *k* and *m* (Fig. 24.) are each one inch and three quarters from the middle line *l b*, and four inches from the edge D F of the table.

d r q (Fig. 26.) is the upright of another bridle, of which the top, or upper ſurface, is ſeen at *x d p q*, Fig. 24. the front and ſide in the perſpective figure 27, and the back and ſides in the perſpective figure 28. The hinder ſurface of the two claws, repreſented at *a* and *c* (Fig. 28.) is ſcrewed on to the fore-ſurface of the table, as at *f g* and *h k*, Fig. 26. by two flat-headed ſcrews, each of which is one inch and ſeven twelfths long, and near a quarter of an inch in diameter towards its head, which is half an inch in diameter. The middle of this bridle anſwers to the middle of the length of the table. The under ſurface of the bridle, and of its wings, anſwers to the plane of the fore ſurface of the table, to which it is faſtened. The length of each wing is about two inches and a half; their breadth is five ſixths, and their thickneſs a quarter of an inch. The length and thickneſs of its arched part are equal to thoſe of the wings. The bending of that part is ſuch as is repreſented at *g d r q h*, Fig. 26. The diſtance *g h* between the two wings is one inch and eleven twelfths. The greateſt width of the bridle, from outſide to outſide, as at *d q*, is two inches and three fourths; and, laſtly, the upper ſurface of its higheſt part *r*, is one inch and two thirds above the upper ſurface of the table.

The uſe of theſe two bridles is to receive the end of the bar, which will be deſcribed hereafter. This bar is ſeen at *x d*, Fig. 1, Plate X. where one of the rings appears towards *d*. A wooden wedge *o t* (Fig. 24. plate XI.) is ſlipped, if there be occaſion for it, between this bar and the table, to which laſt it is faſtened by a ſingle flat-headed ſcrew *t*, around which it turns, as around a center. The ſhape and extent of this wedge is ſuch as is here repreſented according to the ſcale. Its thickneſs, throughout, is ſeven twelfths of an inch, excepting only at the part *r o e*, where its upper ſurface inclines from *r*, to *o e*, in ſuch manner, that the edge *o e* is almoſt ſharp, that it may ſlide, like a wedge, under the end of the abovementioned bar, which paſſes through the two bridles or belts. The length of this piece is five inches and one twelfth, from the center *t*, to its end *o e*. This center *t* is ſix inches and one ſixth from the edge D F of the table, and four inches and a quarter diſtant from the middle line *l b*. We ſhall hereafter ſee, that the bar which enters into the two belts now deſcribed, ought not to fill entirely the belt *a b c*, Fig. 26. but ſhould leave room to introduce under it the wedge juſt ſpoken of, which is not to be inſerted but when it is intended to make the other end of the bar preſs hard upon the axle-tree of the fore-carriage, which ſhould never be done at the time of ſowing, unleſs the huſbandman would ſcarcely bury the ſeed.

Of the two Pipes of the Shares of the Beams, Plate XI.

Through the two holes M and N of the table (Fig. 24.) paſs two braſs pipes, which deſcend to, and open at, the back of the ſhears faſtened in the mortiſes A and B of the two beams. Theſe pipes are ſeen at *d* and *f* in Fig. 1. from whence they paſs through the two holes in the table, and terminate behind the two ſhares D and K, as is repreſented in perſpective in Fig. 29. Theſe two pipes *f p a i k*, and *o r n l*, (Fig. 29.) are perfectly alike. They are almoſt ſquare during their whole length; wider towards the end *f d*, than towards the end *k*; and they are made of plates of braſs, ſomewhat leſs than a twelfth of an inch thick, well ſoldered together. Their opening at *f d* forms a parallelogram, which is an inch and one ſixth wide from *b* to *f*, and an inch and three quarters long from *b* to *d*. The plane or perpendicular projection of theſe openings in the table, is indicated in Fig. 24. by the pricked lines between the letters M and N, where it is to be obſerved, that they are both equally diſtant from the middle line *l b*, and an inch and a half from the edge D F of the table. All the rims of theſe openings, *f*, *b*, *d*, *h*, *o*, (Fig. 29.) are nearly parallel to the upper ſurface of the table, above which they riſe two inches and two thirds. As theſe two pipes are alike, and ſituated in the ſame manner, one on the right, and the other on the left hand ſide of the drill, it will be ſufficient to apply to one of them, what remains to be ſaid of both. This pipe runs in a ſtrait, but oblique line, from its opening *f d* to *i*, directly behind and under the ſhare, from whence its direction becomes perpendicular, to its other opening *k*, which is at the height of three inches and a quarter from the bottom *g* of the ſhare. From its bending at *i*, to the opening *k*, is three inches. This opening *k* is a ſquare, of which the ſides are two thirds, or three quarters of an inch long.

This pipe is held to the ſide *p* of the hole, by a piece of iron which is under the table; and it is alſo faſtened near the bending *i*, by another piece of iron fixed under the beam. Theſe faſtenings are ſeen in Fig. 30. which repreſents, in perſpective, the bottom C D of the table, E F of the beam on the right-hand ſide of the drill, and the ſhare G which is faſtened to it. *q l* is the upper opening of the pipe, which runs from thence cloſe to the ſide *a b* of the hole in the table, where it is faſtened by a plate of iron, *n x*, about one eighth of an inch thick. In this plate is a notch which fits cloſe to three ſides of this pipe. This plate is faſtened to the under ſurface of the table, by two flat-headed ſcrews, *x* and *n*. The pipe continues in the ſame direction from its upper opening *q l*, to its bending at *e*, behind the ſhare; but from thence to *f*, it follows the direction of the back of this ſhare. It is faſtened towards this bending by an iron ſquare, *k i h g*, the thickneſs of which is about one eighth of an inch. This ſquare is faſtened under the beam by two flat-headed ſcrews, *k* and *i*, and to the pipe by two other ſcrews, *g* and *h*, the ends of which ſcrew into a piece of iron, which is ſoldered to the pipe, and which is ſeen between the ſquare and the pipe, from *f* to *e*. The beam A B has a ſhallow notch at *d*, to make room for the paſſage of the pipe.

Of the Pipe of the middle Share, Plate XI.

The two pipes which terminate behind the two ſhares faſtened near the ends of the beams at Q and R (Fig. 2, Plate X.) have now been deſcribed. A third pipe, of nearly the ſame form, terminates behind the third ſhare, which is faſtened at P, in the piece K L. This is the pipe which paſſes between U and *y*, in order to its terminating behind the ſhare *e* C.

This piece K L is repreſented in perſpective at A B, Fig. 31, Plate XI. which ſhews its right ſide, with its ſhare C, and the portion of the middle of the table, where are the two holes D, E, through which paſs the two pipes beforementioned.

This third pipe is made like the two others, of plates of braſs, of the ſame thickneſs and the ſame ſhape. Its opening *b l* forms a parallelogram of nearly the ſame ſize as the ſimilar openings of the two other pipes. The plane of this opening, or its perpendicular projection, upon the table, is indicated by pricked lines near *o c e*, Fig. 24. where it is to be obſerved, that the middle of this parallelogram is in the middle line *l b* of the table, and that its ſide *c c* is five inches and five twelfths diſtant from the edge D F of the table. The rims of this opening *b l* (Fig. 31.) are raiſed about two inches above the upper ſurface of the table. From thence this pipe deſcends in a ſtrait, but oblique line, towards the ſhare which is behind the table; and at the ſame time bears to the right to *d* and *c*, where it bends, in order to take the direction of the lateral ſurface of the piece A B, againſt which it reſts. From thence it continues in this direction to *r*, where it bends again, to *p*, immediately behind the ſhare; and there it is bent again, ſo as to deſcend perpendicularly behind this ſhare, down to *k*, which is within three inches and a quarter of the bottom of the ſhare G.

The table is notched at H, to let in one ſide of the pipe. This notch is alſo ſeen at R, in Fig. 24. The pipe is faſtened in this place by an iron plate *e f*, Fig. 31. about one eighth of an inch thick, which is fixed upon the table by two flat-headed ſcrews near *e* and *f*. This piece is repreſented by itſelf in Fig. 32. *m n*, Fig. 31. is a piece of iron, at leaſt one ſixth of an inch thick, faſtened by two ſcrews, at N, againſt the ſide of the piece of wood A B, into which the thickneſs of this iron is let, as may be ſeen at *m*, in ſuch manner that the outward ſurface of this piece *m n*, is level with that of the piece of wood A B. The pipe is faſtened againſt this piece of iron *m n*, by a belt fixed by two ſcrews to the piece of iron *m n*. This belt is repreſented by itſelf in Fig. 33.

Of the Standards, *Plate* XI.

In the notches Æ W at the two ends of the table, Fig. 2. Plate X. are placed two ſtandards, repreſented in perſpective in Fig. 34. Plate XI. with the two ends of the table, of which the middle is ſuppreſſed, as needleſs in this repreſentation. Theſe two ſtandards being exactly alike, it will be ſufficient to deſcribe one of them.

In each ſtandard may be diſtinguiſhed three parts, namely, the head, which reaches from the line *p a*, to the top of the moulding *b d s*; the baſs, which extends from the top *b d s* of the moulding, to the under part of the ſhoulder *f u q*; and the tail or tenon, which begins at the bottom of the ſhoulder.

All the ſides of this ſtandard are at right angles to each other, excepting only the two indentures *p* and *a* in the head, and the mouldings at the baſe. The inner ſurface A B, which faces the other ſtandard, is every where an even plane.

The head is three inches and a quarter wide, from *b* to *d*; two inches and one ſixth thick, from *d* to *s*; and ſeven inches high, from the line *b d* to the line *p a*.

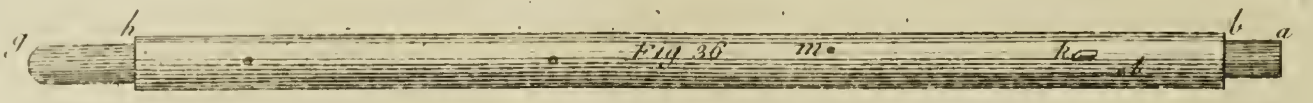
The baſe is four inches and five ſixths wide from *f* to *u*; two inches and five ſixths thick from *u* to *q*; and two inches and a half in perpendicular height from *f u* to *b d*.

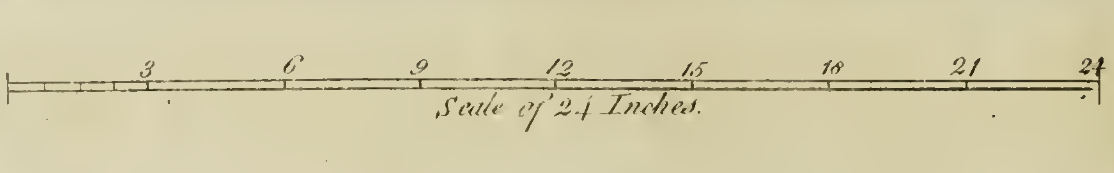
The tail or tenon, which proceeds from the lower middle of the baſe, is equal in breadth *g h*, to the breadth *u q* of the baſe, that is to ſay, it is two inches and five ſixths wide. Its length, *t g*, is ſix inches and a quarter. Its thickneſs is the ſame as the width P L (Fig. 24.) of the notch in the end of the table, which receives this tenon; that is to ſay, one inch and ſeven twelfths. The hole or mortiſe *k n* is in the middle of the breadth of the tenon, and forms a right angled parallelogram, two inches long from *m* to *k*, and eleven twelfths of an inch wide from *n* to *m*. The height of this hole is determined by the thickneſs of the table, in ſuch manner, that the diſtance between the bottom *f u q* of the baſe, to the top *n m* of the hole, is ſomewhat leſs than the thickneſs of the table.

Each ſtandard is faſtened to the table, as may be ſeen in the figure, in the ſame manner as a common turning lathe is faſtened, by a key D, about eight inches and a half long, driven tightly up to its middle, in that part of the mortiſe which is under the table; and for greater ſolidity, one of the keys is put in at the fore part of one mortiſe, and the other at the hind part of the other.

A round hole, one inch and five twelfths in diameter, is bored through the head of the ſtandard, near A. The center or axis of this hole is exactly in the middle of the breadth of the head, and the hole is made through it exactly horizontal to the upper ſurface of the table, or, in other words, perpendicular to the ſide of the ſtandard. The pipe *n o* of the ferrule, Fig. 35. is put into this hole. The diameter of this pipe is the ſame as that of the hole. The pipe *n o*, is of one piece with its ſcutcheon *a b d*,

PLATE XII.





Scale of 24 Inches.

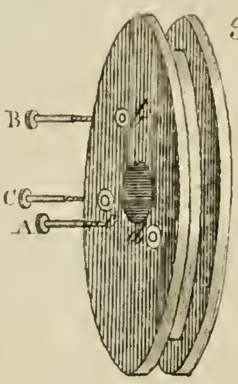
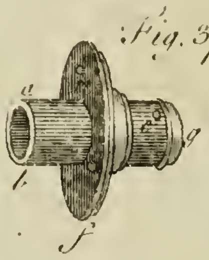
Fig. 42.


Fig. 37.


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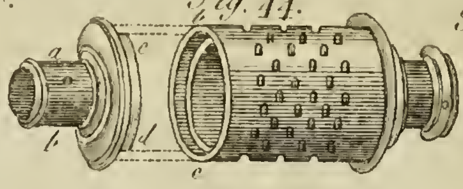

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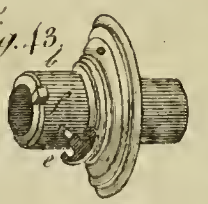

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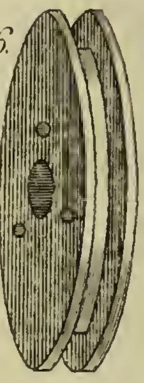


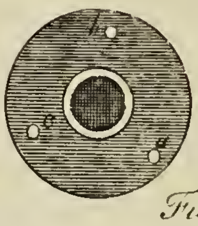


Fig. 41.

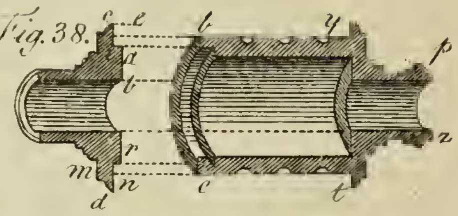
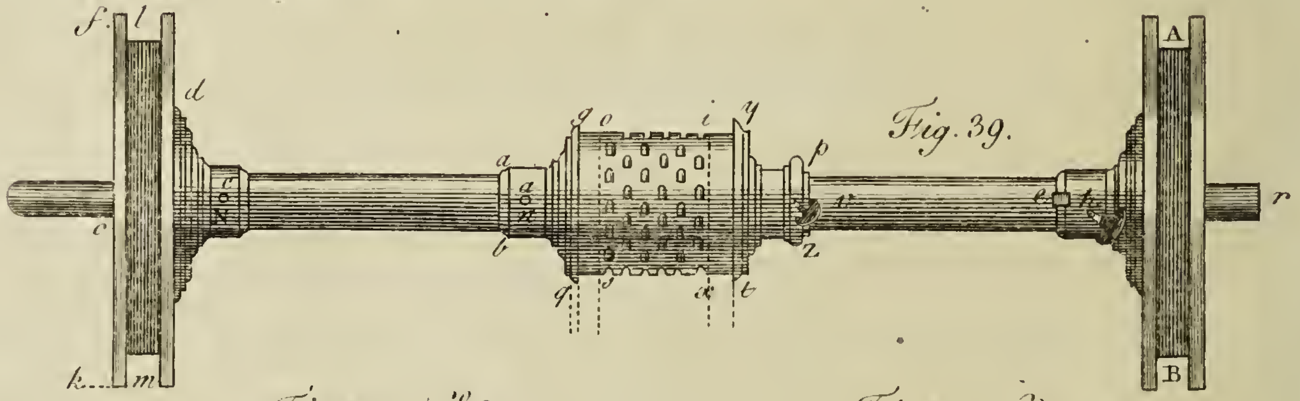
Fig. 38.


Fig. 45.

Fig. 39.


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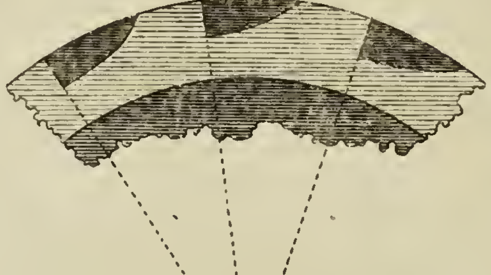

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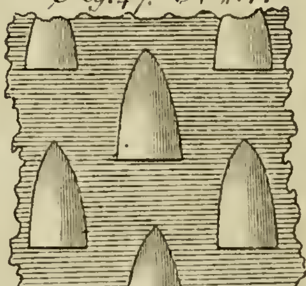

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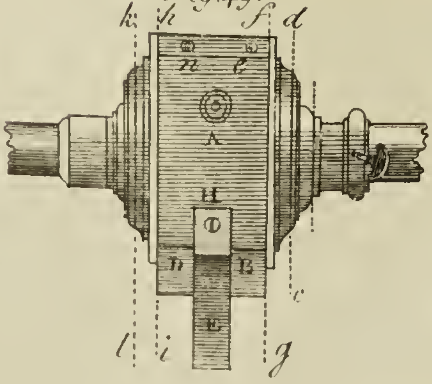

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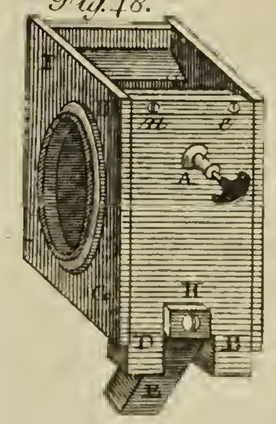


J. Hulett Sculp.

which is one-third of an inch thick: its breadth *ab* is one inch and five-ſixths, and its length *bd* is three inches. All its ſurfaces are at right angles, and parallel to each other. The axis of this pipe is in the middle of its ſcutcheon, and perpendicular to its ſurface. Both the ſcutcheon and the pipe (being but one piece) are bored through with the ſame hole, which is five-ſixths of an inch in diameter; and in the upper ſurface of the inſide of this hole is a grove, which reaches from one end to the other. One end of it is ſeen at *n*, and its uſe will ſoon be ſhewn. The end *no* of this pipe is put into the hole A of the ſtandard (Fig. 34,) at the inner ſide A B of this ſtandard, and the ſcutcheon *abd* (Fig. 35,) is let into this ſurface at *ci* (Fig. 34,) where it is faſtened by two ſcrews, of which the ends are ſeen at *c* and *i*, in this figure, and at *e* and *r* in the adjoining repreſentation of the outſide of the other ſtandard. The two ſmall holes in the ſchutcheon are female ſcrews, to receive the ends of the ſcrews before mentioned, which are one-third of an inch in diameter, and their heads is two thirds. The outer ſurface *ci* of the ſcutcheon is made to lie exactly even with the inner ſurface of the ſtandard, and the centre of its pipe is at the perpendicular height of five inches, and ſeven-twelfths above the ſurface of the table. Theſe two pipes (one in each ſtandard) are deſtined to receive the two pivots *ab*, *gh*, of an iron axis; and the groove *n*, (Fig. 35,) then becomes uſeful, by affording the means of introducing a little oil, to keep the pivots from loſing their temper by their friction, and to make them turn with the greater eaſe.

The ſcutcheon and its pipe ſhould be caſt in one piece of good metal, ſufficiently hard, but by no means brittle.

Of the Axis, and the Pieces which are faſtened to it, Plate XII.

The pivots are of the ſame diameter as their holes; and their ſhoulders *b* and *h* (Fig. 36,) are at the ſame diſtance from each other as the inner ſurfaces of the ſtandards, that is to ſay, two feet.

The axis is repreſented naked in Fig. 36; but the ſeveral pieces repreſented ſeparately in figures 37, 38, 40, 41, 42, 43, 44, 45, and 46, are to be faſtened to it.

Fig. 39, repreſents all theſe pieces fixed upon the axis. It is to be obſerved here, that the long pivot *c* (Fig. 39,) goes through the hole of the ſtandard which is on the left-hand ſide of the drill, and the pivot *r* through the ſtandard on the right-hand; ſo that all theſe figures exhibit a front view of the axis and its pieces.

The pivot *ab* (Fig. 36,) on the right-hand ſide, is one inch and a quarter long; and that on the left, *hg*, about two inches. The diameter of the axis towards the ſhoulder *b* and *h* is one inch and a twenty-fourth part of an inch. From thence it thickens gradually to near the middle of its length, in order to facilitate the fixing of the pieces which are to be ſlipped on, over its two ends. In the middle, its diameter is one inch and an eighth.

The firſt piece which is ſlipped over its end *g* (Fig. 36,) is repreſented in perſpective in Fig. 37: a ſection of it is ſeen in Fig. 38, and it appears in profile at *gabq* in Fig. 39. It is a hollow cylinder, of which the outer diameter *ab* (Fig. 37,) is one inch and thirteen twenty-fourths of an inch. It has a ſhoulder, of which the total diameter *cd* (Fig. 38,) or *gq* (Fig. 39,) is three inches and five-twelfths. Its thickneſs from *a* to *b* (Fig. 38,) is ſeventeen twenty-fourths of an inch; and the thickneſs *nm* of the ſhoulder is one-ſixth of an inch. This hollow cylinder and its ſhoulder are made of the ſame piece of braſs, caſt in a mould, and afterwards turned. The diameter of the hollow of this cylinder is the ſame as that of the middle of the axis, upon which it goes very tightly, and is faſtened, as in Fig. 39, by a riveted pin *n*, one-ſixth of an inch in diameter, which paſſes through the axis and the cylinder. This cylinder is placed in ſuch manner that its rim *ab* is eight inches and fifteen twenty-fourths of an inch diſtant from the ſhoulder *e* of the axis Fig. 39, or from the ſhoulder *b* (Fig. 36.)

After this cylinder is firmly fixed, another hollow cylinder, repreſented in perſpective in Fig. 40, is forced over the end *g* of the axis Fig. 36. Its end *g* is put on firſt, and forced forward, till the edge of its other opening *ab* (Fig. 40,) is about a twelfth part of an inch beyound the ſhoulder *h* of the axis Fig. 36. The reaſon for putting it thus a little beyond the ſhoulder *h*, is, that it may not touch the pipe of the ſtandard when it turns.

This cylinder (Fig. 40,) has, nearly in the middle of its length, a ſhoulder, of which the flat ſide *fd*, which is alſo repreſented in full view in Fig. 41, forms a circle perpendicular to the axis of the cylinder. This circle or ſhoulder is four inches in diameter, and a quarter of an inch thick towards its edge; but it is thicker towards the middle, as is ſeen in its profile at *d* (Fig. 39.) The whole length of the cylinder between its two ends *ab* and *g* (Fig. 40,) is three inches; and the diameter of its thickneſs at each end, *ab* and *c*, is one inch and five-twelfths: the length *na*, from the end *ab* to the flat ſide *df* of the ſhoulder, is one inch and nine twenty-fourths.

This cylinder and its ſhoulder are of one piece of braſs, caſt in a mould, and turned in a turner's lathe. When put upon the axis, over which it goes very tight, in ſuch manner that, as was ſaid before, its end *ab* (Fig. 40,) is placed about a twelfth part of an inch within the ſhoulder *h* of the axis (Fig. 36,) it is faſtened by a pin which goes in at the hole *c* (Fig. 40,) and paſſes through the axis. This pin, which is of iron, and one-ſixth of an inch in diameter, goes tight through the cylinder and the axis, without projecting at either of its ends. This cylinder is repreſented as pinned at N (Fig. 39.)

Fig. 42, is a wooden pully, of which a part is ſeen at P (Fig. 1, Plate X.) and of which the hole in its centre is of the ſame diameter as the end *ab* of the cylinder (Fig. 40, Plate XII.) This end of that cylinder is put through this pully, which is every where one inch and a quarter thick, that is to ſay, ſomewhat leſs than the length of the end *na* of the cylinder (Fig. 40;) ſo that when the pully is put upon the cylinder, and its ſide is placed againſt the ſhoulder *df*, the end *ab* of the cylinder projects a little beyond the other ſide of the pully, to prevent its rubbing againſt the adjoining ſtandard. This pully is repreſented in profile at *lm* (Fig. 39.) Its extreme diameter, *fk*, is eight inches; and its groove *lm*, which is ſquare, is an inch and a quarter deep, and three quarters of an inch wide. This pully is placed cloſe to the braſs ſcutcheon, to which it is faſtened by three ſcrews A, B, C, (Fig. 42,) which ſcrew into the three holes *a*, *b*, *c*, (theſe being female ſcrews) in the flat part of the ſhoulder (Fig. 41,) of the cylinder (Fig. 40.) Each of theſe ſcrews (Fig. 42,) is from a quarter to a third part of an inch in diameter; and their head, which is flat, is about a quarter of an inch thick, and two-thirds of an inch in diameter. Theſe heads are ſcrewed into the holes *ab* and *c*, till they lie even with the ſurface of the pully on that ſide.

To the other end *b* of the axis (Fig. 36,) is fitted exactly, though ſo as to ſlip on with eaſe, a third hollow cylinder (Fig. 43,) of which the profile is ſeen at *h* (Fig. 39.) It is like that which is marked N *d* at the other end of the axis; with this only difference, that the extreme diameter of the end *be* of the cylinder (Fig. 43,) is about two inches. This cylinder is faſtened to the axis by a thumb-ſcrew *e*, which goes through a female ſcrew in the cylinder, and of which the end enters into the hole *l* in the axis (Fig. 36,) which is not a female ſcrew: and that the end of the ſcrew may be directed to this hole, without any difficulty, when the cylinder is upon the axis, this laſt is provided with a ſmall tongue *k*, which goes exactly into the notch *f*, (Fig. 43,) as is ſeen at *e*, (Fig. 39.)

A pully exactly like the former is faſtened to the ſhoulder of this cylinder, by three ſimilar ſcrews, and in the ſame manner: obſerving equally here, that the outer ſurface of this pully do not rub againſt its adjoining ſtandard. This pully is ſeen at Q, (Fig. 1, Plate X.)

It is ſometimes neceſſary to take this pully and the cylinder off from the end *r* of the axis (Fig. 39,) which is the reaſon why this cylinder is faſtened by a ſcrew, and not by a pin, like the other. They are taken off, to make room for putting upon the axis the cellular cylinder, which is of caſt braſs, and turned in a lathe.

Of the cellular Cylinder, *Plate* XII.

This cylinder is ſeen in profile, upon the axis, at *p*, *y*, *g*, *q*, *t*, *z*, (Fig. 39,) and in perſpective in Fig. 44. Fig. 45 repreſents its longitudinal ſection. The part of this cylinder which is between the two lines *y t* and *p z*, (Fig. 39) is exactly like the above deſcribed cylinder Fig. 37 and 38, and *g*, *a*, *b*, *q*, (Fig. 39.)

The only difference between them is, that the one is fixed permanently to the axis, by a pin *n*, (Fig. 39;) and the other is faſtened by a ſcrew *v*, which paſſes through a female ſcrew near the end of the cylinder, which is ſtrengthened there for that purpoſe, by a moulding or collar *p z*. The end of this ſcrew enters into a hole *m* in the axis (Fig. 36;) but this hole is not a ſcrew. The other part of the cellular cylinder included between the two lines *y t* and *g q*, (Fig. 39,) is three inches and five-twelfths long; its outward diameter, throughout this length, is two inches and twenty-one twenty-fourths of an inch: and its inner diameter is two inches and a third. This inner diameter is a little wider towards the end *b c* of the cylinder, (Fig. 44 and 45.) It is exactly the ſame as the outer diameter of the projecting part *c d* of Fig. 37, which is to go into, and fit cloſely to, the end *b c* of the cellular cylinder, (Fig. 44;) ſo that the edge of this end *b c* may run quite up to the flat ſide of the ſhoulder of Fig. 37. The pricked lines in Fig. 45 and 38, are intended to expreſs the correſpondence of the parts of theſe two cylinders, which are to be united, by putting the end of one into the end of the other. Fig. 39 ſhews the cellular cylinder joined to the ſhoulder of the other cylinder: in which poſition it is that the cellular cylinder is faſtened to the axis by the ſcrew *v*, as before ſaid: and that the end of this ſcrew may be directed ſtrait to the hole in the axis, whenever this cylinder is put on, two contiguous lines or marks may be made, one upon the edge *p z* of the cylinder, and the other upon the axis.

Of the Cavities of the cellular Cylinder, *Plate* XII.

On the ſurface of this cylinder, between the lines *y t*, and *g q* (Fig. 39,) are ſcooped hollows or cavities, repreſented at large in Fig. 47, N°. 1, and ſeen in profile in Fig. 47, N°. 2. They are ſhaped nearly like a niche, which terminates in a cone at its top, and is rounded gradually deeper and deeper down to its bottom, which is a flat, perpendicular to the loweſt part of the cavity.

To conceive and fix the poſition of theſe cavities upon the cylinder, the two pricked lines *i x*, *o s* (Fig. 41,) muſt be drawn round the cylinder, at equal diſtances from the lines *y t*, and *g q*, and diſtant from each other two inches and one-third, which is the inner breadth of the ſeed-box in which the cylinder is placed, as will be more particularly explained in the deſcription of it.

The breadth between the lines *i x*, and *o s*, muſt then be divided into ſix equal ſpaces, by five other parallel lines drawn round the cylinder. Each of theſe ſpaces marks the width of each row of cavities; and the ſix rows of cavities muſt face exactly the ſix valves of the bin, which will ſoon be ſpoken of.

After this, the places muſt be marked for twelve ſimilar cavities, placed at equal diſtances from each other, in each of the breadths traced round the cylinder; obſerving, that the length of the cavities is to be in the ſame direction as thoſe breadths; and alſo, that the flat end of each cavity muſt be undermoſt, and the rounded end uppermoſt, when the cylinder fronts the fore-part of the drill, which is the view repreſented in Fig. 39; for it is the flat end of the cavities that is to go foremoſt, when the cylinder turns and drops the ſeed.

It is likewiſe to be obſerved, that each cavity ſhould be oppoſite to the interval between two cavities in the next adjoining rows, as they are placed in Fig. 39, 44, and 47.

It will be right to have two or three, or even more, cellular cylinders, equally fitted to the axis (Fig. 39,) but with cavities of different ſizes, in order to be thereby enabled either to ſow more or leſs ſeed, or ſmaller or larger ſeeds, ſuch as barley, lentils, peaſe, beans, millet, oats, &c. for each of which its proper cylinder ſhould be uſed.

The cavities in Fig. 47, N°. 1 and 2, are of a ſize fit for wheat, barley, lentils: for millet, they muſt be much ſmaller; for peaſe, ſomewhat deeper; for oats, there ſhould be but eight or nine cavities in each row, in order that thoſe cavities may be made longer than for wheat, on account of the length of the oat, which is the only ſeed that I have found leſs eaſy to ſow than wheat: the reaſons are, the lightneſs of oats, their not ſlipping eaſily between each other, and their having at one end of the grain a pretty long, flexible, and elaſtic point. Theſe obſtacles ſometimes hinder the grains from entering into the cavities, and the ſeedſman muſt be more careful when he ſows oats, than when he ſows any other kind of grain; though, notwithſtanding theſe difficulties, I have had them ſown pretty well.

To ſow beans, the cylinder muſt have but three rows of cavities, of a length, breadth, and depth proportioned to the ſize of the beans. The bin, which has ſix valves for wheat, ſhould have but three for beans, and theſe valves ſhould be proportioned to the breadth of the cavities, which muſt be placed exactly oppoſite to them, as for wheat.

The following rule will determine the proper ſize of the cavities, by applying, as may eaſily be done, what is here ſaid of wheat to any other kind of grain.

The cavities muſt be large enough to contain three or four grains of wheat, and their depth muſt be ſuch that theſe grains do not riſe above the ſurface of the cylinder, in order that when the cavities filled with ſeeds, paſs under the valves of the bin, the grains may not fall out of the cavities. This will be ſtill better underſtood, after reading the deſcription of the ſeed-box.

Of the Seed-Box, *Plate* XII. *and* XIII.

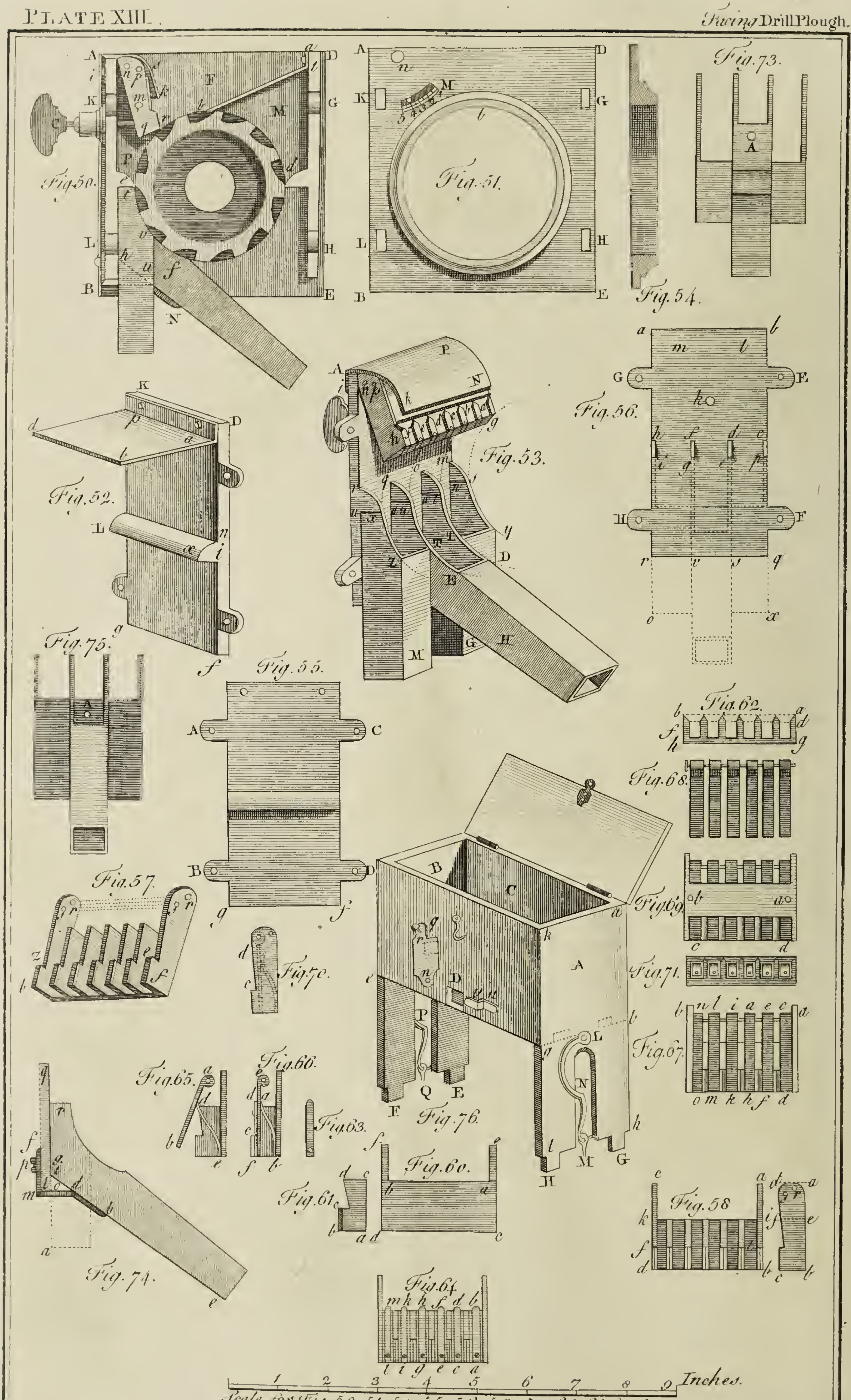
After unſcrewing and taking off from the axis, the pully AB (Fig. 39) its cylinder *h*, and the cellular cylinder *p z*, *g q*; the ſeed-box (Fig. 48,) is placed upon the axis, by running the bared end of this laſt through a round hole in each of the two parallel ſides of the ſeed-box. The diameter of theſe holes is the ſame as that of the cellular cylinder, which is then to be put over the axis, by paſſing its proper end through the hole in the ſide of the ſeed-box, which it traverſes, and faſtening it in the manner before directed. The pully is alſo then to be replaced. The front of this box is ſeen at B (Fig. 1, Plate X.)

Fig. 49 repreſents the box and the cellular cylinder placed upon the axis, where it is to be obſerved that the outer breadth of the box, expreſſed by the interval between the lines *d c* and *k l*, is exactly the ſame as the length of the cylinder expreſſed in Fig. 39, by the diſtance between the lines or ſhoulders *y t*, and *g q*; ſo that the box is held between theſe two ſhoulders *y t*, and *g q*. It is alſo to be obſerved, that the inner breadth of the box, expreſſed by the interval between the lines *f g*, and *h i*, in Fig. 49, is exactly the ſame as the length of the cylinder expreſſed by the lines *i x*, and *o s*, in Fig. 39.

This braſs-box has neither cover nor bottom, but is formed of four plates, each five twenty-fourths of an inch thick. Fig. 50 repreſents the inſide of the plate FG, (Fig. 48,) which is on the left-hand ſide of the drill, with the pieces which the box contains, and a ſection of the cylinder, lengthways of one of the rows of cavities. Fig. 51 repreſents the outſide of the plate oppoſite to the former, and which conſequently is on the right-hand ſide of the drill.

Theſe two plates (Fig. 50 and 51,) are exactly equal. Each of them forms a parallelogram, of which the length AB (Fig. 50 and 51,) is four inches and eleven

PLATE XIII. *Facing* Drill Plough.



Scale for Fig. 50. 51. 54. 55. 56. 58. 59. 60. 61. 62. 63. 64. 65. 66. 67. 68. 69. 70. 71. 72 73. 74. 75 & 90.

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twelfths, and the breadth B E four inches and fifteen twenty-fourths. Both of them are perforated by a large round hole, of the ſame diameter as that part of the cylinder in which are the cavities. The centre of this hole is in the middle of the breadth of theſe plates, and the upper extremity *b*, of this hole (Fig. 50 and 51,) is an inch and one-ſixth diſtant from the upper edge, D A, of the plate. Both the plates have four mortiſes, G, H, K, L, (Fig. 51,) the breadth of which is equal to the thickneſs of the plates, and the length about half an inch; though this laſt is almoſt arbitrary. Both of them have alſo, directly facing each other, a hole at *n* (Fig. 50 and 51,) three twenty-fourths of an inch diameter, and of which the centre at the diſtance of five twenty-fourths of an inch from the line D A, and half an inch from the line A B. The inner ſurface of both the plates is even; and laſtly, each of them has, on its outer ſurface, a ſhoulder which projects round the rim of the great hole. One of theſe ſhoulders is ſeen in perſpective in Fig. 48. The profile of one of them is ſeen between the lines *d c* and *f g* (Fig. 49,) and that of the other between the lines *h i* and *k l*. Fig. 54 repreſents a ſection of them both. The thickneſs of this ſhoulder, that is to ſay, the diſtance to which it is to project, has already been determined by the total diſtance between the lines *y t* and *g q* (Fig. 39.) When the inner ſurfaces of theſe two plates (Fig. 50 and 51,) are laid againſt each other, their edges and holes, now deſcribed, ſhould coincide exactly.

What they differ in is, firſt, that one of them (Fig. 51,) has a ſmall opening M N, which the other has not, and which will be deſcribed in its proper place; and ſecondly, that the hole *n* (Fig. 50 and 51,) is a female ſcrew in Fig. 50, to receive the end of a ſcrew which traverſes the box, but is not wormed in that manner in Fig. 51, where the outſide of the plate is hollowed a little around this hole, to make room for the flat head of this ſcrew, which will be ſpoken of hereafter.

The two plates now deſcribed are fixed in their proper places by means of two others (Fig. 55 and 56,) which laſt are of equal ſize with each other. D E (Fig. 50,) is the profile of Fig. 55, which is the back of the box; and A B (Fig. 50,) is the profile of Fig. 56, which is the front of the box repreſented at A (Fig. 48 and 49.)

The two tenons A and B (Fig. 55,) enter into the two mortiſes which are hid near G and H in Fig. 50. The two other tenons C and D (Fig. 55,) are expreſſed near G H in Fig. 50, and receive the mortiſes G and H of Fig. 51. In like manner the two tenons E and F of Fig. 56, enter into the mortiſes hidden near K and L in Fig. 50, where are marked the two other tenons, likewiſe ſeen at G and H in Fig. 56, which are to receive the mortiſes K and L of Fig. 51. The diſtance between the tenons of the ſame ſide of a plate, and conſequently between their mortiſes, is arbitrary; as is alſo the length of the tenons, which are pierced, in order to their being fixed very tightly by pins about the twelfth part of an inch thick. Theſe two plates (Fig. 55 and 56,) when rightly placed between the other two plates, ſhould be perpendicular to them, and parallel to each other, as well as to the lateral edges of thoſe other plates, and the diſtance between them, from inſide to inſide, ſhould be four inches. The upper edges of the four plates, when they are put together, ſhould be horizontally level; by which means the bottom of the two largeſt plates will reach lower down than the ſmaller. Theſe two ſmaller plates (Fig. 55 and 56,) are ſhaped like a parallelogram two inches and a third wide, and four inches and thirteen twenty-fourths long. This breadth anſwers exactly to the ſpace between the lines *i x* and *o s*, (Fig. 39,) and between the lines *f g* and *h i*, (Fig. 49.)

The plate (Fig. 55,) which is ſeen in perſpective in Fig. 52, has, quite acroſs its inner ſurface, a ſolid plint *x* L, which is of the ſame piece as the plate, and runs parallel to *f g*, (Fig. 52 and 55.) The bottom of this plint is flat, and its top is arched like a portion of a circle. Its thickneſs from *i* to *n* is nine twenty-fourths of an inch, and its projecture *i x*, (Fig. 52,) is ſuch that its edge *x* L meets the ſurface of the cellular cylinder, as in the profile *d* (Fig. 50.)

The uſe of this plint is to ſtrengthen the aſſemblage of the plates; for which purpoſe its ends *x* L, (Fig. 52,) ſhould join exactly to the larger plates: and it ſerves likewiſe to prevent the grains of corn from ſlipping down between the plate and the cellular cylinder.

To the top of the inſide of this plate is faſtened, by two ſcrews *a* and *p* (Fig. 52,) a plate of braſs one-twelfth of an inch thick. Its extent *a*, *p*, *d*, *b*, is a rectangle parallelogram, of which the breadth *a p*, or *d b*, is the ſame as that of the plate to which it is faſtened; ſo that its edges *a b* and *p d* lie cloſe to the inſides of the two largeſt plates (Fig. 50 and 51.) The profile of this plate is ſeen at *a l b*, (Fig. 50,) where it is inclined from *l* to *b*, in ſuch manner that the whole length of its edge *b d*, (Fig. 52,) is almoſt cloſe to the ſurface of the cylinder, directly above its axis, as in the profile *b*, (Fig. 50.) But this plate muſt not quite touch the cylinder, becauſe it would then obſtruct its motion, or at leaſt occaſion a needleſs and detrimental friction. Its uſe is to hinder the corn which fills the ſpace F, from falling down into the ſpace M, and to make it paſs only under the piece *r q* (which will ſoon be deſcribed) to drop from thence into three pipes, which begin near *e*, as will be ſeen hereafter.

The plate Fig. 56, (ſeen in perſpective in Fig. 53, with ſome pieces fixed to it) has, riſing upon its inner ſurface, four, exactly ſimilar ſmall partitions, which are of a piece with the plate. Theſe four partitions *c p*, *d e*, *f g*, *h i*, (Fig. 56,) are ſeen in perſpective at *m s*, *o t*, *q v*, and *r x*, in Fig. 53. The top *r x* of all theſe partitions is rounded like the quarter part of a circle, and the bottom *x v* is flat, and at the ſame height as the axis of the cylinder, as may be ſeen in the profile *e* of one of theſe partitions (Fig. 50.) The two outer partitions *c p* and *h i*, (Fig. 56,) are at the edges of the plate, and the two others *d e*, *f g*, divide the ſpace between *c* and *h* into three equal parts. Theſe partitions are about a twelfth part of an inch in thickneſs, and their rounded part terminates in an edge, that the grains which may chance to fall upon it may not lodge there. The height *u r*, (Fig. 53,) or *i h*, (Fig. 56,) of all theſe partitions, is nine twenty-fourths of an inch. The lower ends *s w*, *t æ*, *v a*, *x u*, (Fig, 53,) of all theſe partitions, are in a plane perpendicular to the plate, and parallel to the edges *b a*, *q r*, of this plate (Fig. 56.)

This plate has alſo upon its outer ſurface a ſmall cylinder, which is ſeen in profile at K, (Fig. 50,) in front at A, (Fig. 49,) and in perſpective at A, (Fig. 49,) and B, (Fig. 1, Plate X.) Its whole length is two-third of an inch, and its diameter is half an inch, excepting its ſhoulder at the plate, which is a little more. This cylinder is pierced lengthways with a female ſcrew, which goes through the plate perpendicularly to its ſurface, and through which paſſes a ſcrew C *q*, (Fig. 50,) five twenty-fourths of an inch in diameter, of which the end is ſeen at *q*, and the head at C. This head is alſo ſeen at B, (Fig. 1, Plate X.) The hole is ſeen at *k* (Fig. 56,) in the inner ſurface of the plate. The centre of this hole *k* is in the middle of the breadth of the plate, and at the diſtance of five twenty-fourths of an inch from its edge *a b*. This fixes the place of the ſcrew and of its cylinder; the only uſe of which laſt is, by its length, to give the greater ſtability and firmneſs to the ſcrew, which keeps the bin at a greater or leſs diſtance from the cellular cylinder.

Of the Bin and its Valves, Plate XIII.

The bin, which has ſix valves, is ſeen in profile at *q n*, (Fig. 50.) The outſide of this bin is ſeen in perſpective at *g h n*, (Fig. 53,) with the ends of the valves *a*, *b*, *c*, *d*, *e*, *f*, ſeparated from each other by partitions. It is ſuſpended in the box by the axis or ſcrew beforementioned (Fig. 50 and 51,) which goes in at the hole *n* in the end (Fig. 51) of the box, then paſſes through the hole *n* of the bin (Fig. 50 and 53,) runs quite through the length of the bin, and ſcrews into the female ſcrew in the plate (Fig. 50,) which, as was ſaid before, is directly oppoſite to the hole *n* in the plate (Fig. 51.) The head of this ſcrew, at *n* (Fig. 51,) lies even with the outer ſurface of this plate.

Fig. 57 repreſents in perſpective the bin alone and its partitions, all made of one piece, or plate of braſs. Fig. 58 repreſents geometrically the fore-part of the bin, which is here turned towards the ſeedſman. Fig. 60 repreſents its back. Fig. 62 its bottom. Fig. 59 one of its utmoſt ſides, or largeſt partitions, both of which are equal and alike. And Fig. 61 the ſide or profile of one of the ſmaller partitions, which are all equal and like to each other.

The whole length of the bin from outſide to outſide, that is to ſay, from a to c, and from b to d, (Fig. 58,) or from c to d, and from e to f, (Fig. 60,) is the ſame as the breadth of the inſide of the box, or of the ſpace between the lines $i\,x$ and $o\,s$, (Fig. 39,) or $f\,g$ and $h\,i$, (Fig. 49.) The bottom of the bin is a parallelogram i, k, d, b, (Fig. 58,) or a, b, d, c, (Fig. 60,) eleven twenty-fourths of an inch wide at $a\,c$ and $b\,d$. This bottom is of the ſame thickneſs as the largeſt partitions or ſides $a\,b$, $c\,d$, (Fig. 58,) and the five ſmaller partitions; that is to ſay, three twenty-fourths of an inch. Theſe partitions, both great and ſmall, are at equal diſtances from each other, and all their ſides are perpendicular to the bottom of the bin.

The whole length of the two largeſt partitions, (Fig. 59,) from b, to the pricked line $g\,d$, which is perpendicular to $a\,b$, is one inch and ſeventeen twenty-fourths. Their breadth at $a\,i$ and $b\,c$ is five-ninths of an inch. The line $c\,m$, parallel to $b\,a$, is eleven twenty-fourths of an inch long. The notch $l\,m$ is one-twelfth of an inch deep. The angle a, b, c, is of eighty-five degrees. The perpendicular diſtance from the centre of the hole s, to the line $g\,d$, is a quarter of an inch; and the perpendicular diſtance from the ſame centre to the line $a\,b$, is five-twelfths of an inch. The diameter of this hole is a full twelfth of an inch. The perpendicular diſtance from the centre of the hole r, to the line $g\,d$, is very near, but not quite, one-ſixth part of an inch; and the perpendicular diſtance from this ſame centre to the line $a\,b$, is five twenty-fourths of an inch. The diameter of this hole is one-ſixth of an inch. Theſe two main partitions, $a\,b$ and $c\,d$, (Fig. 58,) which have now been deſcribed in the account of Fig. 59, are exactly alike, and pierced in the ſame manner; ſo that if they could be laid flat together, inſide to inſide, their dimenſions and holes would tally perfectly.

It is through the hole r, (Fig. 59,) that the ſcrew or axis is paſſed which keeps the bin ſuſpended to the plates, and which was mentioned before. Theſe two holes $r\,r$ are ſeen in Fig. 57, where their axis is indicated by two pricked lines. And it is through the hole s, (Fig. 59,) that the ſcrew or axis is paſſed which goes through the valves, next to be ſpoken of, and by which they are ſuſpended in the bin. Theſe two holes $s\,s$ are ſeen in Fig. 57, with their axis, which is indicated by two pricked lines.

Fig. 61 repreſents the profile of the ſmall partitions. Its total height from $a\,b$ to $c\,d$, is equal to the breadth $d\,b$ of the bottom (Fig. 60,) as is ſhewn in Fig. 58. The ſhape and ſize of theſe ſmall partitions is exactly like, and equal to that part of Fig. 59, which is included between the lines e, f, b, c; ſo that their edges would tally in all reſpects, if they were laid one upon the other. The line $c\,d$, (Fig. 61,) is perpendicular to $c\,a$.

The edge $m\,c$, (Fig. 59,) is a bevil, ſloped towards the inſide of the bin, as at $e\,f$, (Fig. 57,) and $a\,d$, (Fig. 62.) The like edge $z\,b$, (Fig. 57,) and $h\,f$, (Fig. 62,) is ſloped in the ſame manner. All the ſimilar edges $e\,b$, (Fig. 61,) of the ſmall partitions, which are included between the lines $e\,f$ and $b\,d$, (Fig. 58,) are bevils on each ſide, and form as many acute edges, as is ſeen in Fig. 62, between the lines $a\,b$ and $d\,f$. The diſtance between the lines $a\,b$ and $g\,h$, is five-ninths of an inch.

Fig. 58 is repeated in Fig. 64, with only the addition of the ſix ſprings $a\,b$, $c\,d$, $e\,f$, $g\,h$, $i\,k$, $l\,m$, each of which is faſtened by a ſmall ſcrew, a, c, e, g, i, l, at one of their ends, next to the bottom of the bin, and in the middle of the interval between two partitions. The breadth of theſe ſprings is nearly equal to two-thirds of this interval, and their thickneſs is the ſame as that of a common ſpring of a watch, which is the ſtuff they are made of. Fig. 63 exhibits a front view of one of theſe ſprings. Their length and bending, when in a ſtate of reſt, is repreſented in the profile $e\,d$, (Fig. 65,) $b\,a$, (Fig. 66,) ſhews the profile of theſe ſprings in a ſtate of contraction.

Fig. 64 is repreſented in Fig. 67, with only the addition of the ſix valves $c\,d$, $e\,f$, $g\,h$, $i\,k$, $l\,m$, $n\,o$, ſeen in profile in Fig. 65 and 66. Each of theſe ſix valves is, at moſt, one-twelfth of an inch thick, and their total length, $a\,b$, (Fig. 65,) is one inch and thirteen twenty-fourths. The ſix valves, put together, weigh twenty penny-weights, or five-ſixths of an ounce. When put in their proper places (Fig. 67,) each of them covers one of the before-mentioned ſprings. The breadth of each of them is equal to the whole width of the interval between two partitions, between which they muſt only be able to move. They are all faſtened to the ſame axis $a\,b$, which, as was ſaid before, paſſes through the holes $s\,s$, (Fig. 57 and 59.) The diameter of this axis is a full twelfth part of an inch. One of its ends ſcrews at a, (Fig. 67,) into one of the aforeſaid holes s, and the other end, which has a flat head, is buried at b, in the other hole s; for which purpoſe the outſide of the plate is pared away a little, around this hole. One of theſe holes is ſeen at p, in Fig. 50 and 53. The valves are laid flat in Fig. 67, with their ſprings contracted, as in the profile, (Fig. 66.) When the ſprings are at liberty, they puſh the valves out of the partitions, as far as is repreſented in the profile (Fig. 65.) But they are kept within partitions, by a cover $a\,b$, (Fig. 69,) which is put into the notch $f\,m$, (Fig. 59,) and $e\,d$, (Fig. 61;) and, in ſhort, into all the notches, which are upon a level with each other, from $i\,e$ to $f\,k$, (Fig. 58.)

Fig. 67 is repeated in Fig. 69, with only the addition of the cover, which is three quarters of an inch wide, as long as the whole breadth of the bin, and not quite a twelfth part of an inch thick. It is faſtened by two ſcrews a and b, which go into the upper edge of the large partitions, as appears in the profile (Fig. 66 and 70.) Fig. 70 repreſents one of the large partitions of the bin, with the end $c\,d$ of its cover, and the head of one of the ſcrews which faſten it. Fig. 66 repreſents the profile of one of the ſmall partitions of a valve $e\,f$, of its ſpring $a\,b$, and of the cover $d\,c$. This figure ſhews alſo, that the end of the valve cloſes with the loweſt edge of the partition; as may be ſeen more diſtinctly at $d\,o$, (Fig. 67 and 69.)

Fig. 68 repreſents the back of theſe ſix valves faſtened to their axis.

The end of each valve, d, f, h, k, m, o, (Fig. 67,) is bent a little outward, as in Fig. 71, which is only a repetition of Fig. 62, with the addition of the ſprings of the valves, and their cover.

The whole bin, furniſhed with the ſix valves and their axis, the ſix ſprings and their ſcrews, and the cover and its two ſcrews, but not the axis or ſcrew which ſuſpends the bin in the box, weighs four ounces and a half.

The bin thus completed, and ſuſpended in the box, as was ſaid before in ſpeaking of Fig. 50 and 53, is again covered by thin plate of braſs repreſented in perſpective at i, A, k, N, P, (Fig. 53,) and of which the profile is likewiſe ſeen at i, A, s, k, (Fig. 50.) This plate is bent at A P, (Fig. 53,) in ſuch manner that its bended part turns inward, over the upper edge of the front of the braſs-box; and its edge, which is ſeen in profile at A i, (Fig. 50 and 53,) and fully at $e\,n$, (Fig. 48 and 49,) is faſtened to the upper part of the outer ſurface of this plate of the box, by two ſcrews e and n, which go into the holes l and m, in Fig. 56. This plate, from its bending A P, (Fig. 53,) projects over into the box, inclining down to the bin, which it covers as low as N k, where the cover of the bin before-mentioned ends. This plate performs the office of a ſpring, and ſhould therefore be ſcrewed on very tight. It preſſes the bin againſt the end q of the ſcrew q C, (Fig. 50.) The breadth A P and k N of this plate, (Fig. 53,) is the ſame as the breadth of the inſide of the box; ſo that its two edges, A k and P N, lie cloſe to the inner ſurfaces of the two large plates, (Fig. 50 and 51,) which form the ends of the box.

Of the three Pipes of the Seed-Box, Plate XII. *and* XIII.

Fig. 72 repreſents a perſpective view of the three pipes, which are ſeen partly at B, D, E, Fig. 48 and 49, Plate XII. and at *a b*, Fig. 1, Plate X. They are made of plates of braſs, about a twelfth part of an inch thick, and are ſeparated from each other only by a ſimple partition. Their front is ſeen in perſpective, and on the right-hand ſide of the drill, in Fig. 72. Their back is ſhewn in perſpective, and on the right-hand ſide of the drill, in Fig. 53. Their front is repreſented geometrically in Fig. 49 and 73; and their back in Fig. 75. Fig. 74 repreſents geometrically, the ſide or profile of the middle pipe, which is inclined with the piece that faſtens it to the plate. The profile of the pipes on each ſide of this is indicated by pricked lines.

Theſe three pipes, (Fig. 72,) are ſet againſt the plate (Fig. 56,) in ſuch manner that the edges *a b*, *c d*, (Fig. 72,) are applied cloſe to it, and in the ſame order, at *i r*, *v g*, (Fig. 56.) The edges *g h*, *f e*, (Fig. 72,) are applied in like manner at *p q*, *s e*, (Fig. 56.) The line *b h*, (Fig. 72,) is ſet exactly even with *r q*, (Fig. 56.) By this means the anterior ſurfaces *b c k i*, and *f h l m*, of the two outer pipes, (Fig. 72,) exceed the bottom of the box, as at B D, (Fig. 48 and 49;) and the upper edges *a n*, *d o*, *e p*, *g q*, (Fig. 72,) join to the lower edges of the four partitions (Fig. 56,) at *i*, *g*, *e*, *p*, as is ſeen in perſpective in Fig. 53, at *x u*, *v a*, *t æ*, and *s w*.

Theſe three pipes, which hold together, are faſtened to the plate by means of a ſingle braſs ſcutcheon A, (Fig. 72,) which is ſeen directly in front at H, (Fig. 49,) and at A, (Fig. 73.) Its fore part and right hand ſide are ſeen in perſpective at A in Fig. 72; and its fore part and left hand ſide at H, (Fig. 48.) Fig. 75 ſhews a full view of the back part of it at A; and the whole profile of it, on the right hand ſide, is ſeen at N *u* B L, (Fig. 50,) and at *b d l f*, (Fig. 74.) This ſcutcheon is bent at *d* and at *m*. Its breadth is the ſame as that of the middle pipe, which is the interval between the other two, as is ſeen in Fig. 48, 49, 72, 73, 75. Its part *b d*, (Fig. 74,) is ſoldered or riveted to the lower ſurface of the middle pipe: from thence it takes an horizontal direction from *d* to *m*, and then aſcends perpendicularly from *m* to *f*. This length *m d* is one inch, and the thickneſs of the ſcutcheon, throughout, is about a ſixth part of an inch, or ſomewhat leſs. The thickneſs of the plate, Fig. 56, of which the profile is here at *q l*, Fig. 74, is exactly embraced between the extremity *r i* of the pipe, and the ſcutcheon *f l*. The bottom, *q r*, (Fig. 56,) of this plate, reſts upon the horizontal part *o l* of the ſcutcheon, (Fig. 74;) and this ſcutcheon is faſtened to the plate by a ſcrew *p g*, which goes into the hole *n*, (Fig. 56.) It is to be obſerved, that the line *r c*, (Fig. 74,) is equal to the edges *a b*, *c d*, *e f*, *g h*, (Fig. 72,) of which it expreſſes the profile; that its farther extent *o a*, (Fig. 74,) is equal to the lines *b i*, *c k*, *f l*, *h m*, (Fig. 72,) of which it expreſſes the profile; and that the line *d l*, (Fig. 74,) is in the ſame horizontal plane as the line *b h*, (Fig. 72.)

The angle *r*, *i*, *e*, (Fig. 74,) is of one hundred and twenty-ſix degrees; and the diſtance from *o* to *i* is one third of an inch. The outſide breadth of theſe three pipes, taken together, is the ſame as that of the plate; and each of them occupies a third part of that ſpace, as in Fig. 53, 56, 73 and 75. Each of them is ſquare. The length of the two outer pipes, from the line *b h*, (Fig. 72,) or from the bottom *q r* of the plate, (Fig. 65,) to the line *i m*, (Fig. 72,) or *x o*, (Fig. 56,) is one inch and a twelfth: the length of the middle pipe, (Fig. 74,) from *i*, where it joins to the plate, to its other end *e*, is four inches and five twelfths.

Theſe three pipes are faſtened to the plate, as in Fig. 53. The edges *x*, *z*, *v*, T, E, *t*, *l*, D, *s*, *y*, of their upper openings, are circular, that they may fit exactly, and fit cloſe to the circumference of the cylinder, which is there indicated by pricked lines, and is ſhewn in Fig. 50, by the line *t v f*, which expreſſes the profile of theſe edges, againſt which the cylinder rubs lightly when it turns.

Manner of working the Seed-box, and of the Pieces which it contains, Plate XIII.

The line or edge *g h* of the ſix valves, (Fig. 53,) muſt be very near to the ſurface of the cellular cylinder, tho' not quite ſo cloſe as to occaſion a friction when the cylinder turns; and the lower end of each valve muſt anſwer to a row of cavities; ſo that the part F of the ſeed-box, (Fig. 50,) being filled with corn, and the cylinder turning from *b* to *r*, this laſt carries with it the grains that fall into the cavities which paſs under the edge of the correſponding valves: thoſe that fall from the two valves *a* and *b*, (Fig. 53,) are dropped, by the cavities, into the pipe G, in the ſpace between the pricked lines *g s* and *b t*, and are conveyed to the back of the ſhare which is on the left hand ſide of the drill; thoſe that fall from the two next valves, *c* and *d*, are dropped between the pricked lines *b t* and *d v*, into the pipe H, and are conveyed to the back of the ſhare which is in the middle of the drill: and thoſe that fall from the two laſt valves, *e* and *f*, are dropped between the pricked lines *d v* and *b x*, into the pipe M, and are conveyed to the back of the ſhare which is on the right hand ſide of the drill.

If it happens that ſeveral grains preſs together at the ſame time, at the outlet of any one of the valves, ſo as to choak it, that valve immediately gives way, lets them paſs, and is inſtantly replaced as before, by means of its ſpring which puſhes it back. No grain is ever broken by the valves: ſo that if this accident does ſometimes happen to a few, it is not during the time of actually ſowing the ſeed, but only when the drill is turned, in order to begin another bout, or when the ſeedſman, inſtead of drawing the drill forward, drags it towards himſelf, and makes the cylinder turn backward.

By looſening the ſcrew C *q*, (Fig. 50,) which is at B in Fig. 1, the bin, before preſſed againſt this ſcrew by the ſpring or plate A *s k*, (Fig. 50,) is moved farther from the cylinder, the ſpace between the cylinder and the end of the valves is increaſed, and a greater quantity of corn then paſſes at a time. By turning the ſcrew C *q* farther in, the bin is puſhed nearer to the cylinder, and fewer ſeeds are dropped.

To know exactly how much the bin ſhould, at any time, be ſet nearer to, or farther from the cylinder, there is, at one of the ſides of the bin, a ſmall ſcrew, of which the head *m* paſſes through a circular opening M N, (Fig. 51,) in the largeſt plate of the box, where it becomes a certain guide, by means of a few equal diviſions engraved and numbered at the edge of that opening. The centre of the arch of this opening is the ſame as that of the hole *n*, upon which the bin moves.

Of the Hopper, Plate XIII.

Fig. 67. repreſents in perſpective the hopper which is ſeen at A in Fig. 1, and of which the bottom covers the top of the ſeed-box. D, (Fig. 76,) is the front, and A the right hand end of the hopper. The boards which form the ends A and B are three quarters of an inch thick; thoſe of the ſides D and C are ſeven twelfths of an inch thick; and the thickneſs of the cover is five twelfths of an inch. The ſides and ends, which are at right angles to each other, and to the bottom, are joined together by dove-tail tenons; and the bottom is joined to the ends A and B by tenons which go into mortiſes in theſe ends, as may be ſeen on the line *b g*. The four tenons G, H, E, F, enter into the mortiſes Q, R, S, T, in Fig. 24, of which the dimenſions have been given. Thoſe dimenſions fix the length *g e*, or *k d*, of the hopper, (Fig. 76.)

Its breadth, from outſide to outſide, at *a k*, or *b g*, is ſeven inches; and its outſide depth *k g*, or *d e*, is eight inches and a half. The height of the legs of the hopper, from the line *b l*, where it reſts upon the upper ſurface of the table, to the line *b g*, which is the under ſurface of its bottom; is determined by the diſtance between the top of the ſeed-box and the top of the table: it is here eight inches and a ſixth. In the middle of the breadth of the two legs, are two openings, N and P, rounded at their top, to let through them the iron axis which bears the cellular cylinder, and keeps the ſeed-box ſteady under the hopper. Theſe two openings are ſeven inches high, and one inch and three quarters wide. The hopper is faſtened to the table by two hooks, one of which is ſeen entire at L N M, and part of the other at P Q. Each of them moves upon its rivet L, juſt above the opening of the foot, and is bent from thence to N, to make room for the paſſage of the axis; after which it hooks into a ring M and Q, fixed upon the table, but not mentioned before.

Towards D is a ſquare opening, an inch and a half wide, cut immediately above the bottom, and through which the hopper may be emptied. This opening is ſhut by a ſmall plate of iron, or braſs, which turns like a latch upon a ſcrew *n*, which faſtens it at that end, whilſt the other end *r* is ſlipped down to the ſmall piece of braſs or iron *v x*, which is faſtened to the box by a ſcrew at *x*, in ſuch manner, that the pricked part of the latch, near *r*, is covered by the end *v* of this laſt ſmall piece, which is bent for that purpoſe, ſo as not to lie quite cloſe to the box, and the edge *r q* of the farther part of the latch reſts upon the edge *x* of this ſmall piece.

Of the Fore-carriage, Plate XIV.

Fig. 77 is a perſpective view of the fore-carriage without its wheels. It is ſeen with its wheels in Fig. 1. Plate X. Fig. 80 repreſents a geometrical plan of the inſide of one of the wheels of the fore-carriage, which is ſeen at *t* Fig. 1, Plate X. and Fig. 81, Plate XIV. repreſents a ſection of it. P and Q, (Fig. 77,) are the two fore-ends of the beams, to which the fore-carriage is faſtened by hooks and rings.

In Fig. 77, *a d*, and D E, are the two exactly ſimilar pieces which are ſeen at S *s* and V *r* in Fig. 1. Their length, *a d*, (Fig. 77,) is two feet eight inches; their breadth, *d* A, is two inches and two thirds, and their thickneſs is two inches. They are parallel to each other, and connected by two traverſes, *g h*, *f l*, of which the ends are tenons pinned into mortiſes in the pieces D E, *a d*. Theſe two traverſes are omitted in Fig. 1, Plate X. in order to render that drawing the more ſimple. The length of theſe traverſes, excluſive of their tenons, is two feet, their breadth is two inches and a quarter, and their thickneſs one inch. Theſe two traverſes are perpendicular to the two other pieces. Their diſtance from each other, between the fartheſt outſide edge *g h* of the one, Fig. 77, and the fartheſt outſide edge *f l* of the other, is ſeven inches and a half. The edge *g h* is one foot ſix inches and a third diſtant from the two ends B and D.

F G is an axle-tree, of which the middle part *n s* is two inches and ſeven twelfths ſquare, and of which the upper angles are cut off as in the drawing. The ſquare ſhoulders of the two ends *s n*, from whence the ſpindles proceed, project a very little beyond the outſide of the pieces D E and *a d*, in order that the nave of the wheels may not rub againſt theſe pieces. The ſpindles *s* G, *n* F, are eigh inches and a third long, and one inch and five twelfths in diameter. This axle-tree is placed upon the pieces D E, *a d*, parallel to the traverſes *g h*, *f l*, in ſuch manner, that the diſtance from the line *s n* to the ends E and A, is a foot and a half. This axle-tree is faſtened to the two pieces D E, *a d*, by two iron pins and nuts, *b q*, an inch and a ſixth ſquare, of which the ſcrew, which is ſeven twelfths of an inch in diameter, has a head an inch and a half in diameter, which lies cloſe to the under ſurface. This ſcrew is repreſented with its nut in Fig. 78. Upon this axle-tree are fixed two wooden pins, five or ſix inches long, and five tenths of an inch, or a whole inch in diameter. Theſe pins are perpendicular upon the upper ſurface of the axle-tree; the ſpace between them is four inches, and this ſpace is in the middle of the length of the axle-tree. This axle-tree is pierced perpendicularly between the two pins, to admit another pin, which will ſoon be ſpoken of.

The two wheels, which are placed at F and G, are exactly alike. Fig. 80 repreſents the inſide of one of theſe wheels, with a pully fixed round its nave, and faſtened to its ſpokes by four ſcrews, each of which goes through the pully and one of the ſpokes. This pully is ſeen in profile at *b d*, (Fig. 81,) with two of its ſcrews.

The total diameter, *g h*, of each wheel, excluſive of its iron hoop, is two feet and a half; that of the nave *p q* is four inches and one ſixth; that of the pully *b d* is one foot two inches and a ſixth; the thickneſs of the pully is an inch and one third; its grove, which is cut down ſquare, is two thirds of an inch wide, and two thirds or three quarters of an inch deep. The length *p r*, or *q s* of the nave, is ſix inches; the thickneſs of the wheel at *i n* is an inch and two thirds, and at *i h* two inches and a quarter. Of the four hooks R, H, T, K, (Fig. 77,) which ſerve, by means of two rings, to faſten the fore-carriage to the ends of the beams P Q, the two, H and K, are faſtened in the uſual way, by nailing them, at their flat end, upon the two pieces of the fore-carriage: but the other two, R and T, are ſhaped like a carpenter's ſquare, of which one end is ſcrewed upon the beam, in order to facilitate the putting on or taking off of the ring. At T, this hook is placed in its proper ſituation for holding the ring: at R, it is turned the other way, that the ring may be taken off eaſily.

Of the Pieces which ſupport the Drill upon its Fore-carriage, Plate XIV.

Fig. 82 repreſents in perſpective a piece of wood which ſupports the drill upon its fore-carriage, when there is occaſion to turn it in ſowing. This piece may be called the pole. It is ſeen at *x d* in Fig. 1, Plate X. Its end A, (Fig. 82,) enters into the two bridles or belts *g r h* and *a c b*, (Fig. 26,) which have been ſpoken of before, and of which one is ſeen near *d* in Fig. 1. Its other end *q r*, (Fig. 82,) reſts upon the axle-tree (Fig. 77,) between the two pins, as is expreſſed by pricked lines in Fig. 82, and as may be ſeen at *x* in Fig. 1.

The breadth *q r*, (Fig. 82,) of the lower ſurface of this piece is an inch and a quarter, throughout its whole length, to its end A; and its thickneſs throughout its whole length *q s* is an inch and a half. Its upper angles are taken off, from the end *q r* to *s*; but from *s* to A, this piece is ſhaped like the two bridles or belts into which it is to enter.

Its length from *q* to *s* is one foot ſeven inches and five-ſixths; and from *s* to *t*, it is two inches and ſeven-twelfths. At *t*, the thickneſs of a quarter of an inch is taken off from its under ſurface, as at *t v*; and from *v* to A, its length is five inches and five-twelfths. It is the length *s* A, that goes into the two belts or bridles *g r h*, and *a c b*, (Fig. 26, Plate XI.) and the notch or ſhoulder *t* is made in order to inſert a wedge whenever it is neceſſary to make the end *q r*, (Fig. 82,) reſt upon the middle of the axle-tree, in order to convey the drill the more eaſily to any diſtant part, without putting it upon its hind-carriage. This wedge ſaves the ſeedſman the trouble of holding up the handles of the drill ſo high as he would otherwiſe be obliged to do, to make the end *q r* of this piece (Fig. 82,) reſt upon the axle-tree. It is by the help of this piece, that the ſeedſman, when he comes to the end of each bout of the drill, is enabled very eaſily to turn it in order to begin another, by lifting the drill up by its handles; for as the end of this piece reſts upon the middle of the axle-tree, he makes the drill follow the fore-carriage which is drawn by a horſe; and as the diſtance, in this caſe, is but five or ſix feet, there is no occaſion for his making uſe of the wedge. By this means the drill is turned conveniently, and without any loſs of time.

The line A *v*, *t s*, are even; but *q s* is inclined at *t s*, and makes with it an angle *t s q* of 166 degrees. *s a* and *g n* are two ſquare pins, faſtened by tenons into the middle of the breadth of the under ſurface *r q s*, perpendicularly to the lower ſurface *t s*. The pin *s a* is placed near the bending *s*, and the diſtance between the edges or lines *s a* and *g n*, is fourteen inches and two thirds. The breadth *a o* and *n p* of theſe pins, is an inch and a quarter; their thickneſs is two thirds of an inch; the length of *s a* is three inches and a half, and that of *g n* five inches. This pin *g n* is reſted againſt the axle-tree

PLATE.XIV. *Facing* Drill Plough.

Fig. 77.

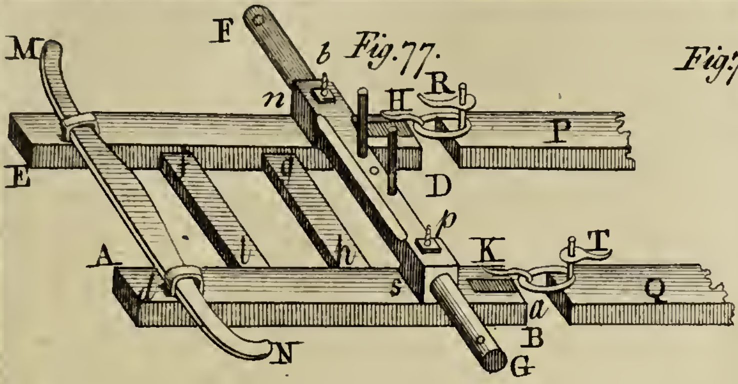


Fig. 79.

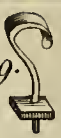


Fig. 78.

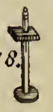


Fig. 81.

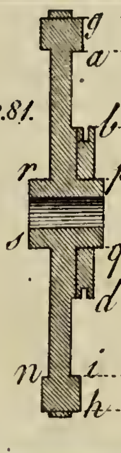


Fig. 80.

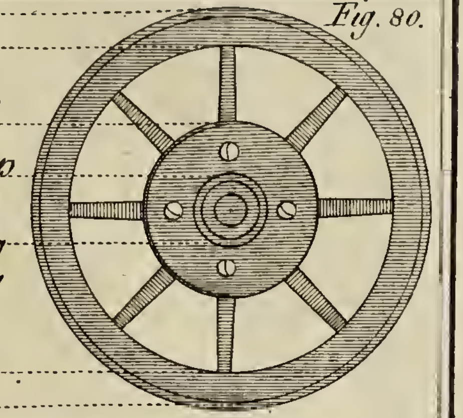


Fig. 82.

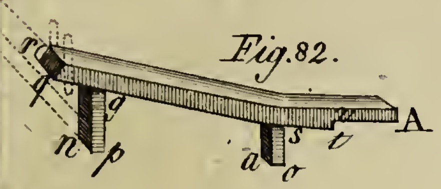


Fig. 83.

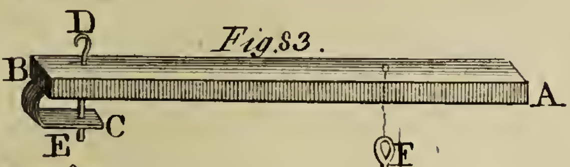


Fig. 84.

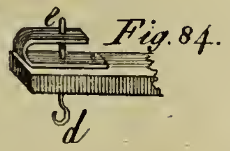


Fig. 85.

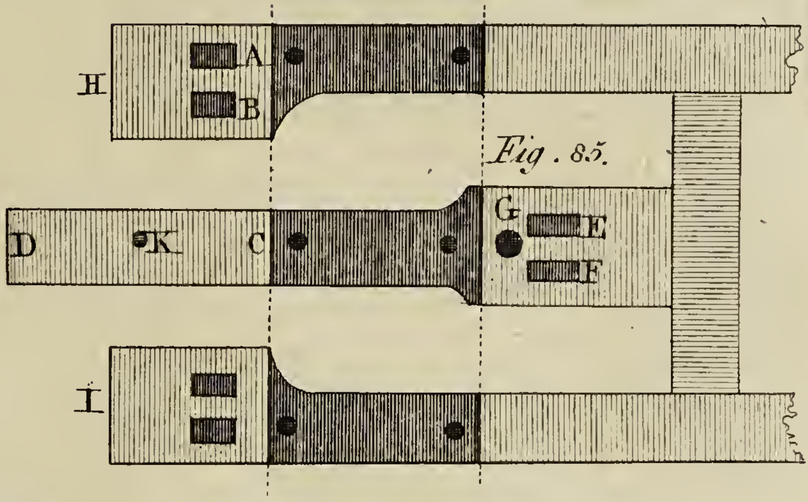


Fig. 86.

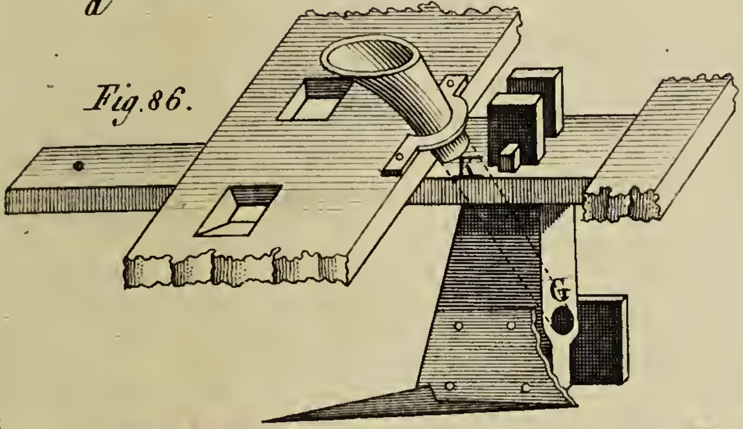


Fig. 87.

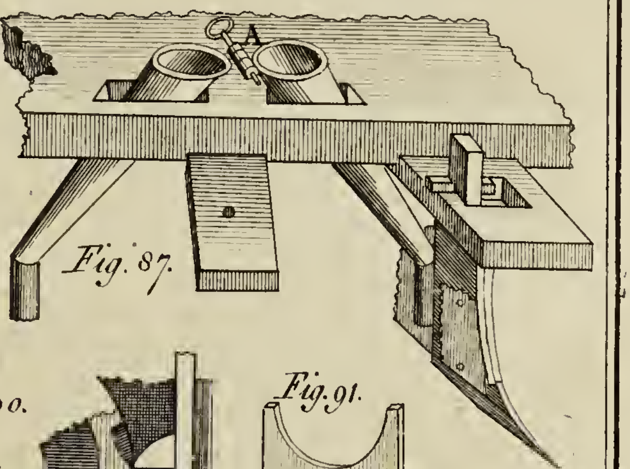


Fig. 89.

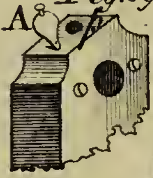


Fig. 88.

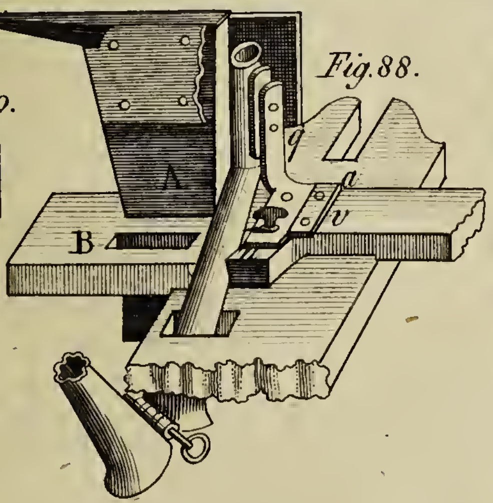


Fig. 90.

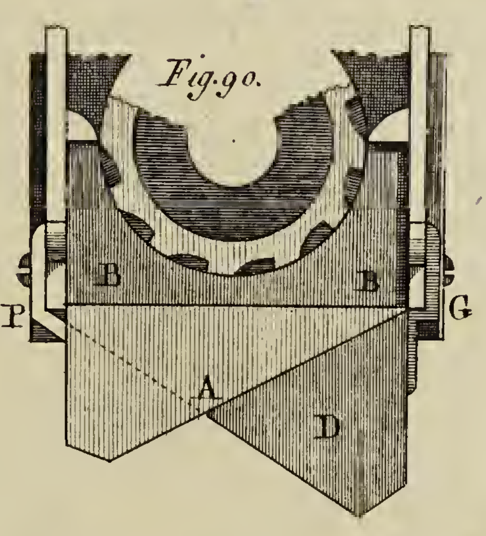


Fig. 91.

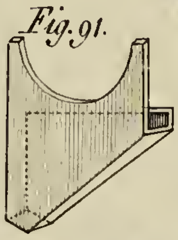


Fig. 92.

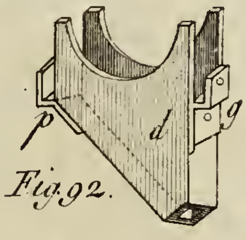


Fig. 94.

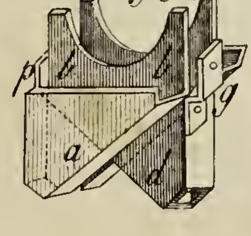


Fig. 93.

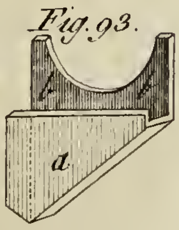


Fig. 99.

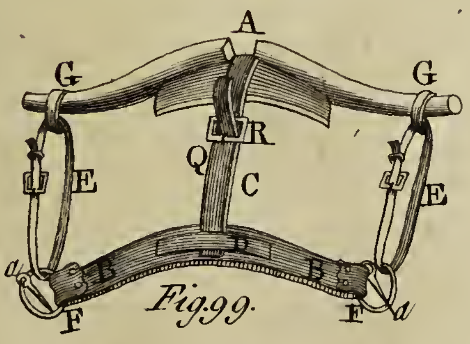


Fig. 97.

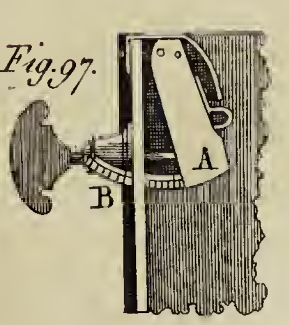


Fig. 95.

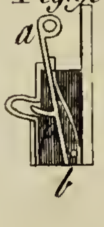


Fig. 96.

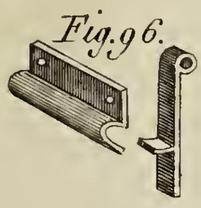


Fig. 100.

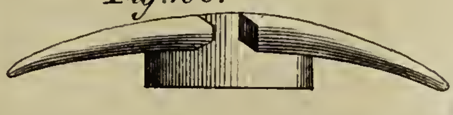


Fig. 98.

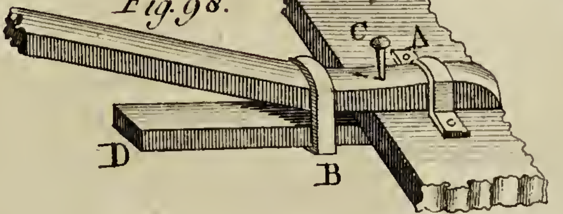
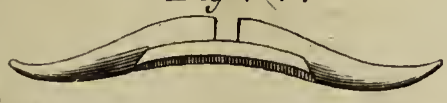


Fig. 101.



J. Hulett Sculp.

F G of Fig. 77, and the other, *s a*, (Fig. 82,) is placed near the table of the drill. The uſe of theſe two pins is only to hinder this piece of wood from ſlipping out of the two belts before deſcribed.

Fig. 83 repreſents in perſpective the piece of wood which ſupports the drill upon its fore-carriage, when it is placed upon its hind-carriage, in order to be removed from one place to another. This piece neither is, nor can be, ſeen in Fig. 1, which repreſents the drill in the ſtate of actual ſowing, and without its hind-carriage. The end A, (Fig. 83,) goes into the belts *e f*, *g h*, (Fig. 21,) before deſcribed, like which it is ſhaped; and the end B, (Fig. 83,) reſts upon the axle-tree, (Fig. 77,) between the two pins. This part of the axle-tree is covered before and beneath by a ſlip or hook of iron, B E C, (Fig. 83,) which is nailed under the end of the piece A B, as in Fig. 84. The axle-tree, the bar, and its hook, are traverſed by an iron pin, D E, (Fig. 83,) and *d e*, (Fig. 84,) which paſſes through the hole in the axle-tree, between the two pins, (Fig. 77.) The length of this piece, A B, (Fig. 83,) is three feet and four inches; its breadth is two inches and a half, and its thickneſs is one inch and a third. The pin F G, which is ſuſpended here, is put into the ring or bridle L, (Fig. 22,) and goes through the hole immediately underneath it.

Of the Hind-Carriage.

This hind-carriage is ſo ſimple that it would be needleſs to give a drawing of it. It conſiſts only of two common wheels, unſhod with iron, two feet eight or nine inches in diameter, ſet upon a very ſimple axle-tree, in the upper ſurface of which are two holes, into which are put the two pins before-mentioned, which are under the beams of the drill. One of them is ſeen at *f h*, (Fig. 3,) and likewiſe at △, (Fig. 1,) Plate X.

It is neceſſary to fix, by proper marks, the reſpective places of the ſeveral ſcrews and mortiſes of the whole machine, in order that when it is taken to pieces and put together again, none of theſe pieces may be miſplaced, or any of the helixes (or ſpiral lines) which the flat-headed ſcrews have formed in the wood, be ſpoiled.

It is better to make the teeth of the harrow bend a little more than thoſe before deſcribed, and repreſented in Fig. 5, Plate X. They ſhould bend ſo that the point *c* of the tooth may project about four inches beyond the pricked line *f*.

Figures 85 *and* 86, *Plate* XIV. *compared with Figures* 2 *and* 31, *Plate* X. *and* XII.

The mortiſe A in Fig. 85, is the ſame as that which is marked Q in Fig. 2. But the end of each beam ſhould be made about two inches wider on the inſide, and a ſecond mortiſe B, (Fig. 85,) ſhould be cut through it, ſimilar and parallel to the former, and at the diſtance of five-ſixths of an inch, or an inch, from it, that the ſhare may be faſtened in the one or the other, according as it may be found proper to place the two fore-ſhares nearer to, or farther from each other, in order to ſow the rows cloſer than they would be by the ſituation of the mortiſes Q and R, (Fig. 2:) but then the pipes which anſwer to the back of theſe two ſhares ſhould be faſtened in the manner which will be explained hereafter.

The middle piece K L, (Fig. 2,) ſhould project beyond the table, from C to D, (Fig. 85,) about nine inches or a foot, and the belt or bridle L, (Fig. 2,) ſhould be ſuppreſſed. This ſame piece ſhould have, in its part E F, (Fig. 85,) nearly the ſame breadth as the end of the beams H, I; and two mortiſes, E F, inſtead of one, in which the ſhare, thicker than was ſaid before in its upper part, is to be faſtened by two tenons and a key. The pipe which terminates behind this ſhare, inſtead of paſſing ſideways, as in Fig. 31, will go ſtraiter and more eaſily through the hole G, (Fig. 85,) which is ſeen at K, (Fig. 86,) and from thence through the thickneſs of the ſhare, which will be pierced for this purpoſe from K to G. The ſole of this ſhare, from this hole to its bottom, will be of the ſame thickneſs as was mentioned before.

Figures 87 *and* 88, *Plate* XIV. *compared with Figures* 29 *and* 30, *Plate* XI.

The upper openings, *f d*, *h o*, (Fig. 29,) of the two foremoſt pipes ſhould be joined by a good hinge A, (Fig. 87,) well ſoldered to them, and of which the pin, ending with a ring at one end, may eaſily be taken out. By means of this hinge, theſe two pipes may be ſet cloſer together, or farther aſunder, like the legs of a compaſs, and be fitted to the different ſituations of their ſhares. The faſtening of the lower end of theſe pipes will be nearly the ſame as was deſcribed in Fig. 30; with this difference, that inſtead of bending the ſquare *k i g* of that figure only at *i*, upon its upper ſurface, and making its part *k i* run lengthways of the beam E F; here, (Fig. 88,) is twiſted as it were in its bending, in order that the part *s n* may lie acroſs the beam, and lengthways of the table. In this caſe, if the ſhare A be put into the mortiſe B, the part *s n* muſt be ſlipped farther, till the hole *s* can be faſtened at *n*, by the thumb-ſcrew which is at *n*: and as this part, being held only by a ſingle ſcrew, might be apt to looſen and jog, a piece or ſlip of iron, *a v*, is permanently fixed at its edge, ſo as to keep it tight in either of its ſituations. The ſcrew *n* faſtens in a nut ſunk into the upper ſurface of the beam, where this nut is permanently fixed, and covered by the table. There ſhould likewiſe be two holes in the other part of the ſquare, towards *q*, to ſerve for the two different ſituations of the ſhare. The pipes of the ſhares are more eaſily made round, as here repreſented, than ſquare, as was directed before.

Figure 89, *Plate* XIV. *compared with Figure* 35, *Plate* XI.

Inſtead of the ſmall groove *n*, (Fig. 35,) in the braſs cylinder, intended for introducing a little oil to that part; a more ſimple way will be to bore a perpendicular hole *p*, (Fig. 89,) through the head of the ſtandard, down to the ſpindle; and this hole may be covered by a ſmall plate A, made to turn upon a ſcrew or rivet.

Figures 90, 91, 92, 93, *and* 94, *Plate* XIV. *compared with Figures* 50 *and* 53, *Plate* XIII.

As the three pipes or funnels G, H, M, (Fig. 53,) embrace at their upper opening, only a ſmall part, *f*, *t*, (Fig. 30,) of the cellular cylinder, ſome grains may chance to be loſt on the ſide where this cylinder is not covered, from *d* to *f*. To prevent this inconvenience, they may be made ſo as to embrace the whole lower ſemidiameter *d f t* of the cylinder in the manner repreſented in Fig. 90, 91, 92, 93, 94.

The firſt funnel, which is ſeen geometrically at A, B B, (Fig. 90,) is repreſented in perſpective, and of a ſmall ſize, in Fig. 93, where its correſponding parts are marked with the ſame letters *a*, *b b*. This is the funnel M of Fig. 53. The ſecond large funnel, of which a part appears at D, (Fig. 90,) is ſeen entire and in perſpective, in Fig. 92, where the ſame part is marked *d*. This is the funnel H of Fig. 53. Two ſcutcheons *g* and *p* are ſoldered to this funnel, and faſten it, by ſcrews, to the fore and hind inner ſurfaces of the box, as at P G, (Fig. 90.) The third funnel, which does not appear in Fig. 90, and which is like the firſt, is repreſented in Fig. 91. This is the funnel G of Fig. 53. Theſe three funnels are made ſeparately, of very thin plates of braſs, bent, and well ſoldered; and are afterwards firmly rivetted to each other, ſide to ſide, as in the perſpective, (Fig. 94.) They are ſo tightly joined, that the ſcutcheons *g p*, (Fig. 92 and 93,) are alone ſufficient to hold them all in their proper places.

Figures 95 *and* 96, *Plate* XIV. *compared with Figure* 66, *Plate* XIII.

In the repreſentation of this part in Fig. 66, the valve *e f* is actually cloſed by its ſpring *a b*, to the cover *d c*, and in this ſituation it is ſhut: but when the corn preſſes againſt this valve, and forces it into the ſituation *a b*, (Fig. 95,) a grain may jump ſo as to get between the valve and the cover, and thereby hinder the valve from cloſing again; ſo that more corn would continue to run out. To guard againſt this accident, each valve muſt have a ſmall tongue *p* immediately below the cover, and the cover muſt be bent in that place, to receive the tongue when the valves cloſes. Both of theſe are repreſented ſeparately in perſpective, in Fig. 96.

Figure 97, *Plate* XIV. *compared with Figures* 50 *and* 51, *Plate* XIII.

Inſtead of the index *m*, (Fig. 50,) and the graduated opening M N, (Fig. 51,) an eaſier and more ſimple way will be, to faſten the end A of a graduated limb or border of a circle, A B, (Fig. 97,) to the bin, in ſuch manner that its other end B may project through a hole in the front of the braſs-box. This will mark exactly the ſituation of the bin.

Figure 98 *compared with Figures* 82, 85, *Plate* XIV. 21, 26, *Plate* XI.

When the middle piece is lengthened, as at C D, (Fig. 85,) there is no occaſion for the ring or bridle L, (Fig. 2,) and *f k*, (Fig. 26,) or for the pieces *s a* and *g n*, (Fig. 82;) and then the pole A, of this Fig. 82, will paſs through the belt A, (Fig. 98,) and through another belt B, which laſt goes round it and the piece D. This belt is fixed by two ſcrews under the piece B D. The pin C, which penetrates into the table, will complete the fixing of this pole. The hole K, (Fig. 85, receives the pin F G, (Fig. 83,) which goes through the two pieces C D, (Fig. 85,) and A B, (Fig. 83.)

M. de Chateauvieux's *Inſtructions concerning the Manner of uſing* his DRILL-PLOUGH.

“ This drill is repreſented in Fig. 1, Plate X. with all its parts put together, in a ſtate fit for working. When the thongs which encompaſs the grooves of the pullies Q P of the axis in Fig. 1, and thoſe of the fore-carriage *u t*. are ſtretched properly, and the hopper is filled with corn, a horſe is to be harneſſed to the ſpring-tree bar, and an intelligent man, who can walk a good pace, ſhould guide this horſe, which ſhould be a mild, tractable creature.

“ The ſeedſman will hold the handles of the drill, in order to direct it: and he will warn the guide whenever he deviates from the ſtrait line in which he ought carefully to keep. He will alſo obſerve, from time to time, whether the diſtribution of the ſeed is not ſtopped by ſome unexpected accident: for he can ſee the end of the pipes through which the grain ſhould drop; beſides which, the corn makes a little noiſe in paſſing through the pipes, and he may eaſily hear it. The ſeedſman will take particular care that the thongs do not ſlip out of the grooves of the pullies; and if they do, he will replace them inſtantly: but this accident is very rare; nor, indeed, does it hardly ever happen, unleſs the thongs are new, and have not yet been ſufficiently ſtretched. It is proper to obſerve here, that we have tried hempen ropes, and ſmall iron chains: but thongs of leather are much better than any other thing.

“ Care ſhould be taken, that the ſeed-corn be free from grit, dirt, or little ſtones; for either of theſe might damage the valves of the bin. If the corn has been ſteeped in lime-water, as is the practice of ſome farmers, in hopes of preſerving their crops from ſmut, it muſt not be ſown till it is ſo dry that the grains will ſlip eaſily over one another.

“ The ſeedſman will be particularly careful to repleniſh the hopper before it is quite empty.

“ He will oil the ſpindles of the axis once or twice a day; obſerving that they require moſt frequent oiling when the drill works in dry ground, which ſends up a very fine duſt: and he muſt cleanſe the ſpindles and the pipes in which they turn, every morning, by rubbing off the old oil, and putting on new. He will alſo, from time to time, cleanſe the ſpindles of the axle-tree of the fore-carriage, and rub them with ſoap. If any rain happens to fall during the time of ſowing, he muſt wipe the drill very dry, as ſoon as he has got it home, and particularly about the axis, to prevent its ruſting. It is even highly proper to have a leather covering to put over the table and all the parts upon it, and likewiſe over the ſtandards, the axis, and the hopper. It is eaſy to conceive the proper cut of this covering.

“ The prudent huſbandman ſhould always have with his drill, a ſmall box, containing a hammer, a pair of pincers, a turn-ſcrew, thongs, ropes, nails, iron-rings and buckles, a little bottle of oil, and other ſuch like things, in order that, if any of them ſhould be wanted in the field, he may not loſe time by being obliged to ſend home for them.

“ The ſeedſman will obſerve, when he is going to ſow, not to leave the wedge *t*, (Fig. 24, Plate XI.) under the pole, in order that end *c*, (Fig. 1, Plate X.) may not preſs upon the axle-tree of the fore-carriage. (The only uſe of the pole, at the time of ſowing, is to turn the drill when a ſecond bed is to be ſown after the firſt is finiſhed, and ſo of others.) It is eaſy to conceive, that if this end of the pole ſhould make the drill reſt upon the axle-tree, it might often happen, that, by its being thereby too much ſubjected to the motions of the fore-carriage, the ſtones or clods which the wheels may meet with, would, by raiſing them higher than the general ſurface, throw the ſhares out of the ground, or at leaſt occaſion the furrows to be ſhallower in thoſe places; things which ought by all means to be avoided.

“ We have repreſented but one ſpring-tree bar, in Fig. 1, becauſe we think a ſingle horſe may be uſed, without any inconvenience, when the ground is not too much loaded with wet: but if the land be too full of water, two horſes muſt be put to the drill, which, in that caſe, muſt have a double bar, the manner of ordering which is too well known to need any deſcription. Each horſe will then go in a furrow, and they will not poach the bed, as would be the caſe, in wet land, if the drill was drawn by only one horſe, whoſe ſteps are determined by the middle of the bed.

“ For want of horſes, oxen may be uſed, and the ſowing may be performed equally well.

“ It is proper to obſerve, that the quantity of ſeed diſtributed by the drill is exactly the ſame, whether the horſes or oxen go faſt or ſlow. If, for example, one bed is ſown in ten minutes, and twelve or fifteen minutes are employed to ſow another, of equal dimenſions, neither more or leſs ſeed will be dropped in one, than in the other; becauſe the revolutions of the cylinder, (Fig. 39,) are invariably regulated by thoſe of the wheels of the fore-carriage, whoſe circumference, be it turned quick or ſlow, will always deſcribe a line of equal length, and the cylinder turns exactly with theſe wheels. The only difference that can ariſe from the greater or leſs ſpeed of the horſe, is the gain or loſs of time: but the quantity of ſeed ſown will be conſtantly the ſame, ſo long as the drill remains ſet in the ſame manner.

“ The greater or leſs goodneſs of the ſoil, its having been well or ill prepared for ſowing, its ſtate of dryneſs or humidity, and ſeveral other circumſtances which ſhould be carefully attended to, will oblige the huſbandman ſometimes to vary the quantity of ſeed. The drill is accordingly made to diſtribute more or leſs, by the means before-mentioned, of placing the bin nearer to, or farther from the cellular cylinder, by turning the ſcrew L, (Fig. 50, Plate XIII.) By ſetting the bin farther off, a greater quantity of ſeed is dropped; and by bringing it nearer, a leſs proportion is ſown. It will be eaſy to find the proper diſtance at which to fix it, in order to its giving out exactly the deſired quantity of ſeed.

“ Though this method affords a pretty wide latitude, it may ſometimes not be ſufficient. This is a caſe which will very ſeldom happen, and which we have not yet met with; but if it ſhould at any time take place, the drill may eaſily be made to diſtribute ſtill more or leſs ſeed, by changing the pullies of the axis, Fig. 39, Plate XII. for others of a larger or ſmaller diameter, which will either accelerate or retard the motion of the axis, in proportion to their ſize.

“ We will ſuppoſe, for example, that the pullies are but of half the diameter of thoſe before deſcribed. It is evident that theſe ſmaller pullies will make the axis turn round twice, where it turned but once with the former, and that double the quantity of ſeed will conſequently be dropped on the ſame length of ground. By the ſame rule, pullies twice as large will turn the axis but half the number of times, and but half the quantity of ſeed will of courſe be let fall, in the ſame ſpace. The proportion of the ſeed ſown may likewiſe be increaſed or diminiſhed, by a greater or leſs number of cavities in the cellular cylinder; and the changing of this cylinder is ſoon and eaſily performed: but, as was ſaid before, there will very ſeldom be any occaſion for theſe alterations.

" The furrows opened by the ſhares of the drill, and in which the ſeeds are depoſited, ſhould be of different depths, in different caſes; and this may be effected by means of the rings which faſten the drill to its forc-carriage at the hooks R H, T K, (Fig. 77, Plate XIV.) For general uſe, the diameter of about three inches, from inſide to inſide, will be ſufficient for theſe rings, and then the furrows are made about three or four inches deep. They will be opened deeper by uſing rings about four inches in diameter; and it is immaterial whether they are round or oval. With ſmaller rings, the furrows will be made ſhallower; and their depth may alſo be diminiſhed, by making the horſe draw with longer traces, or by uſing a lower horſe.

" If very ſhallow furrows are wanted, or only juſt the ſurface of the ground is intended to be opened, the wedge *t*, (Fig. 24,) muſt be put under the pole. In ſhort, a little practice will ſoon ſhew the huſbandman how to manage this drill in every reſpect, and make him thoroughly acquainted with all that is neceſſary to be known in regard to the diſtribution and proper covering of the ſeed, which laſt part is perfectly well performed by the teeth of the annexed harrow.

" If any thing ſhould ſtill ſeem obſcure to thoſe who have read attentively, and ſtudied the deſcription of each part of this drill, let them but ſet actually to work, and their ideas of it will ſoon be perfectly clear. Each part, taken ſeparately, may be made with great eaſe: their ſizes, ſhapes, and proportions, are pointed out in ſuch manner, that no workman of common underſtanding can miſtake; and when the parts are conſtructed, there can be no difficulty in putting them together, if the foregoing directions are but obſerved."

" *Deſcription of a Harneſs, to yoke Oxen one before another,*" *Plate* XIV.

" The utility of being able to put oxen to this drill, in ſuch manner as to make them go one before another in the furrow, without treading upon the places which are to receive the ſeed, firſt put me upon contriving a harneſs proper for theſe cattle: for I was not ſatisfied with thoſe I had ſeen in different countries. Two of my teams of oxen, harneſſed in my new manner, have worked the whole year; ſeveral perſons have adopted the method; and I am more and more pleaſed with it. This harneſs is very ſimple, and very light, and does not ſubject the oxen to any irkſome confinement.

" Fig. 99 and 100, repreſent the whole of this harneſs, that is to ſay, its plan and a view of it. Fig. 99 ſhews it to be compoſed of a yoke A, which the ox bears upon his head, and which is there faſtened to his horns by long thongs. The reſt of the harneſs is of leather. The piece B, is the principal part, and that by which the ox is to draw. It reſts againſt his neck, a little below the withers, and fits extremely cloſe to the neck when the ox draws. If it be made of double leather, there is no occaſion for the piece of leather D, which ſerves only to ſtrengthen it when it is ſingle. The thong C faſtens in the buckle Q R, which is fixed to the yoke by another thong. The uſe of theſe is to hinder the large piece of leather B, from riſing above the withers, when the ox toſſes his head, or raiſes his neck. Care ſhould be taken not to ſtretch the thong C too much, for the ox muſt not draw by it.

" The thong E E, with their buckles to lengthen or ſhorten them, ſerve to make the oxen draw by the yoke, by putting them through the large iron buckles F F, and the leather buckles G G, which muſt be nailed to the yoke. The length of theſe thongs is ſuited to the purpoſe for which they are intended.

" My traces are made of ropes, and I find them convenient. At one end of them is part of a leathern trace, about fifteen inches long, like the end of the harneſs of a coach horſe. This end is put through the large buckles F F, where it is faſtened by the tongue *a a*: ſo that the trace may eaſily be ſhortened or lengthened."

DRILL-RAKE, an inſtrument invented by M. Vanduffel, for drilling peaſe, &c.

This inſtrument, which is chiefly calculated for light grounds, in ſmall incloſures, not exceeding four or five acres. It is a ſort of ſtrong plough rake, with four large teeth at *a a*, *b b*, (Plate XV. Fig. 1,) a little incurvated, as repreſented in the figure. The diſtance from *a* to *a*, and *b* to *b*, is nine inches. The ſpace, or interval, beteen the two inner teeth, *a* and *b*, is three feet ſix inches, which is ſufficient room for the cultivator or hoe-plough to move in, if conducted with care, before the peaſe have branched much. To the piece of timber *c c*, forming the head of the rake, are fixed the handles *d*, and the beam *e*, to which the horſe is faſtened.

It is evident, that when this inſtrument is drawn over a piece of land made thoroughly fine, and the man who holds it bears upon the handles more or leſs, according to his diſcretion, four channels or ſmall furrows, *f*, *g*, *h*, *i*, will be formed; that the diſtance between the furrows *h i*, and *f g*, will be nine inches: and that the interval *e*, or ſpace contained between the furrows *g*, *h*, will be three feet and a half. It is alſo evident, that theſe diſtances may be preſerved with great truth, provided the teeth *a*, *a*, return (when the ploughman comes back, after having ploughed one turn, or about, as they call it) in two of the channels formed before, marked *b*, *b*; ſo that though he cuts four drills at the firſt bout, yet, in effect, he only forms two drills each turn, becauſe there are always two drills to be paſſed over twice, or reploughed, being, in fact, not much more than guids, or marks of direction. Yet even this ſmall work of ſupererogation repays itſelf, becauſe it makes the drills more open, diſtinct and clear.

If the firſt four channels, formed at one motion by this inſtrument, are ſtreight and true, all the lines in the field will partake of the ſame regularity. It will therefore be proper to mark out this firſt trace of the drill-rake by exact meaſurement, fixing into the ground, at every diſtance of ten feet, little flat ſticks, labelled with paper; which being finiſhed, the reſt may be left to the ploughman.

When the ground-plot of an acre is thus formed into drills (which may be completed in four hours, by one ploughman, a horſe, and a boy to lead the horſe) you muſt ſend two or three women and children into the field, in order to ſprain the peaſe, or ſcatter them by a ſingle motion of the hand, at a certain diſtance one from another, into the channels. Uſe no harrow, which will be apt to draw the ſeeds out of the lines; but cover them with the flat part of the head of a hand-rake, and preſs them down gently.

The great excellence of this drill-rake conſiſts in its ſimplicity; for after the meaſurement of the parts is once laid down, the meaneſt carpenter and ſmith in England can either make or repair it; and if the firſt four lines formed by it are true, the reſt of the lines or rows muſt be geometrically exact, which is an elegance none can feel, but ſuch as take delight in correct huſbandry. *Eſſays in Huſbandry, Eſſay II. page* 212.

DRONE, the male bee, one that makes no honey. *See the article* BEES.

DROPSY, a diſeaſe incident to horſes, and generally called the water-farcy. *See* WATER-FARCY.

DROPWORT, the name of a perennial weed common in paſture lands, having winged leaves; the diviſions of which are all regular, and ſharply indented about the edges. The flowers are white, growing in a bunch like an umbel. Its roots are very remarkable, conſiſting of a bunch of knobs hanging upon threads; from whence it has the name of filipendula, and dropwort. The flowers have an agreeable ſmell.

DROUGHT, dry weather, want of rain. It alſo ſignifies thirſt, or want of drink.

DUB, a pool, or pond of water.

DUCK, the name of a well-known fowl, very neceſſary for the huſbandman's yard, as they require no charge in keeping; for they live on loſt corn, ſnails, &c. for which reaſon they are very proper for gardens. Once in the year they lay a large quantity of eggs, eſpecially a ſort of duck which turns up its bill more than the common kind. When they ſit they require no attendance except they having a little barley or offal corn near them, that they may not ſtraggle far from their neſts to chill their eggs. They are reckoned to be better hatched under a hen than a duck; becauſe while they are young the hen will not lead them ſo often into the water. Some reckon it very proper to cut off the feathers from their rumps; becauſe when their tails are wet, it often occaſions their drowning. As to the fattening of them, you may do it in three weeks's time, by giving them any kind of corn or grain, and plenty of water. Ground malt, wet either with milk or water, is beſt. *Mortimer's Huſbandry*, *vol.* I. *page* 257.

DUN, a colour partaking of brown and black.

DUNG, the excrements of animals, putrified vegetables, &c. uſed in improving land.

Dungs are intended either to repair the decay of exhauſted worn-out lands, or to cure the defects of other ſoils, which are as various in their qualities, as the dungs uſed to meliorate or reſtore them. Some lands are too cold, moiſt, and heavy; whilſt others are too light and dry. To anſwer this, ſome dungs are hot and light, as that of horſes, ſheep, pigeons, &c. Others again are fat and cooling, as that of oxen, cows, hogs, &c. And as the remedies which are uſed muſt be contrary to the diſtempers they are to cure, ſo the dung of oxen, cows, and hogs, ſhould be applied to lean, dry, light earths, to make them fatter and cloſer; and hot and dry dungs to cold, moiſt, and heavy lands.

Dung has two peculiar properties. The one is to fatten the earth, and render it more fruitful; and the other, to produce a certain ſenſible heat, capable of cauſing ſome conſiderable effect; which laſt is ſeldom found but in the dung of horſes and mules, while it is newly made, and a little moiſt.

Horſe-dung, the leaſt fat of any, is the moſt fiery, if taken freſh as it falls, and the moſt apt to excite a ſudden fermentation; for which reaſon it is then fit only for the hot-bed. When this heat is paſt, it may be ſpread on fields where we would have a rank graſs to ſpring: but it ſhould not by any means be admitted into the garden, or where we would wiſh to have good roots, unleſs the ground be very ſtiff, cold, or wet, and then too it ſhould be well rotted, leſt, inſtead of correcting the ſoil, it leave couch, and other pernicious weeds, worſe than the diſeaſe itſelf; the ſeeds of hay, and of other plants, which the horſes eat, coming oftentimes entire from them: for thoſe vegetables which cattle chiefly eat commonly ſpring up from their dung; as long knot graſs from this beaſt; ſhort, clean, and ſweet paſture from ſheep and cows; the ſow-thiſtle from ſwine. Ground mucked with horſe-dung is always the moſt infected of any; and if it be not perfectly conſumed, it makes your roots grow forked, fills them with worms, and gives them an unpleaſing reliſh: but if laid on at the beginning of winter, and turned in at ſpring, it ſucceeds ſometimes with pulſe.

Horſe-dung is greatly improved by being mixed with its oppoſite, cow-dung, which is cold and fat; and this mixture is conſiderably meliorated if mixed with a proper earth, with mud, or with aſhes and urine. Cow-dung alone is the worſt of all dungs to endure wet, becauſe it is the moſt eaſily diſſolved. But either of theſe dungs, either ſingly, or mixed as above, ſhould not be uſed till it is old; nor ſhould it be laid abroad expoſed to the ſun and wind, as is the practice of ſeveral injudicious farmers, who let it lie ſpread on their field-lands during three or four of the ſummer months, till the ſun and air have exhauſted all its virtue: whereas, if it be laid in heaps, mixed with earth, and left in that ſtate till it be rotten, it will be the ſooner brought to a proper temper, will produce a ſweeter graſs when laid on paſture grounds, and will go much farther than in the common way when ſpread before the plough for corn, of which it will then greatly promote the growth.

Mr. Miller ſays he has frequently ſeen new horſe-dung buried as it came from the ſtable, in very cold, moiſt land, and always obſerved that the crops have ſucceeded better, than where the ground was dreſſed with very rotten dung.

Sheeps-dung and deers-dung are nearly of the ſame quality, and are generally eſteemed the beſt of all dungs for cold clays Some recommend beating them into powder, and ſpreading them very thin over autumn or ſpring crops, about four or five buſhels to an acre, in the ſame manner as aſhes, malt-duſt, &c. are ſtrewed. But this light dreſſing does not laſt long. The moſt common way of conveying it upon land is, by folding of the ſheep themſelves upon it, by which means their urine is ſaved as well as their dung, which ought to be turned in with the plough as ſoon as poſſible, that it may not lie expoſed to the heat of the ſun. In Northamptonſhire, they think it beſt to fold ſheep after July, and to fold them the lateſt upon dry land. In ſome parts of France, where they likewiſe fold their cows and oxen, the place of folding is changed twice every night. In Flanders, they houſe their ſheep at night in places ſpread with clean ſand, about five or ſix inches thick, which, being laid on freſh every night, is cleared out once a week. This mixture of ſand and dung makes an excellent dreſſing for ſtrong land; for the dung and urine of the ſheep is a very rich manure. M. Quintinie thinks it the greateſt promoter of fruitfulneſs in all ſorts of ground. This method of folding ſheep in a covered fold, and of mixing their dung with earth, ſand, &c. according to the nature of the ſoil it is intended for, is likewiſe, very properly, recommended by Mr. Mortimer; who adds, that he has known vaſt crops of rye upon barren lands that have been old warrens, well dunged by rabbits; and large oak and aſh upon the ſame, though the ſoil was very ſhallow.

Next to ſheeps-dung, the preference is generally given to that of ſwine, one load of which will go as far as two loads of other dung. The laying it on too thick may perhaps have occaſioned the old miſtaken notion of its breeding more weeds than any other dung: for all dungs will make weeds ſhoot up; whether they contain within themſelves ſeeds of thoſe plants, not ſo thoroughly digeſted by the animal as to be deprived of their vegetative power, as may ſometimes be the caſe, or by the additional fertility which they communicate to the earth. This dung is beſt when carried from the ſtye directly to the field, where it is a rich manure both for corn and graſs, eſpecially the latter, and for almoſt any ſort of land. Hot ſands and gravel are particularly benefited by it; and it is reckoned a very great fertilizer of fruit-trees. Many good huſbandmen prefer this dung before moſt ordinary ſorts of manure, and to take great care not only to have their hog-yards well paled and paved with pebbles, or other ſtones, or with chalk, which is much the beſt; but alſo to increaſe the quantity of the dung as much as they can, by throwing into the ſtye all the ſtraw, fruit, beans, roots, plants, weeds, &c. which are the refuſe of the garden, with the offals of the kitchen, and every kind of traſh; all which is not only very good for the hogs themſelves, but increaſes their dung to ſuch a degree, that ten or twelve ſwine have yielded ſixty or eighty loads of excellent manure in a year. Some notable farmers will make their hog-yards produce them an annual profit of twenty or thirty pounds. Mr. Worlidge thinks this the beſt of dungs to prevent or cure the canker in trees; and Mr. Mortimer eſteems it beſt for manure, when mixed with horſe-dung; for which reaſon he adviſes placing the hog-ſtye as near the horſe-dunghill as can conveniently be. The farmers in Staffordſhire frequently ſow on poor light ſhallow land, a ſmall white pea, which they never reap, but turn in as many hogs as they think the crop will fatten, and let them lie upon it day and night. The dung and urine of theſe animals enriches the land ſo much, that it ſoon acquires a thick ſward, and continues to be good grazing ground for ſeveral years.

In this light, of reaping a double advantage from the manuring of land, the author of the New Syſtem of Agriculture adviſes huſbandmen to ſow ten or fifteen acres of their ground with turnip-feed, a little before they ſow clover, which, he thinks, is beſt done in September: then, towards the beginning of March, to take the beſt opportunity to buy three hundred ſows, all ſuch as will farrow in about a month. Let little ſties, formed of boughs or reeds, be made for them in the moſt convenient parts of the clover ground, either in the corners, or under the hedges of theſe fields; and let the ſows be kept up, and fed daily with the turnips which were ſowed the autumn before. At firſt, it will be neceſſary to take the trouble of boiling them, tops and all, and of giving them in the troughs with the water not yet cold: they may afterwards be only ſcalded; and in a week or ten days the ſwine will eat them raw, with the greateſt greedineſs and pleaſure. In the beginning, or towards the middle of April, theſe ſows will farrow; after which they muſt not be fed with turnips any longer than till the clover is pretty high, when they and their pigs may be turned in among it. It is impoſſible for one who had not ſeen it, to imagine how eagerly the ſwine will graze on clover, which increaſes their milk to ſuch a degree, that the pigs ſhoot forward at a double rate; and, as they leave off ſucking, they too take to feeding on the clover, by which they proſper ſo faſt, that, by the end of October, every pig will fetch twenty or five and twenty ſhillings, in any market. The treading of great cattle is apt to break the ſtalk of clover graſs, and they ſpoil, by trampling it down, a much greater quantity than they eat: but ſwine are never hurtful this way; and if there be any fear of their rooting up the ground, that may be eaſily prevented by a ring in their noſes; though our author ſays, he never knew a hog break up an inch of clover. They graze upon it with more pleaſure than they could root.

Human ordure is a very fat and hot manure, full of fertilizing ſalts, and therefore extremely proper for all cold ſour ſoils, eſpecially if it be mixed with other dung, ſtraw, or eath, to give it a fermentation, and render it convenient for carriage. Some do not like to uſe it on account of its bad ſmell; and others imagine, that it gives a fetid taſte to plants; but in this they ſeem to carry their delicacy rather too far. It is uſed with great ſucceſs in many parts of France, all over Flanders, and, I believe, not leſs profitably round about London. Mr. Bradley ſays, it is kept in pits, made on purpoſe, in foreign countries, till it be one, two, three, or four years old: that of four years old is accounted the beſt; that of three years tolerable; but the others not ſo fit for uſe; and that the perſons concerned in theſe pits pay great regard to the place from whence they have it, preferring that which comes from towns where the moſt fleſh is eaten, as the ſtrongeſt and richeſt manure. It certainly ſhould not be laid on too new, nor in too great quantities, becauſe it is of a very hot nature; but when that heat is tempered by age, putrefaction, and a due mixture with other ſoils, it becomes a rich and excellent manure. Perhaps it may owe great part of this richneſs to the urine with which it is mixed; for tho' human urine be deſtructive to vegetables, whilſt it is new, by reaſon of its burning ſal-ammoniacal ſpirit, as Glauber terms it, yet, as in many other moiſt things, ſubject to putrefaction, time will correct that defect, digeſt the urine, take of its fiery quality, and ſo alter its nature, as to render it an extraordinary fertilizer of every kind of ſoil. Columella certifies, that old urine is excellent for the roots of trees. Mr. Hartlib commends the Dutch for preſerving the urine of cows as carefully as they do the dung, to enrich their lands, and inſtances a woman he knew near Canterbury, who ſaved, in a pale, all the urine ſhe could; and when the pale was full, ſprinkled it on her meadow, the graſs of which looked yellow at firſt, but afterwards grew ſurpriſingly. Similar to this is what Mr. Bradley relates, as of his own knowledge. Human urine was thrown into a little pit conſtantly every day, for three or four years. Two years after, ſome earth was taken out of this pit, and mixed with twice as much other earth, to fill up a hollow place in a graſs walk. The turf which was laid upon this ſpot grew ſo largely and vigorouſly, beſides being much greener than the reſt, that, by the beſt computation he could make, its graſs, in a month's time, was above four times as much in quantity as that of any other ſpot of the ſame ſize, tho' the whole walk was laid on very rich ground. The author of the Engliſh Improver is therefore very right in ſaying, that human urine is of great worth, and will fatten land more than is generally imagined by our farmers, whom he adviſes to take all opportunities of preſerving this, and every ſort of urine for their ground, as carefully as is done in Holland.

The dung of all poultry is of a very hot nature, full of volatile ſalts, and therefore extremely proper for cold lands, being light of carriage, and a little of it going a great way. It is moſt commonly uſed for diſtant grounds, where it is ſprinkled on wheat or barley, after they are come up, or upon the latter at the time of ſowing. Mr. Mortimer thinks forty buſhels ſufficient for an acre. It is uſed to moſt advantage when dried and powdered, and is very efficacious in keeping froſt out of the earth. Its effects are ſudden, but they do not laſt long. Hens dung is very rich, though not ſo hot as pidgeons dung, nor is it ſo eaſy to ſow, becauſe it hangs more together, neither can it be ſo eaſily collected. The opinion that gooſe dung is rather hurtful than beneficial to corn or graſs, is an ancient error, as is proved by Mr. Worlidge, who ſays, he was credibly informed, that a flock of geeſe having made a track a-croſs a field of wheat during the winter, and nibbled the corn clear from the ground in their daily paſſage in ſuch a manner, that the wheat upon it proved the next year much finer than any other part of the field. He alſo mentions a field which had been given to the town of Sutton, in Northamptonſhire, for feeding geeſe, whoſe dung rendered it one of the richeſt paſtures he ever ſaw, inſomuch, that all ſorts of cattle fed on it very greedily; nor could he hear from any of the inhabitants, that ſo much as one beaſt received the leaſt injury from it. He adds, that his own horſes, kept in a piece of paſture on which geeſe lay very much, eat the graſs bareſt where the fowls had dunged moſt, and that he never found it do them any hurt, except making them too fat.

Perhaps the reaſon why the dung of geeſe has been ſaid to occaſion barrenneſs, flowed from obſervations where it had been laid too thick; for being of a hot fiery nature, it will, if laid on in too large quantities, deſtroy the graſs; but if ſpread thin in the winter, it will prove a very rich and valuable manure, eſpecially if mixed with cooling earth, and left for ſome time to putrify.

DUNG-HILLS, heaps of dung collected in the yard, and other places, belonging to a farm.

They are made up of the dung of different animals, of different kinds of ſtraw, and other vegetable ſubſtances; and they have frequently different animal ſubſtances in their compoſitions.

Compoſt, or compound dung-hills, are a collection of different matters, as earth, mixed with dung from an ordinary dung-hill, lime, and other manures.

Some perſones make dung hills of this kind, and are of opinion, that the dung and other manures with which they are compounded, are thereby made to enrich a greater quantity of land, than if not mixed with earth; and beſides, do not produce the bad effects which ſometimes are produced by dung, when taken directly from a dung-hill, and laid upon land.

It will not be amiſs that we enquire into the advantages of this kind of dung-hills, which will be a means not only of recommending them, but alſo of pointing out the moſt proper method of conſtructing them.

The firſt thing to be enquired into, is the advantage ariſing from the mixing lime, marle, or other manures, with the earth and dung. Lime, as it is a diſſolver of all vegetable and animal ſubſtances, when mixed with dung, will help to diſſolve it; and as it communicates an abſorbent power to earth, will enable the earth with which it is mixed to attract the vegetable food in greater plenty from the air. But in order to make it produce theſe effects, it is neceſſary to mix it with dung and earth; for if the lime is laid in a kind of ſtratum above the dung, and below the earth, it will abſorb the water that falls upon the dung-hill, and thereby will prevent the dung from receiving a ſufficient quantity of water to make it putriſy; and will alſo occaſion ſuch a heat as to burn the dung, and render it uſeleſs; and, beſides, can have but little influence in diſſolving the dung, and communicating to the earth its abſorbent quality. If the lime is laid above the earth, and expoſed to the air, it will be attended with the ſame conſequences: it will abſorb the water; and though it will attract the vegetable food from the air, yet will be of no more uſe for this end, than if ſpread upon as much land as the ſurface of the dung-hill extends to.

The ſame thing may be ſaid of marle, if uſed inſtead of lime; but if marle is uſed inſtead of earth, it is probable that the compoſt will become very rich, as the marle has a very ſtrong abſorbent quality, and would be greatly expoſed to the influence of the air. A much ſmaller quantity than is uſed in the ordinary way, it is probable, would be found ſufficient, and its effects would be ſooner diſcovered. If this is tried, it will be neceſſary to carry the dung to the marle-pit, and there form the dung-hill; for marel is ſo heavy a body, that it would be too expenſive to carry it firſt to the dung-hill, and then to the field.

The advantage of mixing dung with the earth is next to be conſidered. This, it is pobable, is the principle advantage of the compound dung-hills, and that the advantages ariſing from lime are but trifling. They are often made without lime, and their effects, it is ſaid, are equally good.

Dung, in the ordinary dung-hills, has its vegetable food ſometimes waſhed away by rain, when it falls in large quantities. Now this is prevented by the earth in the compound dung-hill, which abſorbs the water, and all the vegetable food which it carries from the dung.

In the ordinary dung-hills, the dung on the ſurface, it is generally ſuppoſed, loſes a part of its vegetable food, which is exhaled by the ſun, or carried off by the wind. This is prevented, by covering the dung with earth in the compound dung-hill.

But it is probable, that the compound dung-hill receives its principal advantage from the earth being expoſed to the influence of the air; and if this be true, the more abſorbent that the earth is which is uſed, and the larger that the ſurface of the dung-hill is, in proportion to its bulk, and the quantity of dung contained, it will be the richer.

This directs us to the proper method of conſtructing it, to make it long and narrow, with as many diviſions in it as can be made conveniently; for thereby a larger ſurface is expoſed in the ſame quantity, and the more vegetable food acquired.

It is proper to obſerve further, that earth ſhould always be in the bottom of the dung-hill, to receive any of the juices of the dung which the rain may carry downward; that the dung ſhould be immediately covered with earth, to prevent the juices from being exhaled, or carried off; and that the earth ſhould be expoſed for a conſiderable time, before any more dung is laid on, that ſo it may receive all the benefit from the air which it is capable of, before it is covered.

This kind of dung-hills is made with leaſt expence upon the field for which the dung is intended. The head-ridges are commonly high raiſed, by the turning of the ploughs upon them, and contain the richeſt earth in the field. Theſe are very proper places for the dung-hills. The earth is at hand, and can eaſily be thrown upon the dung.

Thoſe that treat of dung-hills of this kind commonly recommend earth as oppoſite as poſſible to the nature of the ſoil upon which the dung is to be laid. They recommend clay for a light ſoil, and light earth for a clay ſoil. Beſides, theſe the farmer cannot always command; and, though he can, will frequently find it very expenſive to carry them. It is probable, that there is not ſo much in adapting the earth of the dung-hill to the kind of ſoil, as perſons, at firſt ſight, are apt to imagine. It is certain, that there cannot be ſo much in it, as to anſwer the expence of fetching the earth. It is true, that, in many farms, there are different ſoils, and therefore the dung may be carried to a ſoil different from the ſoil of the field for which it is intended; there the dung-hill may be formed, and from thence carried to the field; but ſtill this is an additional trouble and expence; and therefore this method is not to be followed, till, upon a comparative trial, the advantages are found to do more than anſwer the expence.

It is a practice in ſome parts of Scotland, to lay clay upon clay land. This practice, it is ſaid, ſucceeds very well, which makes it probable, that it is not very material what kind of earth is uſed for the compound dung-hill, provided it is of the abſorbent kind; and, therefore, the farmer need not be anxious about getting earth different from his ſoil, but may make his compound dung-hill of the earth of the field which he intends to manure.

Farmers, eſpecially if they live in countries that do not abound in cattle, may be apt to aſk, where they are to get ſufficient quantities of dung neceſſary for carrying the practice of agriculture ſtill nearer to perfection? M. de Tourbilly anſwers this queſtion, by pointing out the following method of making an artificial manure.

“ Before the winter ſets in, ſays he, that is about the middle of November at fartheſt, huſbandmen ſhould cleanſe all the yards, and out-lets belonging to the farm-houſe; lay them ſmooth, and, if neceſſary, dig away a little of their ſurface, till it is about a foot lower than the floor of their buildings; then if they have any common or waſte land, let them bring from thence fern, thiſtles, and other coarſe weeds, cut down in full ſap, at which time they are beſt, or occaſionally as they are wanted, and lay a bed of them, about two inches thick, upon the places thus prepared. If weeds cannot be got, coarſe wheat or rye ſtraw may be uſed in their ſtead, in beds about half as thick. A layer of earth, about ſix inches deep, ſhould be ſpread upon this bed of weeds, or ſtraw. Earth of a quality proper for the improvement of the ſoil intended to be manured, is undoubtedly the beſt; though any earth, which in this caſe the farmer will dig as near to the houſe as he conveniently can, is preferable to the miſtaken practice of paring off the upper ſoil, or turf, of the neareſt common or waſte land, to mix with the artificial manure: for when poor ground has loſt its ſurface or ſward, it long remains a barren ſpot, before a new ſoil, capable of affording root and nouriſhment for graſs, can be formed upon it. If no proper earth lies nearer at hand, the farmer may take off the ſurface of any part of his plowed ground which lies too high, and is not at too great a diſtance. But, as much as poſſible, he ſhould adapt the earth mixed with this manure to the nature of the land for which it is intended.

“ This bed of litter and earth ſhould be let lie about a fortnight, during which all ſweepings and filth of the kitchen and houſe ſhould be thrown upon it, that nothing may be loſt, which can be converted into manure. The wetneſs of the ſeaſon, and the paſſing of men, cattle, and carriages, over this bed, will greatly contribute to rot it; to complete which, let the farmer turn in all his cattle of every kind, and drive them backward and forward over it, after rain has fallen. This will ſoon render it a kind of coarſe mud mixed with litter, which may be cleared away at the end of another fortnight. If it be too liquid, as it often is in rainy ſeaſons, it ſhould be laid up in little heaps, upon the ſame place, till it be drained. Let it then be carried to a ſufficiently capacious hole, or pit, dug for the purpoſe in or near a corner of the farm-yard. This pit muſt be in a dry place; for no manure ſhould ever be laid in water, which would waſh away its unctuous parts, deſtroy its heat, diſſolve its ſalts, and even leſſen its bulk conſiderably, if it run off elſewhere. One load of ſtable and other dung ſhould be mixed with every two loads of this artificial compoſt, as it is laid in the pit. The next day, another bed of litter and earth may be ſpread in the yard, &c. as before; and, being managed in the ſame manner, will be fit for carrying to the dung-pit in about another fortnight. Thus two ſupplies of this artificial dung may be had every month, during the whole winter and part of the ſpring.

“ This work will not be expenſive: every body, even women and children may be employed at it, and it is done at a time of the year when labourers are leaſt wanted in the field. It may be continued in the ſummer: though the beds do not rot near ſo ſoon in dry weather; two or three months being ſometimes requiſite then to bring them to a proper ſtate, in the above method. However, this may be conſiderably haſtened, and much improved, by bringing cattle to lie upon them in the night, unleſs they are in folds. The earth and other ſubſtances of this manure will be greatly enriched by their dung and urine, before it is carried to the ſtercorary.

"As this laſt made dung will not be ſufficiently rotted by the next ſowing ſeaſon, the beſt way is to lay it in a ſeparate pit, to mellow, for the enſuing year; and it will be ſtill better, if kept two years. The other dung, made in a wetter ſeaſon, and more thoroughly putrefied at firſt, ſhould remain about ſix months in the pit, to ripen; and be wetted now and then in dry weather. During this time, it heats, ferments, and acquires an excellent quality. It may be made to ſuit any ſoil, and agrees with many lands better than pure dung taken from the ſtall or ſtable, than which it is milder, leſs fiery, and more laſting. Farmers who have not a large yard belonging to their houſe, may make this compoſt in any other place that beſt ſuits their convenience; and the poorer ſort of peaſants may do the ſame. By mixing with it a third part of other dung, they triple their quantity of manure." *Memoirs ſur les Defrichemens*, *p.* 78.

This eaſy and profitable method of making artificial dung is likewiſe recommended by the ingenious author of the Diſſertation on Agriculture, publiſhed in the Memoirs of the truly laudable Society eſtabliſhed at Berne, for the Improvement of rural Oeconomy.

"There are, ſays he, two ways of meliorating land. One of them may be called natural, and the other artificial. The former conſiſts in a well proportioned mixture of two or three different kinds of earth, the reſult of which is a new ſort, more favourable to vegetation; and the latter in dung.

"Dung conſiſts of animal or vegetable ſubſtances, either actually putrefied, or in a ſtate of putrefaction. It operates two ways upon the earth: firſt, by conveying nouriſhment to the plants which grow in it, as the air and water alſo do; and ſecondly, by opening its pores and ſeparating its parts, by a kind of fermentation, till at laſt it is itſelf converted into a kind of fine black mould.

"The only way to have plenty of this uſeful matter, without much expence, is by a mixture of ſtraw or litter with the excrements of animals. Manure may be obtained from every part of animals or vegetables: but a quantity ſufficient for a large extent of ground would coſt too much. I therefore ſhall not here ſpeak of ſawduſt, tanner's bark, aſhes, ſoot, linen or woollen rags, ſhavings of horn, &c. of which quantities can be had only in the neighbourhood of populous towns; but ſhall content myſelf with pointing out the means of increaſing dung in countries diſtant from great cities.

"Agriculture affords an ample field, and very abundant matter, for the moſt uſeful of all experiments. Nothing would contribute more effectually to its improvement, nay, to the reducing of it to fixed and certain rules, than for proper perſons to try upon different pieces of ground, of ſimilar ſize and ſoil, ſome of the principal methods pointed out by the moſt intelligent in this art, and compare the iſſue of their trials, and the ſeveral incidents attending them, during a courſe of years. This is particularly wanted in order to determine the effects, and the quantity moſt proper to be uſed, of different manures. To this end, two or three fields of experiment might be ſet apart, to be cultivated exactly according to a well choſen and well digeſted plan. An exact account ſhould alſo be kept of every occurrence, diſburſement, and produce. Regularity is the ſoul of all buſineſs. Such journals, properly methodized, would give us a clear inſight into rural Oeconomy, and ſet order, aſſiduity, and frugality in ſo advantageous a light, that every one would be forced to acknowledge them to be the ſource of riches, and as ſuch would be induced to practiſe them." *Tom.* II. *part* III. *page* 651.

DURZ'D, or *dorz'd out*, an epithet applied in the northern counties to corn beaten out of the ears by the wind turning it in the field, or other accidents.

DWARF, an epithet applied to ſuch trees and plants as are leſs than the common ſorts of the ſame genus.

Dwarf-trees were formerly in much greater requeſt than they are at preſent; for though they have ſome advantages to recommend them, yet the diſadvantages attending them greatly over-balance; and ſince the introducing of eſpaliers into Engliſh gardens, dwarf-trees have been in little eſteem, for the following reaſons:

1. The figure of a dwarf-tree is very often ſo much ſtudied, that, in order to render the ſhape beautiful, little care is taken to procure fruit, which is the principal deſign in planting theſe trees.

2. The branches being ſpread horizontally near the ſurface of the ground, render it very difficult to dig or clean the ground between them.

3. Their taking up too much room in a garden, eſpecially when they are grown to a conſiderable ſize, for nothing can be ſown or planted between them.

It is alſo very difficult to get to the middle of theſe dwarf-trees in the ſummer, when their leaves and fruit are on the branches, without beating off ſome of the fruit, and breaking the young ſhoots; whereas the trees on an eſpalier can at all times be come at on each ſide, to tie up the new ſhoots, or to diſplace all vigorous ones, which, if left on, would rob the trees of their nouriſhment.

Add to this, the fruit-buds of many ſorts of pears and apples are produced at the end of the former year's ſhoot, which muſt be ſhortened in order to keep the dwarfs to their proper figure; ſo that the fruit-buds are cut off, and a greater number of branches are obtained than can be permitted to ſtand; ſo that all theſe ſorts of fruit-trees, whoſe branches require to be trained at full length, are very improper to train up as dwarfs.

Theſe evils being entirely remedied by training the trees to an eſpalier, hath juſtly gained them the preference. *Miller's Gard. Dict.*

DWARF-OAK, the name of a ſhrub common in many parts of North America, where it is planted for making hedges and fences. It grows very faſt, and becomes ſo thick by cutting with ſheers, that hardly a bird or mouſe can creep through it when in full perfection. The acorns are ſown in rows or drills, where the hedge is propoſed to be made, which admits of being made of a conſiderable height. Such a fence as this would be a ſcreen from the winds in winter, as well as a ſecurity to the incloſure; and therefore a hedge of this kind would be very uſeful here; and the plant would, perhaps, on further examination, be found capable of being ſerviceable in ſome other ways. *Muſeum Ruſticum*, *vol.* VI. *p.* 293.

DYER's-WEED. *See the article* WELD.

E.

EADDISH, or *Eddiſh*, roughings, or graſs growing among the ſtubble, after the corn is cut.

EARING, or *Aring*, ploughing, tilling, cultivating.

EARNING, cheeſe-rennet.

EARTH, the ground, conſiſting of different modifications of terrene matter.

The earth, which generally preſents itſelf firſt to the eye, is no particular kind of ſoil, but, uſually, a mixture of the ſoil underneath, with every adventitious ſubſtance, either purpoſely brought to, or accidentally lodged upon it. From theſe cauſes, this ſuperficial earth, commonly called mould, grows and increaſes yearly in depth; oftentimes to ſuch a degree, as to form even conſiderable eminences, eſpecially where there has been a fall of woods and trees, ſuch as birch and beech, which, not being of a conſtitution to remain long in the ground without rotting, as fir, oak, elm, and ſome other timber will do, are pretty ſoon reduced into mould as ſoft and tender as that in which they were ſown or planted.

This ſurface-earth, and alſo the natural under-turf earth, to the depth of about a foot, is generally the beſt and ſweeteſt, being enriched with all that the air, dews, ſhowers, and celeſtial influences can contribute thereto: for that earth is beſt, and it is the ſame with water, which is moſt expoſed to the influences of the ſun and air. The fatneſs of the under-turf earth, drawn up to the ſurface by the kindly warmth of the ſun, ſpends but little of its vigour in the graſs and tender verdure which it produces, provided no rank weeds be permitted to grow and perfect their ſeeds; but maintains its natural force, and is therefore, of all uncultivated moulds, the moſt grateful to the huſbandman.

As the reſt of the ſubjacent earths approach this in virtue, ſo are they to be valued. Of theſe there are ſeveral kinds, diſtinguiſhable by their ſeveral conſtitutions. The beſt of them is black, fat, and at the ſame time porous, light, and ſufficiently tenacious, without any mixture of ſand. It riſes in pretty large pieces, and falls into duſt, of its own accord, after a ſhort expoſure to the air; but without crumbling altogether into duſt, which is the defect of a leſs perfect ſort.

This excellent black mould is fit for almoſt any thing, without much manure. The farmer is not always ſo happy as to meet with it: or if there be a ſmall depth of it, other, leſs fertile, ſoils lie underneath, ſuch as clay, gravel, ſand, &c. which require different treatment, according to their various qualities. Theſe ſoils often appear on the ſurface; and may be ſaid to be almoſt barren, till brought by art to anſwer the purpoſes of the huſbandman. In clays and ſtiff ſoils, the component particles have too cloſe an adheſion to admit the roots of plants with the eaſe requiſite for them properly to ſeek their food: and, on the other hand, ſand, and ſoils of a light nature, are too looſe to give the proper ſtability to plants, or to retain the mixture neceſſary to convey their nouriſhment into them. It will therefore be right, firſt, to ſhew how theſe extremes may moſt properly be corrected, and then point out the means of keeping the ſuperficial mould in conſtant heart, to uſe the language of farmers.

EARTH-BOARD, that part of a plough which turns over the earth. *See the article* PLOUGH.

EAVES, the edges of the roof that over-hang the walls of a building.

EDDER, the ſmall ſhoots of aſh, hazle, oak, &c. uſed for binding the tops of hedges.

EDDISH, the ſame with eaddiſh. *See* EADDISH.

EDGE, the extremity of a border.

EDGE-GROWN, come up uneven, not ripening all together.

EDGINGS, the ſeries of ſmall, but durable, plants, ſet round the edges or borders of flower-beds, &c. The beſt and moſt durable of all plants for this uſe is box, which, if well planted, and rightly managed, will continue in ſtrength and beauty for many years. The ſeaſons for planting this are the autumn, and very early in the ſpring; and the beſt ſpecies for this purpoſe is the dwarf Dutch box. The edgings of box are now only planted on the ſides of borders, next walls, and not, as was ſome time ſince the faſhion, all round borders or fruit-beds, in the middle of gardens, unleſs they have a gravel walk between them, in which caſe it ſerves to keep the border from waſhing down on the walks in hard rains, and fouling the gravel.

In the laſt age, it was alſo a very common practice to plant borders, or edgings, of aromatic herbs, as thyme, ſavory, hyſſop, lavender, and the like. But theſe are all apt to grow woody, and to be in part, or wholly, deſtroyed in hard winters. Daiſies, thrift, or ſea July flower, and chamomile, are alſo uſed by ſome for this purpoſe; but they require yearly tranſplanting, and a great deal of trouble, elſe they grow out of form; and theſe are alſo ſubject to periſh in very hard ſeaſons. *Miller's Gard. Dict.*

EDIFICE, a fabric, a building.

EFT, a newt, or evet.

ELBOW, a name given by horſemen to the hind-part of the fore-leg, pointing towards the briſket.

ELDER, fuel for fire.

ELDER, the udder.

ELDER, is alſo the name of a well-known tree, and is often uſed in making fences, which may be done by taking elder-ſticks, or truncheons, ten or twelve feet long, and ſticking them in the bank ſloping both ways, ſo as to form a kind of chequer work. By this means a fence may be ſooner raiſed than by any other, as the elder is a very quick grower. The wood, when large, is very uſeful for turners and mathematical inſtrument-makers, being nearly equal to the beſt box, and for many uſes ſurpaſſing it. *Mortimer's Huſbandry, vol.* I. *page* 7.

ELM, the name of a tree too well-known to need any deſcription, being common in almoſt every part of England.

Elms are very proper to be planted in hedge-rows, upon the borders of fields, where they will thrive much better than when planted in a wood, or cloſe plantation, nor will their ſhade be very injurious to whatever grows under them; but when theſe trees are tranſplanted out upon banks after this manner, the banks ſhould be well wrought and cleared from all other roots, otherwiſe the plants, being taken from a better ſoil, will not make much progreſs in theſe places. About Michaelmas will be a good time for this work, for the reaſons before aſſigned; but when they are planted, there ſhould be ſome ſtakes fixed in by them, to which they ſhould be faſtened, to prevent their being diſplaced by the winds; and part of their heads ſhould be taken off, before they are planted, which will alſo be of uſe in preventing their being eaſily overturned by winds; but by no means ſhould their leading ſhoot be ſtopped, nor their branches too cloſely cut off; for, if there are not ſome ſhoots left on to draw and attract the ſap, they will be in danger of miſcarrying.

Theſe trees are alſo proper to plant at a diſtance from a garden or building, to break the violence of winds, for which purpoſe there is not any tree more uſeful; for they may be trained up in form of an hedge, keeping them cut every year; which will cauſe them to grow very cloſe and handſome, to the height of forty or fifty feet, and be a great protection againſt the fury of winds: but they ſhould not be planted too near a garden, where fruit-trees, or other plants, are placed; becauſe the roots of the elm run ſuperficially near the top of the ground to a great diſtance, and will intermix with the roots of other trees, and deprive them of nouriſhment. Nor ſhould they be planted near gravel or graſs walks, which are deſigned to be well kept; becauſe the roots will run into them, and ſend forth ſuckers in great plenty; which will deface the walks, and render them unſightly.

But, for large gardens, where ſhade is required, there is ſcarce any tree ſo proper for that purpoſe, being eaſy to remove, when grown to a conſiderable ſize; ſo that a perſon who is willing to have his plantations for ſhade in a ſhort time, may procure trees of one foot circumference in their trunk, which will be in no danger of ſucceeding, provided they are removed with care. And theſe will take root, and grow again, almoſt as well as young plants, which is what few other ſorts of trees will do; but then they ſhould be ſuch trees as have been thus regularly trained up in a nurſery, and have good roots, and not ſuch as are taken out of hedge-rows, as is by ſome practiſed, which ſeldom riſe with any tolerable roots, and conſequently often miſcarry; and this has been the occaſion of ſo many plantations of theſe trees failing; for although ſome of them may live a few years, yet few of them are of long duration, and they rarely increaſe much in their ſtems, but frequently grow hollow, their heart decaying firſt; ſo that they are ſupported only by their bark or ſhell, for a few years, and the firſt ſevere winter, or very dry ſummer, they are generally deſtroyed.

In planting of theſe trees, great care ſhould be taken not to bury their roots too deep; which is very injurious to them, eſpecially if they are planted on a moiſt loam or clay; in which caſe, if the clay is near the ſurface, it will be the beſt way to raiſe the ground in an hill, where each tree is to be planted, which will advance their roots above the ſurface of the ground, ſo that they will not be in danger of rotting in winter with moiſture.

When theſe trees are propagated by ſuckers taken from the foot of old trees, they are commonly laid into the ground very cloſe in beds, where, in dry weather, they may be frequently watered, to encourage their putting out roots. In theſe beds they are left two years; by which time, thoſe that live will be well rooted, though a great many of them generally die; then they ſhould be tranſplanted into the nurſery.

There are ſome who raiſe the witch elm from ſeeds, which it generally produces in great plenty, and are ripe in April. Theſe ſhould be ſown upon a bed of freſh loamy earth, and gently covered; in dry weather they ſhould be watered, and if the bed is ſhaded from the violent heat of the ſun, it will be of great ſervice to the ſeeds, for I always obſerve the plants to come up better in the ſhade, than when expoſed to the ſun. When the plants come up, they ſhould be carefully cleared from weeds; and after they have ſtood two years in the ſeed-bed, they will be fit to plant out into the nurſery.

Sometimes the common Engliſh elm will produce ſeed; but it is not ſo conſtantly fruitful as the witch elm, which ſeldom fails to produce great quantities, when they have arrived to due maturity; which ſeeds will fall to the ground, and when they light upon a ſpot which is not diſturbed, the plants will come up in great plenty.

The timber of the common Engliſh elm is generally preferred to the reſt; though that of the witch elm is often as good, and is the largeſt tree, when planted on a kindly ſoil; but the Dutch elm affords the worſt timber, and never will grow to the ſtature of either of the other ſorts; ſo that this ſhould not be cultivated for the timber; therefore the beſt way to be ſure of the kinds which a perſon would chuſe to propagate, is to have a nurſery of ſtools, in order to furniſh layers; for when they are grubbed up from hedge-rows, there will often be many ſorts intermixed, eſpecially if the people who go about to gather them, furniſh them; becauſe they take them indifferently, wherever they can procure them; ſo that when they are planted out thus blended together, there will be a conſiderable difference in their growths, which will deface the plantation. *Miller's Gard. Dict.*

A correſpondent of the editors of the Muſeum Ruſticum has favoured the public with the following account of an experiment of planting elms on a ſtiff clay.

“ My original deſign, ſays he, was to plant a clump of trees to the north-eaſt, a ſecond to the ſouth-weſt of my houſe, and alſo to plant four rows of elms from the front of my houſe to the village, being about two hundred yards diſtant.

“ My firſt buſineſs in this grand affair was to lay a plan of operations: accordingly, I marked out the ground for my two clumps, and my avenue, driving a ſmall ſtake in the ſpot where every tree was to be planted. For the avenue the ſtakes were placed in four rows, two on each ſide, thirty feet diſtant from ſtake to ſtake, the avenue in the middle thirty feet wide, and the rows diſtant twenty-four feet from each other.

“ My clumps I planted in triangles, one of the points being to the wind, imagining this form would beſt anſwer the intended purpoſe, each clump conſiſting of about one hundred and fifty trees. This preparation was made by me during the ſummer of the year 1737.

“ As ſoon as harveſt was over, the ſame year, I hired ſome labourers, and made them dig a hole ſix feet ſquare, and four feet deep, wherever they found a ſtake, throwing the earth which came out of the hole round its edges.

“ When this work was done, I left it in the above ſtate all that winter and the enſuing ſummer, with an intent that the ſtiff obſtinate nature of the clay ſhould be meliorated by the powerful influences of the froſts, ſun, and variable air.

“ At the end of the ſummer of 1738, I found I had not loſt my labour, when I came to examine the ſtate of my experiment. The nature of the ſoil, wherever the air could operate upon it, was entirely changed, the clay being much leſs compact, and approaching nearer to the ſubſtance of a ſtiff loam, being crumbly, though cloſe in its texture.

“ As ſoon as I found that my land was thus in proper order for planting, I procured from a nurſery-man a ſufficient number of young elm-trees, ordering him to mark the north ſide of every one of them with ſome white paint, previous to his taking them up.

“ This was a precaution ſome might think unneceſſary; but my reaſon for doing it was, becauſe I imagined that a tree, removed from its native ſpot, and tranſplanted into another place, muſt thrive better, if, on being removed, it enjoyed the ſame aſpects as before; and indeed ſome ſmall experiment I had before made in this matter ſeemed to confirm me in the opinion.

“ As ſoon as I had beſpoke my trees, I employed ſome labourers to fill up the holes above-mentioned with the earth that came out of them; but I firſt ſprinkled ſome ſlaked lime over the bottom of each hole, and mixed lime with the earth as it was thrown in, to the quantity of a buſhel for each hole.

“ When this work was done, and the ground appeared level, with a little ſpare earth near each hole, I had my trees planted in the following manner:

“ I began planting my trees about the tenth of October, and had finiſhed by the latter end of the month.

“ I cauſed, in the firſt place, the roots to be moderately trimmed with a very ſharp knife, each root being cut ſloping, not tranſverſely, the ſlope being undermoſt or next the ground: this was, in ſome meaſure, eſſential, to prevent the moiſture proceeding from rain from ſoaking into the wounded part.

“ Having proceeded thus far, I cauſed a tree to be ſet over each hole, upon the ſurface of the ground, round the roots of which ſome under-turf earth was piled, and over that the remainder of the natural ſoil, with which ſome ſlaked lime had been mixed.

“ The upper part of the little hillock, formed round the roots of the tree, was made a little hollow, to convey to the plant as much rain as would be neceſſary to ſupply it with a ſufficient quantity of moiſture.

“ I then employed a perſon to ſecure the little mound with brambles, wattled in the ſame manner as are the graves in a country church-yard; my laſt buſineſs being to apply ſome long ſtakes to each tree, by way of ſupporting it, till it had taken firm root.

“ In this manner, then, I planted the whole number of my trees; and they ſucceeded to a wonder, for but ten failed; and the bark of thoſe was, on examination, found to have been injured by an aſs which broke into my ground: however, the next year I had them replaced, and the diſadvantage was not great.

“ What is moſt remarkable is, that my trees ſtood well the memorable hard froſt, without being, as far as I could find, in the leaſt injured.

“ I now, with pleaſure, view the fruits of my former labours; and I cannot find that any perſon, within twenty miles of me, has finer trees, that have been no longer planted.

“ I well knew, that the only way to defend the roots of my young trees from the damp, raw, under earth, which had proved fatal to other plantations, was, to raiſe them above it: this I effected, by planting them on the ſurface of the ſoil; and ſuch roots as ſtruck downward found a good warm bed in the earth, which had been ſtirred and mixed with lime: however, as the elm has naturally a ſpreading root, the nouriſhment was chiefly extracted from the upper bed of earth, the main roots being covered by only a few inches of mould, and ſome of them, at this time, lie quite bare and prominent above the earth.

“ A great deal depends on ſtaking young trees ſo ſecurely that they ſhall not be ſhaken by every guſt of wind, in ſuch a manner as to diſplace their roots in the earth; for by this means the fibres of the roots of ſuch ſhaken trees are removed from the ſurfaces which ſhould afford them nouriſhment; and either the tree dies, or the mouths of the roots muſt again have time ſo to adapt themſelves to the circumjacent particles of earth, as to be in a capacity of once more extracting their nouriſhment and food from their common mother.

“ The trees in my avenue do not now ſeem as if they were planted on the ſurface; for I have, to make the way hard and good, ſince laid many loads of gravel in the middle ſpace, and between the trees: this, together with the trees ſettling a little after planting, as moſt trees do, has made the whole appear near level.” *Muſæum Ruſticum, vol.* IV. *page* 154.

Mr. Dodart, in a diſcourſe made before the Paris academy, on the great fecundity of vegetables, and their prodigious increaſe, choſe this tree as an example of it. He obſerved an elm of about ſix inches diameter in the body, and about twenty feet high to the branches, he ordered one of the branches to be cut off, and, without reckoning the ſeeds which had been ſhaken off by the blows of the weapon, or loſt by the fall, he counted the reſt only which remained on. This branch was about eight feet long, and on this there were 16450 ſeeds. Counting in a very moderate way, there muſt be reckoned, at leaſt, ten ſuch branches as this, on an elm of that growth. The product of theſe ten branches will be then 164500 ſeeds.

All the branches which are ſhorter than eight feet, on the ſame tree, taken together, on a moſt moderate computation, muſt be allowed to make a ſurface more than double that of theſe ten branches. The product of this ſurface of the ſhort branches, therefore, will be 329000.

An elm may very reaſonably be ſuppoſed to live a hundred years, and as the elm, here mentioned, was but of twelve years growth, it cannot be ſuppoſed, in that ſtate, to be yet arrived at its middle degree of fertility in ſeeds; therefore the ſmalleſt addition that can be made to the 329000, will bring it to at leaſt 330000, for the mean yearly product of ſeeds of the tree; and to know what is the whole product of an elm in ſeeds, according to this computation, this ſum muſt be multiplied by a hundred, the number of years of the duration of the tree. Thus the ſmalleſt amount will be thirty-three millions of ſeeds, produced by an elm originally raiſed from one ſingle ſeed.

This, however, is no more than the natural produce of the tree, in its wild ſtate; we all know very well, that proper management will make trees yield abundantly more fruit than they naturally would. Thus, if this elm, at a proper ſtage of its growth, had been lopped off at the head, it would have puſhed out infinitely more numerous branches; and a ſet of theſe would have appeared in a circle round the trunk, at about half an inch from the place where it was cut off, and this would have been the caſe in whatever part, or at whatever height, it had been cut. All the trunk of the tree, from the ground up to the beginning of the natural eruption of the branches, being then full of theſe rudiments of branches, placed in circles, and ſeparated by circular ſpaces of about half an inch deep, compoſes ſo many circles of branches, or rudiments of branches, as there are half inches in meaſure from the ground up to the firſt natural rudiments; all theſe rudiments are formed, therefore, all ready to appear in form of complete branches, and all contain, in miniature, their proportion of ſeeds, and any circle of them may be made to ſhoot out and appear, by only cutting off the trunk juſt above them; theſe are all, therefore, to be allowed really to exiſt, and all to be brought into the account of the providence of nature, in the fecundity of the tree, as all are formed and provided for it. There are, therefore, evidently contained, in the elm, ſo many times thirty-three millions of ſeeds, as there are half inches in twenty feet, which was its meaſure from the ground to the firſt branches: that is to ſay, this tree contains actually in itſelf 15840000000 rudiments of ſeeds, or has ſo many bodies incloſed in itſelf, by each, or any one of which, it is capable of multiplying its ſpecies, and of producing ſo great and aſtoniſhing a number of trees. The imagination is ſtartled at being conducted to ſo amazing a ſcene by reaſon.

What are we to think then of the immenſity of the works of the great Creator of the univerſe, when we conſider that every one of theſe ſeeds contains in itſelf a tree, loaded with an equal number of ſeeds, and each of thoſe another tree, loaded in the ſame manner, and ſo on, beyond the utmoſt extent of our capacity; and that conſequently here is a geometrical proportion, or progreſſion of increaſe, the firſt term of which is 1, the ſecond 15840000000, the third the ſquare of that number, the fourth the cube, and ſo on to infinity. Reaſon and imagination are loſt together in the immenſity of ſuch a calculation! *Mem. Acad. Par.* 1700.

ELSHIN, a pail, kit, or bucket.

ENDIVE, or ſuccory, a plant much cultivated in kitchen gardens.

It is propagated by ſeeds, which are longiſh, flat at one end, and roundiſh at the other, not unlike to little bits of ſmall ſtalks. Thoſe of the white, the green, and the curled, which are the ſorts cultivated in the kitchen garden, are of a whitiſh grey colour. The ſeeds of the wild ſuccory, which is uſed for medicinal purpoſes, are black, but of the ſame ſhape as the former. All the ſorts of endive are eſteemed aperitive and diuretic. They will grow in almoſt any ſoil, but thrive by far the beſt in deep, good, and well looſened mould. The management of each ſort is the ſame.

The curled endive is the ſort now moſt cultivated in England for ſallads in the autumn and winter, during which it may be continued in perfection, ſo long as the ſeaſon will permit, by obſerving the following directions.

The firſt ſowing of endive ſhould be about the middle of June; for that which is ſown earlier is apt to run up to ſeed, eſpecially if the ground be rich, and the ſituation warm, before the plants have arrived to a proper ſize for blanching. The ſecond ſowing ſhould be in the beginning of July, and the third and laſt about the middle of the ſame month. The plants of each of theſe ſowings will be ſo very different in their growth, that each bed will afford a ſucceſſion of two or three crops, and the three ſowings will of courſe furniſh an uninterrupted ſupply during the whole ſeaſon.

The plants muſt be well weeded, and frequently watered in dry weather, till they are fit to tranſplant. A ſpot of rich ground, proportioned to the number of plants intended to be ſet in it, ſhould then be prepared for them, by thorough digging, and laying of its ſurface ſmooth; and, if it be very dry, it muſt be well watered. The largeſt plants ſhould be removed firſt from the ſeed-bed, and the ſmaller ones ſhould be left there to gather ſtrength, which they will ſoon do after the additional room for their farther growth, ſo as, in their turns, to be fit alſo for tranſplanting. Care muſt be taken not to break their roots in drawing them up from the ſeed-bed; and if the tops of their leaves are ſhortened then to nearly equal lengths, and they are ſpread with all their roots turned the ſame way, theſe little precautions will render the regular planting of them much eaſier, than when their heads and tails are jumbled promiſcuouſly together. They ſhould be tranſplanted in rows at leaſt one foot aſunder, and ſet ten inches apart in the rows. The earth ſhould be well cloſed around their roots, and they ſhould be well watered every other evening till they have taken good root, after which they muſt be kept clear from weeds.

If the plants left in the ſeed-bed are alſo well weeded and watered, a ſecond tranſplantation may be made from thence in about ten days or a fortnight after the firſt, and the remainder of them will be fit to tranſplant, in the ſame manner as before, at about the ſame farther diſtance of time.

The plants that were firſt tranſplanted will be fit for blanching by the latter end of Auguſt at fartheſt. To do this properly, the gardener ſhould graſp in one hand all the inner leaves of the plant, in regular order, and then collect over them the outſide ſound ones; for the rotten and decayed leaves, which lie next to the ground, ſhould be pulled off and thrown away. The leaves thus gathered up ſhould be placed as nearly as can be in the natural order of their growth, ſo as not to croſs one another, and when the whole plant is thus collected, it ſhould be tied up very cloſe with a twig of oſier, or a ſtrong ſlip of baſs mat, at about two inches below the top. This ſhould be done in a very dry afternoon, when the middle of the plants is perfectly free from dew or rain: for any ſuch moiſture tied up in them, would ſoon make them rot. In about a week after this, theſe plants ſhould be tied again round the middle, to prevent their heart-leaves from burſting out on one ſide, which they are otherwiſe apt to do, as they increaſe in bulk; and with this management they will be quite blanched in three weeks or a month, from the time of the firſt tying up. The largeſt plants ſhould always be tied up firſt; ſo that by going over the ſame ground once a week, and taking them according to their ſize, the crop will be continued longer than if they were all tied up at once: for they will not hold ſound and good above ten days or a fortnight after their blanching has been completed, eſpecially if the ſeaſon prove wet. For this reaſon it is moſt adviſable to ſow and plant at different times, as before directed. But it is to be obſerved, that all the plants of the laſt ſowing ſhould be tranſplanted under pales, walls, or hedges, to ſcreen them from froſt; and if the winter be ſevere, they ſhould alſo be covered with peas-haulm, or ſome other light covering, which ſhould be carefully taken off in mild weather: and theſe borders muſt likewiſe be as dry as poſſible; for endive is very liable to rot, if planted in moiſt ground in the winter.

Only the plants of the two firſt ſowings are to be tied up in order to blanch them: for, after October, when the nights begin to be froſty, the plants of the late crop would be in great danger of being killed thereby, if they were to be left entirely above ground, even though they ſhould be covered with haulm. The beſt way of managing theſe, is to take them up in a very dry day, and with a large flat pointed dibble, plant them in the ſides of ridges of earth laid very upright, facing the ſun, with only the tops of the plants out of the ground. The plants thus ſituated will be expoſed to as little wet as poſſible, for rain cannot then lodge upon them, and in about three weeks or a month's time they will be blanched fit for uſe: but they will not keep good long after that. Freſh ones ſhould therefore be planted in this manner every week or fortnight at fartheſt, by thoſe who would have a conſtant ſupply for the table; and if thoſe which were tranſplanted from the ſeed-beds are kept till February or March, before they are thus ſet to blanch, ſallads of endive may be had regularly till the beginning of April, or later. This laſt planting will continue good longer than that which was made juſt before the beginning of winter; becauſe, as the days increaſe in length, the ſun grows warmer, and the too great moiſture of the earth, which would endanger the rotting of the plants, is more and more exhaled.

When the endive, blanched either way, is fit for uſe, it ſhould be dug up with a ſpade, and after its outſide green and decayed leaves have been ſtripped off, it ſhould be thoroughly waſhed in two or three different waters, to clear it from ſlugs and other vermin which commonly ſhelter themſelves among its leaves.

If any of the plants ſhould put out flower-ſtems either before or during the time of their blanching, they ſhould be immediately pulled up, and thrown away.

In order to have good ſeeds of endive for the next ſeaſon, ſome of the largeſt, ſoundeſt, and moſt curled plants, (a dozen of ſuch will yield ſeeds enough for any middling family,) ſhould be choſen from among the borders where the laſt crop was tranſplanted, before the reſt of it is put into the ridges to blanch. Theſe ſelected plants ſhould be carefully taken up, in the beginning of March, if the weather is mild, otherwiſe it may be deferred a fortnight longer, and tranſplanted into a well ſheltered place, at the diſtance of about eighteen inches aſunder, in one row, which ſhould be placed pretty near to the fence, whether it be wall, pale, or hedge; but not too near, eſpecially if it be the former, becauſe the danger of froſts and nipping winds is greateſt quite cloſe to a wall. Theſe plants ſhould be kept very clear from weeds, a deep ſtirring or two of the earth will give them great vigour, and when their ſtems begin to advance in height, they ſhould be ſupported by a ſtring run along before them, and faſtened at each end, either to the fence, or to ſtakes ſet up for this purpoſe. About the beginning of July, theſe ſeeds will begin to ripen. As ſoon as they are quite ripe, the ſtalks muſt be cut off, and ſpread upon a coarſe cloth, to dry in the ſun. They ſhould then be beaten out, dried again in the ſun, and laid up in bags, or paper, in a dry place. But a circumſtance of ſome moment here is, that it would be wrong to wait for the ripening of all the ſeeds of the ſame plant, becauſe, ſuch is their irregularity in this reſpect, the firſt ripe and beſt of the ſeeds will ſcatter and be loſt, before the others are near ripe.

ERSH, the ſtubble after the corn is cut.

ERGOT, a ſort of ſtub, like a piece of ſoft horn, placed behind and below the paſtern joint.

ESCALLION. *See the article* SCALLION.

ESCALLIOT, a ſpecies of onion, much cultivated in gardens.

Theſe plants are propagated by off-ſets from the roots, and planting them in a light ſoil; for though they will grow in almoſt any ground, they will increaſe moſt plentifully there.

The beſt time for ſetting is towards the end of January. They muſt be taken up as ſoon as their leaves begin to wither; for they will rot if left long after in the ground.

ESPALIERS, in gardening, are rows of trees planted about a whole garden or plantation, or in hedges, ſo as to incloſe quarters or ſeparate parts of a garden; and are trained up regularly to a lattice of wood-work in a cloſe hedge, for the defence of tender plants againſt the injuries of wind and weather. They are of admirable uſe and beauty in a kitchin garden, ſerving not only to ſhelter the tender plants, but ſcreen them from the ſight of perſons in the walks.

The trees chiefly planted for eſpaliers, are apples, pears, and ſome plums; but the two former are moſtly uſed: ſome plant eſpaliers of apples grafted upon paradiſe ſtocks; but theſe being of a ſhort duration, are not ſo proper for this purpoſe; therefore I ſhould rather adviſe the having them upon crab-ſtocks, or (if in ſmall gardens, where the trees cannot be allowed to grow ſo high) upon what the gardeners call the Dutch ſtock, which will cauſe them to bear much ſooner, and prevent their growing too luxuriant.

In chuſing the trees for an eſpalier, endeavour, as near as poſſible, to plant the ſeveral ſorts which are nearly of the ſame growth in one line, that the eſpalier may be the more regular, and of an equal height, which greatly adds to their beauty; for if you plant trees which ſhoot very unequally in the ſame line, it will be impoſſible to make the eſpalier regular: beſides, the diſtance the trees are to be planted muſt be directed hereby; for ſome trees, viz. thoſe of a larger growth, ſhould be planted twenty-five or thirty feet aſunder; whereas thoſe of ſmaller growth need not be above ſixteen or eighteen feet diſtance from each other.

The width of the walks between theſe eſpaliers ſhould (in a large garden) be fourteen or ſixteen feet at leaſt; and, if they are deſigned to be carried up pretty high, the diſtance ſhould be greater, that each ſide may receive the advantage of the ſun and air, which is abſolutely neceſſary, if you would have the fruit well taſted: and if your ground is ſo ſituated, that you are at full liberty which way to make the eſpaliers, I would adviſe the placing the lines from the eaſt a little inclining to the ſouth, and toward the weſt a little inclining to the north, that the ſun may ſhine between the rows in the morning and evening, when it is low; for in the middle of the day, when the ſun is advanced far above the horizon, it will ſhine over the tops of the eſpaliers, and reach the ſurface of the earth about their roots; which is a matter of more conſequence than many people are aware of.

The ſorts of apples proper for eſpaliers are the golden pippin, nonpareil, rennette griſe, aromatic pippin, Holland pippin, French pippin, Wheeler's ruſſet, Pile's ruſſet, with ſeveral others.

The ſorts of pears proper for an eſpalier are ſummer and autumn fruits; for ſome of the winter pears ſeldom ſucceed well in an eſpalier. Theſe trees, if deſigned for a ſtrong moiſt ſoil, ſhould be upon quince ſtocks; but if for a dry ſoil, upon free ſtocks. Their diſtance of planting muſt alſo be regulated by the growth of the trees, which are more unequal in pears than apples, and ſhould therefore be more carefully examined before they are planted. As for thoſe pears upon free ſtocks, the diſtance ſhould never be leſs than twenty-five feet for moderate growing trees; but, for vigorous ſhooters, the ſpace of thirty or five and thirty feet is little enough, eſpecially if the ſoil be ſtrong, in which caſe they ſhould be planted at a greater diſtance. The particular ſorts of pears I would recommend for an eſpalier, are the jargonelle, blanguette, poir ſans peau, ſummer boncretien, Hambden's burgamot, poir du prince, autumn burgamot, l'ambrette, gros rouſſelet, chaumontelle, beurre du roy, le marquis, creſſane, with many others of leſs note, always remembering that thoſe pears which are of the melting kind, will do better in eſpaliers than the breaking pears, which ſeldom ripen well on eſpaliers: you ſhould alſo be careful of the ſtocks theſe are grafted on; for if the breaking pears are grafted on quince ſtocks, the fruits will be ſtony.

I ſhall now give directions for making the eſpalier, to which the trees are to be trained: but this I would not have done until the third year after the trees are planted; for, while they are young, it will be ſufficient to drive a few ſhort ſtakes into the ground on each ſide of the trees, to which the branches ſhould be faſtened in an horizontal poſition, as they are produced; which ſtakes may be placed nearer, or at a farther diſtance, according as the ſhoots produced may require, and will be ſufficient for the three firſt years; for ſhould you frame the eſpalier the firſt years the trees are planted, the poles would rot before the eſpalier is covered. The cheapeſt method to make theſe eſpaliers is with aſh poles, of which you ſhould have two ſorts; one of the largeſt ſize, which contains thirteen poles in a bundle, and the other ſize thoſe of half a hundred; the firſt or largeſt ſize poles ſhould be cut about ſeven feet and a half long; theſe are intended for upright ſtakes, and muſt be ſharpened at the largeſt end, that they may, with more eaſe, be driven into the ground; theſe ſhould be placed at a foot diſtance from each other in a direct line, and of an equal height, about ſix feet above ground; then you ſhould nail a row of ſtrait ſlender poles along upon the tops of the upright ſtakes, which will keep them exactly even, and continue to croſs the ſtakes with the ſmaller poles, and the tops which were cut off from the larger ones, at about nine inches diſtance, row from row, from the top to the bottom of the ſtakes. Theſe rows of poles ſhould be faſtened with wire, and the largeſt end of the poles ſhould be nailed to the upright ſtakes, which will ſecure the eſpalier almoſt as long as the poles will endure; whereas, if your faſtening is not ſtrong, the poles will be continually diſplaced with every ſtrong wind. When your eſpalier is thus framed, you muſt faſten the branches of the trees thereto, either with ſmall oſier twigs, or ſome ſuch binding, obſerving to train them in an horizontal poſition, and at equal diſtances; being careful not to croſs any of the branches, nor to lay them in too thick: the diſtance I would allow for the branches of pears and apples, ſhould be proportioned according to the ſize of their fruit; ſuch of them whoſe fruit is large, as the ſummer boncretien, monſieur John, and beurre du roy pears, and the rennette guiſe, Holland pippin, French peppin, and other large apples, ſhould have their branches ſix or eight inches diſtance at leaſt; and to thoſe of leſſer growth four or five inches will be ſufficient.

But, beſides this ſort of eſpalier made with poles, there is another ſort that is by many people preferred, which is framed with ſquare timbers cut to any ſize, according to the ſtrength thereof, or the expence the owner is willing to go to; theſe, though they appear more ſightly, when well fixed and painted, are not of longer duration than one of the former, provided it is well made, and the poles are ſtrong which are ſet upright; nor will they anſwer the purpoſe better, though they are vaſtly more expenſive; for the greateſt beauty conſiſts in the diſpoſing the branches of the tree, which, eſpecially in ſummer, when the leaves are on, will entirely hide from the ſight the frame of the eſpalier: therefore all expence in erecting theſe is needleſs, farther than making proviſion to ſecure the branches of the trees in a regular order.

Fruit-trees thus planted, and well managed, are much preferable to thoſe trained up in any other figure, upon ſeveral accounts: as, firſt, theſe take up very little room in a garden, ſo as to be hurtful to the plants which grow in the quarters; and, ſecondly, the fruit upon theſe are better taſted than thoſe which grow upon dwarfs, the ſun and air having freer acceſs to every part of the tree, whereby the dampneſs ariſing from the ground is ſooner diſſipated; which is of ſingular advantage to fruit-trees. *Miller's Gard. Dict.*

ESPARCET, the ſame with ſaintfoin. *See the article* SAINTFOIN.

ESSE, a provincial word uſed in Cheſhire, to ſignify aſhes.

ETCH, the ſame with erſh. *See* ERSH.

EVERLASTING-PEA, or broad leaved chickling vetch, a perennial plant, which grows naturally in ſome parts of England, is eaſily cultivated, and the root yields every year a great burden of excellent provender.

Theſe are great inducements for encouraging the cultivation of this plant, which ſeems adapted to any ſoil.

“ I ſowed three years ago, ſays a writer in the Muſeum Ruſticum, a rood of land, light, and but poor in quality, with this ſeed: this work was done early in the ſpring, the land being prepared as for barley.

“ I ſowed it not in the broad-caſt way, as I ſhould have found much more difficulty to keep down the weeds; but I cauſed a ſlight furrow to be drawn the length of the land with a light plough; and when the ſeed was thinly ſprained, or rather dropped into this, another was drawn at a foot diſtance, in which the ſeed was dropped in like manner.

"An interval, or fallow ſpace, was then left at leaſt two feet wide; then two more rows of the vetches, till the whole land was ſown. I muſt obſerve, that I covered the ſeed by means of a light harrow with wooden tines, drawn backward and forward acroſs the land.

"When the plants came up, I had them well hoed, to clear the ground of weeds; and when they grew a little ſtrong, they were ſet out with the hoe to about a foot diſtance in the rows, that they might have room to ſpread and branch.

"The firſt year they yielded no great quantity of fodder, but they have ſince made me ample amends.

"The ſecond ſpring they came up very ſtrong and vigorous, branching out much; and when I turned a couple of horſes in to feed, they were very fond of it, eating it very greedily, though they were taken out of a good, natural upland paſture.

"This laſt ſummer the land was almoſt entirely covered, and it yielded a great deal of feed indeed: for experiment ſake I cauſed a few rods to be mowed juſt before it flowered, and it made good hay, ſweet, without being ſticky.

"Before I conclude, give me leave to obſerve, that when I had cut a few rods of the everlaſting-pea, to make into hay, a ſmall quantity of it was, by accident, ſpread thin upon the ground, ſo as to receive the full action of the ſun's rays: this was, in a manner, ſpoiled, becoming quite dry, inſipid, and brittle, and almoſt all the leaves dropping off; but the remaining part, which was dried either in ſmall cocks, or thick ſwarths, made excellent hay. I am, however, perſuaded that the laſt method is by much the beſt." *Muſeum Ruſticum, vol.* I. *p.* 468.

EWE, the female ſheep. *See the article* SHEEP.

Mr. Ellis, in his Treatiſe on Sheep, has given us the following ſecret, which he poſitively aſſerts will make ewes take ram, at any time of the year. "Separate, ſays he, ſix or more of your ewes from the flock, and give to each half a pint of ſtrong ale, or the ſame quantity of good October, mellow, ſilky beer, and not that which is ſharp by ſtaleneſs; and for giving it in the eaſieſt and ſafeſt manner, you may run the ale or beer through a funnel into the ewe's mouth; and when the ewes have been all thus ſerved, put them into a proper place, not too large, nor too narrow, that the ewes may be confined with one or more rams, that have been before a little better kept than ordinary for this purpoſe. Out of ſix ewes, that I have known to take ram in this manner, not one of them has failed proving with lamb. By the above method, and the aſſiſtance of a ſufficient number of hands, an hundred ewes may be thus doſed with ſtrong drink, and if rams enough are provided, they will all preſently take ram." *Ellis on Sheep, page* 297.

EXERCISE, a proper agitation given to an animal body, in order to produce ſalutary effects.

Exerciſe duly given to horſes that are well fed, is not only the beſt means of all others to prevent ill habits, but to preſerve them in a perfect ſtate of health: for exerciſe converts the food into good and wholeſome nouriſhment, it promotes the circulation of the blood, and all the glandular diſcharges, ſo as greatly to enliven the body, and to make way for freſh ſupplies of aliment. It invigorates the ſpirits, gives ſtrength and firmneſs to the muſcles and ſinews, and enables a horſe to endure labour. And when exerciſe is given abroad, in an open free air, it adds greatly to a horſe's vigour, and prevents any diſpoſition to putrid coheſions in the blood, which a cloſe ſtagnated air often produce, and this eſpecially when horſes are young, and their appetites ſtrong; for indeed when horſes grow old, their appetites are more moderate, and reſt is oftentimes more agreeable to them than labour. Nevertheleſs, exerciſe is, more or leſs, abſolutely neceſſary for all horſes, young or old: for we may obſerve, even old horſes, when they lie much ſtill, though they are not apt, as young horſes, to turn directly ſick, and fall into fevers: yet as their blood grows poor, and languid with age, they become ſubject to many infirmities, as ſwellings of their ſheath and bellies, with other dropſical ſymptoms, and ſometimes to obſtinate eruptions on their ſkins, which exerciſe in a proper degree often prevents.

Horſes, by their natural activity, are every way ſuited to exerciſe and labour, and in that reſpect are more uſeful than any other of the brute creatures; only it depends on us, how they are to be treated, both for their own preſervation, and our benefit; and their food ought always to be proportioned according to their exerciſe. But the time and manner of a horſe's exerciſe is alſo to be regarded, for if he happens either to be worked at an unſeaſonable time, or beyond his ſtrength, it will be more injurious to him than if he had not been worked at all. Therefore this general caution is always needful, viz. never to ride a horſe hard, or put him upon any violent exerciſe when he hath been newly fed, and has his belly full of meat or water; but ſhould be moved out at firſt gently, and he will naturally mend his pace, as his food and water begins to aſſuage, when his rider may urge him on to further ſpeed, as his buſineſs may require.

I need not tell any one, that when a horſe is hot with riding, or any other ſharp laborious exerciſe, he ſhould be cooled by degrees, this being known to almoſt every ſtable boy, from cuſtom and uſe, though it is often neglected, through ignorance or idleneſs, or done with little judgment. And, therefore, when a man has travelled hard upon a journey, or when horſes have been driven hard in a coach or chaiſe, it is not ſufficient, after they come to their bating place, or to the end of their day's journey, to walk them about in hand for half an hour or more, which is uſually done, but their pace ſhould alſo be ſlackened for a mile or two before they come in, and after that, ſhould alſo be walked ſome time in hand, that they may cool gradually before they are brought into the ſtable, with a thin cloth laid over each, if they have been uſed to it. This is the ſafeſt way with young horſes, that have been kept well, and have worked but little. And when ſuch horſes come late to the end of their day's journey, or when the weather is ſo bad, that they cannot be walked about in hand, they ſhould then be well rubbed all over their bodies and limbs, till they are quite cool, without taking off their harneſs and ſaddles, and when cloathed; for when all the ſmalleſt blood veſſels are replete and full, as they muſt unavoidably be in all ſtrong, and eſpecially in long continued exerciſe, and the blood extremely heated, and running like a torrent, any ſudden chill or damp will produce ſtoppages and obſtructions, where the veſſels are the moſt minute and ſmall, or wherever there is the greateſt weakneſs and relaxation, ſometimes inwardly in the lungs, ſometimes in the liver and kidneys, and ſometimes in the ſtomach and guts, and other membraneous parts; and this is uſually followed with inward pain, and inflammation, or with great dulneſs and heavineſs, which, in the end, often produce many untoward diſorders; or if the limbs happen to be weak and relaxed, the blood and juices will ſoon drop down and ſtagnate there, ſo as to produce ſwellings, and ſometimes ulcerations, that are troubleſome enough to remove, eſpecially in thoſe that have been little accuſtomed to ſuch kind of labour; for habit and uſe, in continued exerciſe, alters the caſe very much, becauſe that ſtrengthens and invigorates the nerves and ſinews, as we obſerve in ſome hackney or job horſes, which are ſo ſeaſoned to their work, that ſcarce any thing can hurt them. Indeed ſome of the job horſes, that we ſee endure ſo much labour, are naturally ſtrong, and very hardy, and have at firſt been carefully managed by their owners, who are not able to bear the loſs of cattle, as gentlemen or men of fortune; and, therefore, we ſee them generally, both begin and end their work with great coolneſs, and when they chance to meet with horſes that they find unable to go through their hard work, they uſually make their buſineſs only a mere play, that they may not loſe their fleſh, until they can diſpoſe of them to the beſt advantage. Another neceſſary caution for the preſervation of our horſes, is never to feed them too ſoon, after they have been heated with exerciſe. *Gibſon's Farriery, vol.* I. *page* 182.

EXOTIC, foreign, not produced in our own country. Thus foreign plants and trees are called exotics, or exotic plants.

EXPERIMENT, a trial of any kind; an eſſay made in order to diſcover an uncertain, or unknown effect.

For the ſeveral experiments made on wheat, barley, &c. *ſee the proper articles* Wheat, Barley, &c.

EXPOSURE, is the ſituation or aſpect of a garden or wall, with reſpect to the ſun and winds, and is therefore as various as the points of the compaſs, being either direct, as eaſt, weſt, north, or ſouth, or declining, as ſouth-eaſt, ſouth-weſt, &c. A garden ſloping to the ſouth is ſaid to have a ſouth expoſure or aſpect, or a wall with trees facing the eaſt, is ſaid to have an eaſt expoſure; the ſouth by eaſt, or ſouth ſouth-eaſt points, are generally reckoned the beſt expoſures for gardens, by reaſon they will enjoy the benefit of the morning ſun, and be leſs expoſed to the injuries of the weſt and ſouth-weſt winds, which in this climate are the moſt violent: the next beſt aſpect is the ſouth, particularly if the land is moiſt, but if it is of a dry nature, its product is very apt to be burnt up in hot ſummers, though it extremely well ſuits winter crops. With reſpect to walls, we would give the preference to the ſouth or ſouth-weſt expoſure for tender fruits; for although the eaſtern aſpect receives the invigorating rays of the ſun in the morning, yet the tender bloſſoms are very liable to be deſtroyed by the dry eaſterly winds, which generally prevail at the time the trees are in flower; therefore a wall with trees inclining a little to the weſtward of the ſouth, hath this advantage, that the bloſſoms receive but little damage from the froſts, which melt before the ſun comes to ſhine on them, and fall off like dew, without doing much harm; however, as there will be contrary aſpects, theſe may be planted with ſuch ſorts of fruits as do not require ſo much heat to ripen them; and wherever there are north aſpected walls, they are only fit for baking pears and plums, morello cherries for preſerving; or ſome duke cherries may be thus continued longer in the ſeaſon, as there is a month difference between the ripening on one ſide of the wall, and on the other.

EYE, the organ of ſight in an animal body; or that which repreſents objects to the mind.

The goodneſs or badneſs of the eyes of horſes is a thing wherein the beſt judges are ſometimes miſtaken; for moſt people regard the clearneſs and tranſparency of the eye, which indeed ought to be conſidered: but it is worth obſerving, that horſes, before they are ſix years old, have not that tranſparency in their eyes which they arrive at afterwards, becauſe while they are young and growing, their juices are viſcid and balſamic; ſo that their eyes look thicker or clearer, in proportion as their blood and juices happen to be more or leſs in a good ſtate. The ſame may be obſerved in all horſes that have colds, when the veſſels of the eyes are full: the eyes at that time look thick, and ſometimes inflamed, and a blow on the eye, or a bite, will have the ſame effect, when there is not the leaſt danger of blindneſs.

It is not, therefore, always the clearneſs of the eye that denotes its goodneſs, but a man is alſo to form his judgment from other indications, particularly from the form and manner of the eye, which includes not only the body of the eye, but the eye-lids, eye-brows, and all the parts belonging to it. Many good eyed horſes have a heavineſs in their countenance, with a lowering-brow, yet great numbers of this aſpect go blind with cataracts when they are about ſeven years old, or between ſeven or eight, and ſometimes later. Theſe are the moſt ſuſpicious where there is a bunch or fullneſs between the upper eye-lid and the eye-brow, with a fullneſs round the under eye-lid; ſo that the eye appears as if it was invironed in a ring. Such horſes are often fleſhy about the head and jaws, which, upon every cold, or rather ſlight accident, expoſes them to defluxions in their eyes.

When the eye is extremely flat or ſunk within its orbit, it is always a bad ſign, even though there be no defluxion or humour upon it: a ſmall pig-eye is none of the beſt, nor a large gogling eye. The one often periſhes for want of nouriſhment, occaſioned by ſome defect in the nerves or the arteries that ſupply it with blood; the other by being too much expoſed to accidents, and by having too great ſupplies of nouriſhment.

That eye is almoſt always weak which is of a longiſh oval figure, eſpecially where the two corners are narrow, like the ſhape of an almond. When the coat or membrane, that riſes from the under part of the eye happens to be large and thick, ſo as to preſs the eye-ball, and the caruncle or kernel on the inward corner next the noſe is ſpongy and moiſt, though there is ſometimes a remedy for this defect, yet ſuch horſes in the end generally go blind.

When the eyes are bad, the muſcles or movers of the eyes are generally weak; ſo if the eye looks dead and lifeleſs, the beſt way of trial is to hold up the horſe's head in the ſame manner as when a drench is to be given, which will draw the eye upward; and if it remains there fixed and immoveable, or has a languid motion, it is a pretty ſure ſign the eye is bad. And this trial will, for the moſt part, hold good whether the eye be moiſt or dry.

Some regard the colour of the eye, which, however, is different according to the difference of colour in horſes; and indeed we are ſo far to regard the colour, that if the iris or circle that ſurrounds the pupil or ſight of the eye be diſtinct, and of a pale variegated cinnamon colour, it always denotes a good eye. For the iris is always moſt diſtinct, where the humours of the eyes are moſt clear and pellucid; and thoſe horſes have the beſt eyes, which in colour reſemble the eyes of a ſheep or goat; but few horſes arrive to that perfection of colour and tranſparency, till they are at leaſt ſix years old or upwards. On the other hand, if the iris or circle round the pupil be of a dark muddy colour, and does not appear diſtinct and variegated, till one approaches near the eye, and if the narrow ſky-coloured verge, which we obſerve more or leſs in moſt horſes on the outſide of the iris, happens to be of a milky hue, it is of no good ſign. Neverthleſs, wall-eyed horſes have for the moſt part good eyes.

Some in examining the eyes have a regard to the colour of the horſe, which I take to be no ſure way of judging; for as there are good horſes of all colours, ſo there are good eyed horſes of all colours. The grey, eſpecially the pigeon or dove-coloured grey, are the moſt ſuſpected; alſo the iron-grey, and the dun, &c. But I think I may ſay from experience, that whatever colour is the moſt common among the horſes, ſo as to exceed in number, abounds moſt with bad eyes: and I have obſerved as many bad eyed horſes among the black coach breed as any other.

Moſt people in examining a horſe's eyes lead him under a gate-way, or ſome ſhade, that they may ſee perfectly the colour and tranſparency of the eye: but the beſt way is to obſerve his countenance when he comes firſt out of a dark ſtable into a ſtrong light; for if he has any weakneſs in his eyes, he will wrinkle his brow, and look upwards to receive more light; and if the pupil at the ſame time be large, it is a bad ſign; and therefore the beſt way is to look to a horſe's eyes firſt in the ſhade, to obſerve the dimenſions of the pupil, and if that leſſens upon his coming out into a ſtrong light, it is almoſt an infallible ſign that the eye is good.

Some ſuſpect all horſes that ſtartle to have bad eyes; indeed many bad eyed horſes are apt to ſtartle: but a horſe that ſtarts and looks upwards, lifting his feet high when he moves, as if afraid to touch the ground, ſuch is more likely to have bad eyes than one that ſtartles; for many horſes ſtartle merely out of fear, and I imagine not a few from ſome defect in viſion, viz. from ſeeing objects indiſtinctly at ſome diſtance, in all which caſes the eyes may be ſtrong and durable, though many fancy them to be weak. But if a horſe frequently ſtartles when no object is before him that might cauſe him to ſtartle, we may then ſuſpect his eyes to be but indifferent.

Upon the whole, that eye is generally good where the eye-lids are thin, where the outward coat or tunicle of the eye is alſo thin and delicate, where the caruncle next the noſe is ſmall and dry, where the eye is tranſparent and ſprightly, when a horſe has a bold reſolute look, and takes notice of objects without fear. On the other hand, when a horſe moves his ears backwards and forwards, and ſeems ſurpriſed at every noiſe or motion of the hand; when he raiſes his feet high, is uncertain in his walk or ſtep, and unequal in his goings, when his eyes appear full and ſwoln with a fleſhy circle round them, or when they are ſunk or flat, or of a longiſh oval figure, when the outer coat is thick and covers a great part of the eye-ball, and the glands or kernels of the eye are ſpongy and moiſt;

all theſe denote the badneſs of the eyes, and are often the forerunners of blindneſs. *Gibſon's Farriery, vol.* I. *page* 14.

EYE *of a tree*, a ſmall pointed knot to which the leaves adhere, and from which the ſhoots or ſprigs ſpring forth.

EYE, among gardeners, implies the ſmall bud or ſhoot inſerted into a tree.

EYE-LID, the membrane that covers the eye.

If the eye-lid of a horſe is wounded and cut through, and the cut divides it ſo as the lips part one from the other, it ought to have a ſtitch with a ſtrait needle, ſuch as the ſurgeons uſe for ſuperficial wounds, and not to be drawn too cloſe, but juſt ſo far as to bring the edges together; and this is yet the more neceſſary when the eye-ball happens to be wounded through the eye-lid, that there may be room for the diſcharge of the matter. I have obſerved that the eye-lid requires but one ſtitch, for when there are more, and theſe purſed together, as the farriers generally do, and the lips drawn cloſe, ſuch ſtitches will break in twenty-four hours, and leave the wound in a worſe condition than it was at firſt.

The proper dreſſing for wounds of the eye, is honey of roſes, and tincture of myrrh, viz. one dram of the tincture to an ounce of the other. The beſt way of uſing it is to dip a pledgit of lint in this mixture, made warm, and applied to the wound, for tow and hurds are too harſh for the eye. This dreſſing may be repeated once a day, until the wound is healed up and cicatriſed, and it will ſeldom fail of ſucceſs. *Gibſon's Farriery, vol.* I. *page* 320.

F.

FALLOW, land ploughed, but not ſown, being left to reſt after the years of tillage.

If the farmer finds that one ſummer's fallow does not entirely anſwer the purpoſe of dividing and looſening the earth, it is his intereſt to continue it for another. M. Tull confirms this, by inſtancing a poor man, whom neceſſity compelled to take this method, becauſe he could not get ſeed for his ground after he had tilled it the firſt year. The conſequence was, that his crop was worth more than the value of the land it grew on. Mr. Maxwell too mentions another, who, from a like neceſſity, followed the ſame courſe upon almoſt his whole farm, had ſuch a crop as enabled him to pay many debts, and, by continuing the ſame practice, came in few years to be in a condition to purchaſe the farm.

When the huſbandman intends to break up any piece of land, the firſt thing neceſſary is carefully and judiciouſly to examine the ſurface of the ground, and its depth. If the ſurface be covered with a thick, ſtrong, fibrous turf, and the mould underneath ſufficiently deep, his beſt, and indeed the only right method of proceeding, is excellently well directed by the marquis of Turbilly. But if, on the contrary, the upper mould ſhould be ſhallow, or ſo thin turfed as not to be fit for burning, he muſt obſerve, whether his ſoil be of a ſtrong, or of a light quality. Under the former of theſe are included all deep hard clays, of what colour ſoever; all ſtiff binding earths, and ſuch as, after being expoſed to the ſun, or froſt, grow hard and ſtony; with ſuch as chop and cleave upon their ſurface in the heat of ſummer: and under the latter are ranked (the repetition may be excuſable here for the ſake of perſpicuity) all ſandy, mouldering, gravelly, mellow ſoils; all looſe and open earth, of what nature ſoever; all ſuch as are not ſticky, but will ſoon dry after rain; and, inſtead of lying in great lumps after ploughing, are eaſily apt to diſſolve, and crumble into mould, not being ſubject to bind by the heats in ſummer, or froſts in winter.

If, upon examination, the ſoil is found to be of the ſtiff kind, particular care muſt be taken to turn down its ſurface in the latter end of autumn, that what fibrous roots there are in it may be the more effectually rotted againſt the ſummer ploughing, and that the earth may be mouldered, or mellowed, by the winter's froſt and rains.

When ploughed land is intended to be fallowed, it ſhould likewiſe be ploughed in the autumn, as ſoon as the ſeed time permits, and laid as rough as may be, eſpecially if it be a ſtiff ſoil, that the winter's froſt may mellow it.

In the ſpring, the farmer ſhould take the earlieſt opportunity that his ſpring crops will admit of, to give his fallows a ſecond ploughing acroſs the former; after which the ground ſhould be well harrowed, not only to break the clods, but to pull up ſuch roots as are not yet rotted, that they may be gathered into heaps and burnt. It is eſſentially neceſſary that this, and all the following ploughings and harrowings be performed in dry weather; becauſe, as the purpoſe here is thoroughly to looſen the mould, ſpecial care ſhould be taken to avoid every thing which might counter-act that intention. The farmer cannot wiſh for a greater benefit to his huſbandry, than moderate ſhowers after each fallow, to bring the ſeeds of every weed to vegetate, in order that, being turned down by the ſeveral ploughing, they may be the more effectually deſtroyed.

It ſeems needleſs to mention when the future ploughings ſhould be given, becauſe the farmer ſhould take every opportunity of repeating both them and the harrowings, in full confidence that he cannot over-do it, eſpecially in ſtrong ſoils; in which he may alſo be equally certain, that he cannot err in ploughing too deep: for it is of great conſequence, not only that the roots have a ſufficient depth of mould to penetrate in, but alſo that the cold clay be removed to as great a diſtance as poſſible from the ſurface; becauſe, by its retaining the water, the roots of plants are chilled and killed, eſpecially in the winter, when they reach ſuch ſtagnating wet. If any manure is applied to alter the quality of the ſoil, it cannot be laid on too early in the ſummer, that the ploughings may the more effectually mix it with the earth; but if only compoſt be uſed for enriching the ſoil, it need not be ſpread till juſt before the laſt ploughing.

Authors give directions for ploughing land into many different forms, moſtly ariſing from the different natures of ſoils, but too often from the particular long eſtabliſhed cuſtom of countries, the reaſonableneſs of which is not always ſufficiently conſidered.

Where there is a deſcent for water, all lands ſhould be laid flat, becauſe, in that way, the rains will undoubtedly give a more equal nouriſhment to the crop, than when they are raiſed in ridges. The practice of laying light ſoils into narrow ridges, for wheat, is certainly owing to want of attention; and even in ſtrong land ploughed for winter fallowing and ſowing, we are much inclined to think that the beſt way would be, inſtead of ſingle bouts, or narrow ridges, to make the ridges very broad, and lay them up high: for if the ground is level, the water will lie in the parting thoroughs, and, by ſoaking into the ſides of the ridges, make it ſo poachy, as to render it very unfit to be worked, till late in the ſpring, unleſs the ſeaſon be very dry; or, if there is much deſcent, great part of the beſt ſoil will be carried off. For the ſame reaſons the ſides of hills ſhould always be ploughed almoſt, but not quite, horizontally, that the parting thoroughs, lying open, may ſerve for drains to the water: beſides which, the ploughing of ſuch declivities in this ſloping manner is by much the leaſt laborious both to men and cattle. The furrow here ſhould always be drawn oblique, as Columella directs, ſometimes a little toward the higher, and and ſometimes toward the lower part of the hill, ſo that the direction may be altered in each ſubſequent ploughing.

The erroneous opinion of thoſe who imagine that the ſurface of the ground is conſiderably enlarged by ploughing it into high ridges, and that it therefore affords a larger ſpace for the growth of plants, is thus judiciouſly refuted by M. Duhamel.

“ The produce of a ſloping ſurface is not greater than that of a plane equal in extent to the baſe of the ſlope: for as the plants grow perpendicular to the horizontal baſe, there is no point of the ſlope which does not anſwer vertically to a point of that horizontal baſe: therefore, ſuppoſing the furrows of a piece of ground ploughed in broad lands to be ſix inches deep, and the ridges ſix feet wide; the ſlope from the bottom of the furrow to the middle of each ridge will be one foot in ſix, which is indeed conſiderable: but ſtill the ſurface of the ridges will be to that of their horizontal baſe, only as ſeventy-ſix are to ſeventy-five: a ſmall advantage; eſpecially when compared to a ſixth part of the ground, which is taken up by the furrows, and in which no corn is ſowed.”

Another, and that very eſſential, advantage of fallowing, not yet ſufficiently inſiſted on, is the deſtruction of weeds, which are one of the farmer’s greateſt enemies. By weeds, we here mean every plant which grows ſpontaneouſly in the field, without having been purpoſely ſown, and which it is not the huſbandman’s intention to cultivate. All theſe ſhould be rooted out. It would be needleſs to enumerate them after this general definition; and perhaps equally ſo to obſerve, what every huſbandman muſt know, that cockle, darnel, fox-tail, wild poppies, wild vetches, wild oats, dog’s graſs, colt’s foot, melilot, knot-graſs, thiſtles, and charlock, are the moſt hurtful ſpecies of theſe noxious growths, and the moſt difficult thoroughly to extirpate.

To prevent the increaſe of weeds, they ſhould be deſtroyed before their ſeed is ripe: but that is not poſſible in lands which are ploughed in the common way; becauſe, as they grow intermixed with the corn, and ripen ſooner than wheat, their ſeeds ſow themſelves: neither can they be extirpated by reſting the land; for the ſeeds of ſome of them will remain ſound ſeveral years in the earth. If a field in which there are many poppies, or red-weeds, as they are called in ſome places, be ſowed with ſaintfoin, ſcarce a poppy will appear the ſecond year: but when the ſaintfoin is ploughed up, even at the end of nine years, the red-weed frequently appears a-new, which can hardly be owing to any other cauſe, than that its ſeeds have remained ſound in the earth during all that time; for very few of them, in proportion to the quantities which ſpring up, can have been brought from the neighbouring grounds, or in dung. This is confirmed by an experiment which M. Duhamel made. He ordered the earth, with which a ditch had been filled fifteen or twenty years before, to be dug out, and ſpread upon a piece of ploughed land. Several plants, of different kinds from any that were in the field, ſprouted up in the place where this earth was laid. Conſequently they were produced by ſeeds which had remained ſound in the ground, during the fifteen or twenty years that this earth had lain in the ditch.

This is an important reaſon for ploughing thoroughly all lands which are fallowed: for it is certain, that as numbers of ſeeds ſhoot up during the fallow, repeated ploughing will deſtroy many of them. But there are ſeveral kinds of plants, ſuch, in particular, as wild oats, and fox-tail, the ſeeds of which do not ſprout till they have remained two or three years in the earth; nor will culture make them grow ſooner. Such, at leaſt, is M. Duhamel’s opinion, as well as that of ſeveral other very ingenious gentlemen, though it muſt be confeſſed, that ſome late experiments ſeem to contradict it, and to ſhew, that the ſeeds of thoſe plants which he ſays require being three years in the ground before they will grow, were only buried ſo deep, in the caſe he mentions, as not to be able to vegetate, which they afterwards did when laid within reach of the influences of the air, rain, dew, &c. If ſo, though the increaſe of weeds may be prevented for ſeveral years, by ploughing, cutting, pulling them up, &c. yet it is evident, that the repeated ploughing of fallow lands, far from immediately deſtroying theſe kinds of weeds, will rather help them to grow, when their ſeeds are brought within a proper diſtance from the ſurface, and their time of ſprouting is come. But then, allowing that ſome of their ſeeds may be thus brought up by each ploughing, for a while, it cannot be long before all of them will have ſprouted, after which the ground may be kept quite clear, with proper care.

Huſbandmen have not yet found a more effectual method to deſtroy weeds, than by ſowing the ground out of ſeaſon; that is to ſay, by ſowing oats the year that barley ſhould be ſowed. It has been experienced, that, by this means, ſome kinds of weeds have been deſtroyed, which, appearing only every third year, never ſhews themſelves, in the uſual rotations, but amongſt wheat. But the farmer looſes a crop by this means, and ſtill has ſo many weeds left, that he is obliged to hire people to weed his corn. This is done two ways.

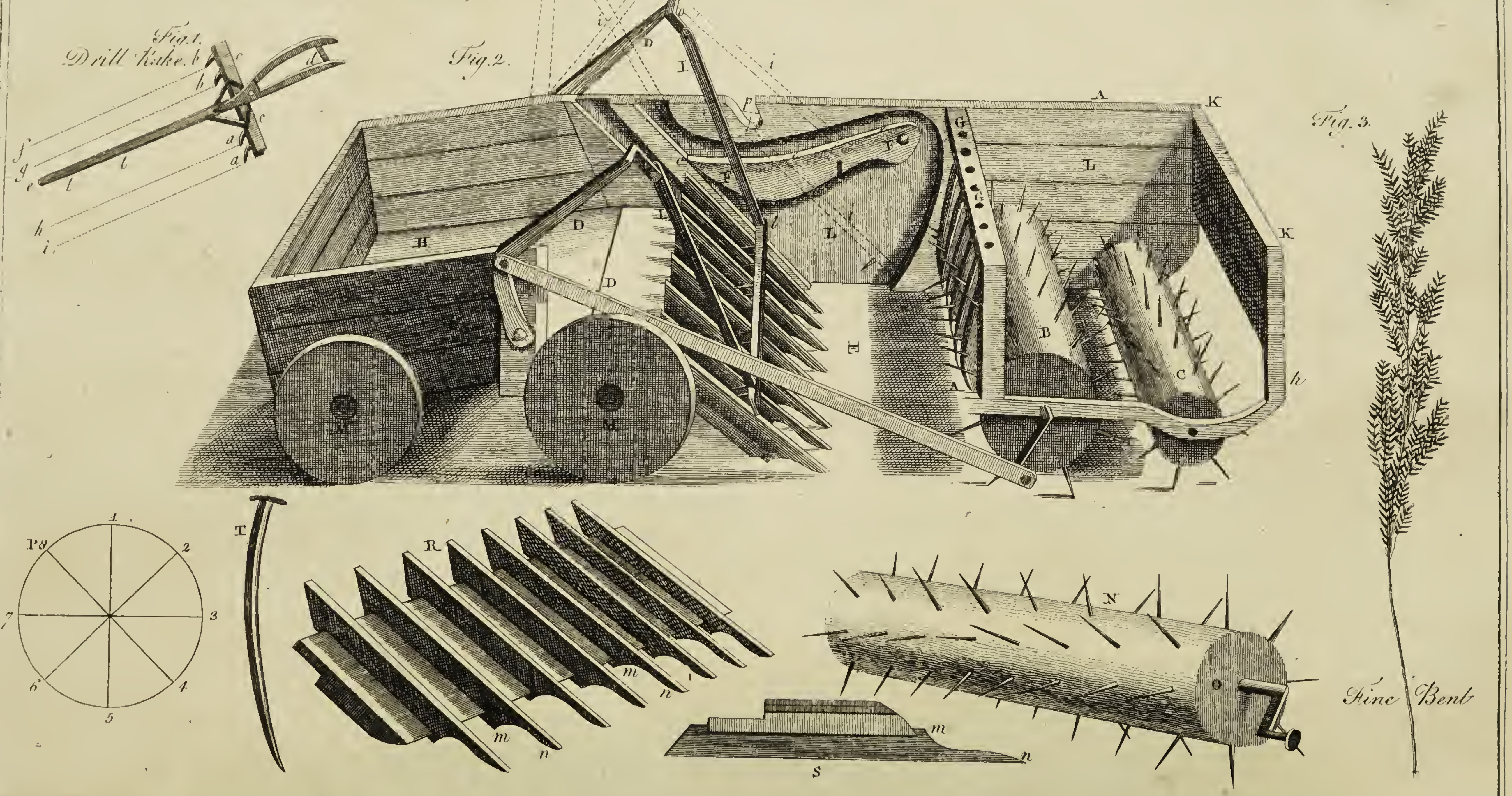
A number of women place themſelves in a row, and, with a hoe made for the purpoſe, cut up all the weeds they ſee, ſuch as thiſtles, blue-bottles, poppies, &c. But many of theſe, when young, frequently eſcape their notice; in which caſe the hoeing muſt be repeated when they are grown larger; and the ſmaller weeds, ſuch as wild vetches, wild oats, darnel, knot graſs, fox-tail, young poppies, &c. which are at leaſt as hurtful as the other, remain in the field. Beſides this, in cutting the weeds, it is ſcarce poſſible not to cut down ſome of the corn; and the roots of the thiſtles and other biennial plants which are cut, produce two or three new ſtalks in lieu of the old one; by which means the evil is increaſed.

The other method of clearing corn, is by hand-weeding it; but this is ſeldom practiſed by farmers, becauſe it is too expenſive: and indeed the women and children generally employed to do this work, moſt commonly pull up a great deal of corn with the weeds; ſo that, what with that, and with their trampling, and dragging their bags of weeds over it, they frequently do more hurt than good, eſpecially if the earth be moiſt.

The ſureſt way to deſtroy weeds, is to continue ploughing while the corn grows: but this can be done only in the new huſbandry.

Weeds may be ranked under four general claſſes: firſt, ſuch as have creeping perennial roots: ſecondly, ſuch as grow in cold wet ſoils: thirdly, ſuch as are of a large ſucculent body; and, fourthly, ſuch as having ſmall ſeeds, or ſeeds which ripen before the corn, ſow themſelves. Each of theſe require a different treatment.

A Fallow-cleaning Machine, Invented by Mr. Aaron Ogden, a Smith at Ashton Underline, near Manchester in Lancashire.



The firſt ſort cannot be deſtroyed but by repeated ſummer ſallows, by which their roots are cut, and turned up to be withered by the ſun and winds, after which they are dragged out by harrows, and ſhould be burnt. This, repeated as often as the farmer conveniently can, eſpecially during a dry ſeaſon, can ſcarcely fail to have the deſired effect. Colts-foot, which is propagated by the root, and is a very pernicious weed, may likewiſe be deſtroyed by ſowing the ground with rye-graſs, or any plant which, coming up early in the ſpring, ſhades and ſmothers it; for that will kill it in a few years. The ſecond kind are deſtroyed by draining the earth of its ſuperfluous moiſture, and by manuring it with lime, aſhes, gravel, ſhelly ſea-land, and other proper correctives for ſuch ſoils.

The third are extirpated by cutting them down when in full ſap and vigour: for the ſap being thereby ſuddenly interrupted in the courſe of its circulation, ſtagnates in the roots, and putrifies there. A few weak lateral ſhoots may be made; but if they are likewiſe cut in the ſame manner, the roots will putrify intirely by degrees, and, inſtead of annoying, will become a manure.

The fourth claſs can be deſtroyed only by frequent fallows, and conſtant cutting, or rather ploughing them down before they run to ſeed. Some, for inſtance the wild oats, may be mowed for hay: but it is much more beneficial to the land to plough them in: becauſe, by that means, inſtead of being exhauſted by frequent crops, it is manured by thoſe enemies to uſeful grain.

FALLOW, alſo ſignifies a pale red colour.

FALLOW-CLEANSING *Machine*, an inſtrument invented by Mr. Aaron Ogden, a ſmith at Aſhton-under-Line, near Mancheſter, in Lancaſhire.

This machine, which bids fair to be of very great uſe in huſbandry for cleaning fallows from weeds, &c. which waſte the riches of the ſoil, will be very eaſily underſtood from the drawing we have given of it on Plate XV. Fig. 2. Where,

A, A, is the frame; B, the firſt roller; C, the ſecond ditto, in which laſt are two cranks to move the arms D, D, which work the rake up the directors fixed on the plank E. The under ſide of the lower ends, or ſhares, of theſe directors, are ſharp to cut the clods, and let them come on the upper ſide. Each alternate heel of the ſhare is longer than the intermediate one, that they may not have more than one half to cut at once.

At the back of the plank E, are two ſcrews to let it looſe, that the directors may be ſet higher or lower. The ſhares are to penetrate the ground two or three inches, to raiſe the quicks till the rake I, I, fetches them into the cart H, where a man muſt be ready with a muck-hook to clear them backward when gathered.

In the rake I, are two teeth for every ſpace of the directors, that ſtones, &c. may be gathered without damage.

K, K, are two ſtaples, by which the machine is drawn: under them, at *h*, are two hooks, placed low to raiſe the machine in turning, by the help of the traces; and the axle-tree of the cart ſhould be fixed upon a pin, that it may turn like a waggon.

F, F, are the triggers to throw the rake behind the roots. The long teeth at G, G, are to cleanſe the roller C.

I, I, is the rake which gathers up the weeds into the cart H, and is drawn above the trigger F, by the working of the arms D, expreſſed by the dotted lines at *d d*, *i i i*.

The triggers F, of which there is one on each ſide, move on the pivots *a*; ſo that when the points *b*, of the rake I, having been drawn up by the directors E, to the part marked *c*, the trigger, giving way, permits the rake to paſs; but immediately falling, the rake returns along the upper ſurface of the trigger marked *e*, *e*, and of courſe falls on the weeds when it comes to the end, a little beyond the pivot *a*.

The reader will obſerve that the boarding is taken away on one ſide, in the plate, in order to give a more perfect view of the inner parts of the machine; and, in fact, it would, perhaps, be better if all the boarding, marked L, L, L, was taken away, and frame-work put in its ſtead.

The cart H, might undoubtedly alſo be made lighter.

The wheels M, M, appear, in the plate, to be made of ſolid wood; but there is no neceſſity they ſhould be ſo.

At N, is another view of the roller C, by which the diſpoſition of the ſpikes may be eaſily comprehended.

Suppoſe the circle O, deſcribed by the end of the roller N, to be divided by four ſtrait lines into eight equal ſegments, as repreſented at P. Let the ſame be done at the other end of the roller, and parallel lines be drawn from one correſponding point to the other, the length of the roller: mark the points with figures 1, 2, 3, 4, 5, 6, 7, 8; afterwards draw oblique lines, as from 1, at the end O, to 2, at the other end, and from 2 to 3, &c. on theſe oblique lines the ſpikes are to be fixed; at equal diſtances, in eight circles, deſcribed on the circumference of the roller.

The ſpikes of the ſmall roller B, are fixed in the ſame manner, except that, the diameter being ſmaller, there are only ſix inſtead of eight rows.

R, is another view of the directors, with the plank E, on which they are fixed; and at S, is a ſection of a part of the plank, with one of the directors as fixed, in which may be ſeen the heel *m*, from whence, to the point of the ſhare *n*, is a ſharp, cutting edge. See the ſame letters in figure R.

At T, is one of the long teeth to be ſeen at G: it is bent towards the roller C, which it ſerves to cleanſe. When the end of the rake *b*, after riſing above *c*, is puſhed, by the motion of the arms D, D, along the upper part *e*, *e*, of the trigger F, and comes to the end beyond *a*; as it falls, the part of the arm, marked *o*, reſts in the notch *p*, till it is again raiſed by the motion of the roller C, with the rake.

The roller C, is to be one foot diameter, the ſpikes nine inches long, that they may go through the furrow (if the ſoil ſhould be too looſe) into the hard earth, the more effectually to work the rake, which otherwiſe might be ſo over-charged as to cauſe the roller to drag without turning.

In the rake-ends *b*, there ſhould be pivots, with rollers or pullies on, to go in the groove, to take off the friction; and they would likewiſe take the triggers more ſurely as the rake comes back.

The rake ſhould alſo be hung ſo far backwarder, that when it is fallen, the arms of it may lie in the ſame plane, or parallel, with the directors, on which it comes up (which will require the frame to be two inches longer in the model.) This will cauſe the rake to fall heavier, and drive the teeth into the roots, and bring them up without ſhattering. Theſe teeth muſt be made of ſteel, very fine, and ſo long as to reach down to the plank on which the directors are fixed, that is to ſay, ſix inches long (the directors are to be alſo made ſix inches broad above the plank.) The rake-head ſhould alſo fall a little before the crank is at the extremity, which will cauſe the rake to puſh forward to let the teeth come into the roots. The rake-teeth muſt drop in the ſame plane with the roller and wheels, or on the ſurface of the earth. No more ſpace ſhould be given from the roller C, to the long teeth, at G, G, than that the rake may juſt miſs the ſpikes of the roller C, and fall on the places before mentioned.

As the firſt roller B, was intended to cleanſe the ſecond C, more than any other uſe, it may be omitted when the machine is made in large, as Mr. Ogden has lately found that the long teeth at G, G, anſwer the end alone, and this renders the machine about a ſixth part ſhorter.

Now, to ſuit any ſort of earth, there ſhould be to each machine three planks, with directors at different ſpaces, to uſe occaſionally: in the firſt, the ſpaces between the directors ſhould be eight inches wide, in the ſecond ſix, and the third four. This will anſwer the ſame end as having ſo many machines.

As there may be ſome objections to the rake not leaving the roots when it has brought them up, Mr. Ogden has ſeveral methods for cleanſing it; but as he would make it as ſimple as poſſible, he chuſes to let it be without them at preſent: but ſuppoſe it ſhould bring ſome roots back again with it, it will probably loſe them before it gets back to the extremity; whence they will lie light, and be of but little detriment to the others coming up.

Mr. Ogden would have the firſt machine made four feet ſix inches wide, the teeth divided into equal ſpaces, the outſides into half ſpaces.

FAN, an inſtrument for winnowing corn. *See the article* WINNOWING.

FANTOME CORN, thin, or light corn, that which has but little bulk or ſolidity.

FARCY, or *Farcin*, a diſtemper to which horſes are too often ſubject. It is a diſeaſe of the blood veſſels, generally following the courſe of the veins, and, when inveterate, thickens their coat and integuments.

At firſt one or more ſmall ſwellings, or round buds like grapes or berries, ſpring out over the veins, and are often exquiſitely painful to the touch; in the beginning they are hard, but ſoon turn into ſoft bliſters, which, when broke, diſcharge an oily or bloody ichor, and turns into very foul and ill-diſpoſed ulcers. In ſome horſes it appears on the head only; in ſome on the external jugular; in others on the plate-vein, and runs downwards on the inſide of the fore-arm towards the knee, and very often upwards towards the briſket; in ſome the farcy ſhews itſelf on the hind parts, about the paſterns, and along the large veins on the inſide of the thigh, riſing upwards into the groin, and towards the ſheath; and ſometimes the farcy makes its appearance on the flanks, and ſpreads by degrees towards the lower belly, where it often becomes very troubleſome.

When the farcy appears on the head only, it is eaſily cured, eſpecially when it is ſeated in the cheeks and forehead, the blood-veſſels being here ſmall; but it is more difficult when it affects the lips, the noſtrils, the eyes, and kernels under the jaws, and other ſoft and looſe parts, eſpecially if the neck-vein becomes chorded. When it begins on the outſide of the ſhoulder or hips, the cure is ſeldom difficult; but when the farcy ariſes on the plate-vein, and that vein ſwells much, and turns chorded, and the glands or kernels under the armpits are affected, it is hard to cure; but more ſo when the crural veins within-ſide of the thigh are chorded, and beſet with buds, which affect the kernels of the groin, and the cavernous body of the yard. When the farcy begins on the paſterns or lower limbs, it often becomes very uncertain, unleſs a timely ſtop is put to it; for the ſwelling in thoſe dependant parts grows ſo exceſſively large in ſome conſtitutions, and the limbs ſo much disfigured thereby with foul ſores and callous ulcerations, that ſuch a horſe is ſeldom fit for any thing afterwards, but the meaneſt drudgery: but it is always a promiſing ſign, wherever the farcy happens to be ſituated, if it ſpreads no farther. It is uſual to affect only one ſide at a time, but when it paſſes over to the other, it ſhews great malignancy; when it ariſes on the ſpines, it is then for the moſt part dangerous, and is always more ſo to horſes that are fat and full of blood, than to thoſe that are in more moderate caſe. When the farcy is epidemical, as ſometimes happens, it riſes on ſeveral parts of the body at once, forms naſty foul ulcers, and makes a profuſe running of greeniſh bloody matter from both noſtrils; and ſoon ends in a miſerable rot.

From this deſcription of the farcy, it will appear how greatly thoſe may be diſappointed, who depend on ſome ſingle ſpecific drink or ball for a certain cure; for the ſymptoms are ſometimes ſo favourable, that it is eaſily conquered by a very ſimple management; and when it ariſes ſuperficially upon the ſmaller veſſels, it will often go off, with moderate labour, without any other means than bleeding. Such inſtances as theſe may eaſily give a reputation to things of no great efficacy, and bring them into eſteem: but whoever has acquired any true notion of the farcy, will know that this diſtemper is not to be conquered but by ſuch things as are fitly adapted to the various ſymptoms that occur in the different ſtages of it. To avoid therefore the perplexity that ariſes from the various complications ſo uſual in the farcy, we ſhall conſider it in its different ſtates, or degrees, viz. when it ſeizes only the ſmaller veſſels; when the larger veins are chorded, and the feet, paſterns, and flanks affected; and laſtly, when the farcy, beginning on one ſide only, breaks out on the other alſo, and affects the whole body.

When the farcy makes its firſt appearance on the head, it riſes on the cheeks and temples, and looks like a net-work, or ſmall creeping twigs full of berries. Sometimes it inflames the eye, and ſometimes little bliſters or buds run along the ſide of the noſe. It ariſes often on the outſide of the ſhoulder, running along the ſmall veins with heat and inflammation; and ſometimes a few ſmall buds appear near the withers, and on the outſide of the hip. In all theſe appearances, the diſeaſe being ſuperficial, and affecting only the ſmaller veſſels, is eaſily conquered by the following method, when taken in time; for the ſimpleſt farcy, if neglected, may degenerate into the worſt ſort.

This diſtemper then being of an inflammatory nature, and in a particular manner affecting the blood veſſels, muſt neceſſarily require large bleeding, particularly where the horſe happens to be fat and full of blood. This always checks the beginning of a farcy, but is of ſmall ſervice afterwards; and if a horſe is low in fleſh, the loſs of too much blood ſometimes proves injurious. After bleeding, let the horſe have four ounces of cream of tartar and lenitive electuary; which may be given every other day for a week, to cool the blood, and open the body; and then give nitre three ounces a day, for three weeks or a month; and anoint the buds and ſwellings with the following ointment twice a day.

"Take ointment of elder four ounces, oil of turpentine two ounces, ſugar of lead half an ounce, white vitriol powdered two drams; mix together in a gally-pot."

The buds ſometimes by this method are diſperſed, leaving only little bald ſpots, which the hair ſoon covers again. When they break and run, if the matter be thick and well digeſted, they will ſoon be well: but in order to confirm the cure, and to diſperſe ſome little lumps, which often remain for ſome time on the ſkin without hair, give the liver of antimony for a month; two ounces a day for a fortnight, and then one a day for the other fortnight; by following this method, a farcy which affects only the ſmall veſſels, may be ſtopped in a week or ten days, and ſoon after totally eradicated.

When the farcin affects the larger blood veſſels, the cure is more difficult; but let it always be attempted early; therefore, on the plate, thigh, or neck-veins appearing chorded, bleed immediately on the oppoſite ſide, and apply the following to the chorded vein.

"Take oil of turpentine in a pint bottle ſix ounces, oil of vitriol three ounces; drop the oil of vitriol into the oil of turpentine by a little at a time, otherwiſe the bottle will burſt; when it has done ſmoaking, drop in more oil of vitriol, and ſo on till all is mixed."

This mixture is one of the beſt univerſals in a beginning farcy; but where it is ſeated in looſe fleſhy parts, as flanks or belly, equal parts of the oil of vitriol and turpentine are neceſſary.

Rub the parts firſt with a woollen cloth; and then apply ſome of the mixture over the buds, and wherever there is any ſwelling, twice a day. Give the cooling phyſick every other day, and then three ounces of nitre every day for ſome time. This method muſt be continued till the buds digeſt, and the chord diſſolves; and when the ſores run plentifully, the matter digeſts well, and the lips and edges are no ways thick or callous, you may expect a ſpeedy recovery; yet to confirm the cure, and prevent a relapſe, give the liver of antimony or crude antimony, as before directed; and to heal the ſores and ſmooth the ſkin, dreſs with bees-wax and oil.

When the farcy begins on the flanks, or towards the lower belly, it often takes its riſe from a ſingle puncture of a ſharp ſpur. The pain and ſmarting is one ſure ſign to diſtinguiſh the farcy from common accidents: the ſtaring of the hair, which ſtands up like a tuft all round the buds or bliſters, and the matter that iſſues from the buds, which is always purulent, and of a clammy greaſy conſiſtence, are other certain ſigns. After bathing with the mixture above-mentioned till the ulcers are ſmooth and healing, ſhould the ſwelling not ſubſide, to prevent the ſpreading of the buds, and to diſperſe them, bathe with either of theſe mixtures as far as the center of the belly; and at the ſame time give a courſe of antimonials, as will preſently be preſcribed.

"Take ſpirits of wine four ounces, oil of vitriol and turpentine of each two ounces, white wine vinegar or verjuice, ſix ounces."

Or the following:

"Take ſpirits of wine rectified four ounces, camphor half an ounce, vinegar or verjuice ſix ounces, white vitriol, diſſolved in four ounces of ſpring water, one ounce; mixed together."

In the lower limbs the farcy lies ſometimes concealed for a great while, and makes ſo ſlow a progreſs, that it is often miſtaken for greaſe, or for a blow or kick; and goes by the general appellation of a humour ſettled there. In order to diſtinguiſh the one from the other, we ſhall obſerve that a kick, or bruiſe, is generally attended with a ſudden ſwelling, or a contuſed wound, which for the moſt part digeſts eaſily; the greaſe is alſo a ſmooth ſwelling that breaks out above the bending of the paſterns backwards; but the farcy begins on the paſtern-joint uſually with one bud, and runs upwards like a knotty crab-tree.

Very ſimple means has ſometimes ſtopped it, before it has began to ſpread; a poultice with bran and verjuice bound round the part, and renewed once a day, will often alone ſucceed; and if proud fleſh ſhould ariſe, touch it with oil of vitriol, or aqua-fortis, an hour before you apply the poultice; for when the diſtemper is local, as we ſuppoſe it here, it is to be conquered by outward applications.

When the diſtemper grows inveterate, and reſiſts the above method, and the veſſels continue chorded, Gibſon recommends the following mixture:

"Take linſeed oil half a pint; oil of turpentine and nitre, of each three ounces; tincture of euphorbium and hellebore, of each two drams; the ſoldiers ointment, two ounces, or oil of bays; oil of origanum, half an ounce; double aqua-fortis, half an ounce. After the ebullition is over, add two ounces of Barbadoes tar."

Rub this into the chorded veins, and wherever there is a ſwelling, once in two or three days; but if the orifices are choaked up with proud fleſh, or the ſkin ſo much thickened over the ulcers as to confine the matter, in either caſe it is neceſſary to make an open paſſage with a ſmall hot iron, and deſtroy the proud fleſh, after which it may be kept down by touching with oil of vitriol, aqua-fortis, or butter of antimony. A ſalve may alſo be prepared with quickſilver and aqua-fortis, rubbing any quantity of the former with enough of the latter, to the conſiſtence of a liniment; ſmear the ulcers with this whenever they appear foul, and you will find it preferable to moſt other eating ingredients.

Our farriers after opening the buds, put in uſually a ſmall quantity of corroſive ſublimate or arſenic, which they call coring out the farcy; this may anſwer where the buds are few, and not ſituated near large blood veſſels, joints, or tendons: others uſe Roman vitriol, or ſublimate and vitriol, in equal quantities: but let it be remembered, that many a horſe has been poiſoned by theſe medicines ignorantly uſed, and in too large quantities; which ſhould be a caution to huntſmen not to ſuffer their hounds to feed on the carcaſes of farcied horſes, as the greateſt part of a pack have been poiſoned by that means.

I ſhall now mention ſome of the deſperate methods, and more violent kinds of medicines given by ſome internally: thus, from four to eight ounces of lapis caliminaris, to which two ounces of tutty, finely powdered, is added, with other metallic ſubſtances have been given. Some give a pound of barrel ſoap boiled in ſtale beer; with ſavin, rue, and other herbs of that intention: others go yet further, being determined to kill or cure, by giving drinks prepared with green vitriol, roche-allum, Roman vitriol, oil of vitriol, boiled in chamber-lie, with hempſeed, hemlock, and common ſalt. Thoſe who uſe nothing but the decoctions or juices of herbs, ſuch as wormwood, rue, or elder particularly, ſtand a much better chance for a cure, if given in time; but when the diſtemper is grown inveterate, nothing comes in competition with mercurial and antimonial medicines.

The following balls are proper in every ſtate of the farcy; and when the diſtemper has been in its infancy, before the ſkin was much defaced, has often cured it in a week or two, by giving them only once or twice a day: but in an old farcy, they ſhould be given for two or three months together.

"Take of native cinnabar, or cinnabar of antimony, eight ounces; long birthwort, and gum-guaiacum powdered, of each four ounces: make into a paſte with honey, and form into balls of the ſize of a large walnut, and roll them into liquorice powder."

The tediouſneſs of this courſe has encouraged the giving of mercurials, and indeed, where they are directed with ſkill, they muſt be attended with ſucceſs; the ſtronger preparations, as the red and white precipitates, and turbith, being combined with ſharp ſaline parts, may be hazardous and injurious, but the latter given in ſmall quantities have been found very ſucceſsful in ſuch kind of inveterate diſorders. Mr Gibſon ſays, he has given it to a dram at a doſe, where the limbs have been greatly ſwelled; that in forty-eight hours the ſores were all dried up, and the limbs reduced; but that it made the horſe ſo violently ſick for ſeveral days, and ſcoured him to ſuch a degree, that it could not be repeated.

One would have thought, that the ſucceſs attending this medicine ſo ſuddenly might have encouraged Gibſon to have made further trials in ſmaller quantities; which, had he done, it is more than probable, he would not have been diſappointed: for the grand ſecret in giving mercurials, as alteratives, is the introducing them into the blood, without operating on the ſtomach and bowels; and to do this effectually, they muſt be given in ſmall quantities, and ſo bridled, as to controul their force on the firſt paſſages: taken in this manner, they will mix gradually with the blood and juices, and operate both effectually and ſafely.

The method I would recommend is as follows: give one ſcruple, or half a dram of turbith, mixed into a ball, with an ounce of Venice ſoap, every other night for a fortnight; then abſtain a week or ten days, and repeat it again. Should this ball purge, or make the horſe ſick, mix it up with two drams of philonium, or with four or five grains of opium, or camphor; with theſe reſtrictions, it may be given for ſome weeks; but ſhould the horſe's mouth be found tender or ſore, you muſt refrain giving, till that complaint is removed by gentle purges; and then return to it again in ſmall quantities; for as the effects of mercurials are very different in the different conſtitutions, both of horſes, as well as men, ſo the quantity muſt be varied in proportion to the operation, which is not intended here to be ſenſible, but to work imperceptible on the blood and juices, correcting them as a powerful alterative. During the whole courſe, particular care ſhould be taken that he gets no cold.

Two ounces of quickſilver, divided with an ounce of turpentine, and made up into four balls, with diapente, and gum guaiacum, of each two ounces, and a ſufficient quantity of honey, have, for this purpoſe, been ſucceſsfully given, one ball twice a week; but gentle purgatives ſhould be interpoſed, to prevent a ſalivation, which ſome horſes are very prone to, on taking mercurials, though in ſmall quantities.

Dr. Brachen recommends the knots and chords to be rubbed with the mercurial ointment before they break, in order to diſperſe them, and, after breaking, to dreſs the ſores with equal parts of Venice turpentine and quickſilver; if by theſe means the mouth ſhould become ſore, treat as above. This method ſeems to be effectual with proper care.

The following is alſo recommended by the ſame gentleman.

"Take butter of antimony, and bezoar mineral, of each an ounce, beat up with half a pound of cordial ball, and give the bigneſs of a walnut, or three quarters of an ounce every day, for two or three weeks, faſting two or three hours after it."

As moſt preparations from antimony are of uſe in the farcy, ſo from two drams of antihecticum poterii to half an ounce, may be given with a bit of cordial ball every other day, for ſome time; for in theſe obſtinate caſes the very craſis of the blood muſt be altered, which can only be affected by degrees, and of courſe is a work of time. *Bartlet's Farriery*, p. 178.

WATER-FARCY. *See the article* WATER-FARCY.

FARDING-BAG, the firſt ſtomach of a cow, or any other ruminating animal.

FARE, *of pigs*, the number a ſow bringeth at one time.

FARM, a portion of ground cultivated either by the owner or a tenant.

The ancient writers on huſbandry, who lived in warm countries, where the heat and moiſture of the air had ſenſible and frequently very dangerous effects on the health of the inhabitants, were very particular in their directions, for the choice of farms or eſtates, and of the ſpots whereon houſes ſhould be built, ſo as to avoid the inconveniencies ariſing from the climate, or from the quality or ſituation of the ground.

Though the temperate air which we enjoy in this iſland renders ſuch directions leſs neceſſary here, yet as ſeveral places in it are remarkably ſickly, and as, even in the moſt healthy ſituations, many houſes and villages are built on the leaſt healthy ſpots, it muſt be of conſiderable advantage to thoſe who can make their choice, to know what ſoils and places ought to be avoided; and of ſuch as are already fixed, to be acquainted with the means of correcting thoſe inconveniencies which cannot be totally remedied.

Inſtructions of this kind are now full as neceſſary in our language, as they ever were in the Greek or Latin, the countries in which Engliſh is ſpoken being more extenſive, and more various in their climes, than even the Roman empire ever was.

The ſacrifices of the ancient Romans ſhew how attentive they were even in the choice of the ground they encamped upon: much more were they ſo in that of the ſituation and nature of the place where they laid the foundations of more laſting buildings. They examined the livers of the cattle fed on the ſpot, when they offered them in ſacrifice; and if theſe were livid or corrupted, they offered others, as the unſoundneſs of the firſt might be owing to ſome caſual diſtemper: but if they were often found to be morbid, they concluded that the air, water, or food which the place yielded, would have a like effect on human bodies, and therefore ſpeedily left that ground, to ſearch for a better ſituation. If after repeated trials, they found the livers good, they judged the air and food to be ſo likewiſe, and ſettled accordingly. We may ſtill obſerve the good effect of this precaution, in the healthy ſituations of the remains of Roman encampments: for they preferred health to every other conſideration.

The Romans had pleaſure, as well as profit, in view, when they bought or ſtocked a farm; and therefore they laid it down as a rule, that no degree of fertility ſhould tempt a man to purchaſe in an unhealthy country, nor the pleaſanteſt ſituation in a barren one. "Buy not too haſtily," ſaid the wiſe Cato, "but view again and again the purchaſe you intend to make; for if it be a good one, the oftener you ſee it, the better it will pleaſe you. Examine how the neighbouring inhabitants fare. Let the country it lies in be a good one; the ways to and from it good; and the air temperate. Let your land, if you can chooſe your ſituation, be at the foot of a hill, facing the ſouth, in a healthy place, where a ſufficiency of labourers, of cattle, and of water may be had. Let it be near a flouriſhing town, the ſea, or a navigable river; or bordering upon a good and well frequented road. Let the buildings upon your ground be ſtrong and ſubſtantial. Do not raſhly condemn the methods of others. It is beſt to purchaſe from a good huſbandman, and a good improver."

Beſides the healthfulneſs of the ſituation, three other things ſhould be particularly attended to in the choice of a farm or eſtate; theſe are the air, the water, and the ſoil. The air ſhould be pure, and temperate; the water wholſome, and eaſily come at, and the ſoil rich.

The knowledge of the healthineſs of the air, is, as lord Bacon obſerves, diſcoverable rather by experiment, than by reaſon or conjecture.

To examine the moiſture of the air before a houſe is built, wool, or a ſponge, may be hung up in the place, and afterwards compared with ſome of the ſame, expoſed in the ſame manner, and at the ſame time, in another place. According as they gain more or leſs in weight, the air is more or leſs humid.

The air is liable to greater alterations, from heat and cold, in ſome places than in others; and as that inequality in the air is an enemy to health, the moſt equal ſhould be choſen. This is eaſily determined by the thermometer, and by viewing the ſituation of the place; for the intermixture of hills and vaillies, though pleaſing to the eye, may be held ſuſpected as to the lengthening of life, becauſe of the variations of heat and cold.

Open places and champaign countries are judged to be healthy, where the ſoil is dry, not parched or ſandy, where wild thyme and other aromatic plants grow ſpontaneouſly, and which is not otherwiſe bare, but interſperſed with trees for ſhade. Yet the change of air in travelling, after being accuſtomed to it, is healthy: whence many travellers have proved long lived; as, indeed, have alſo ſuch as have dwelt conſtantly in the ſame cottage. A ruddy complexion, clear white of the eye, quick hearing, and diſtinct voice, are ſet down by Palladius, as marks of the healthfulneſs of the place where theſe circumſtances are met with in the generality of its inhababitants.

The ancients were particularly attentive to the quality of their water, and to the eaſe of coming at it. They adviſed bringing into the farm-houſe the water of a ſpring which never dries up; or, if there be no ſuch ſpring within the farm, to bring running water as near to it as may be; or to dig for well-water, not of a bitter or brackiſh taſte. If neither of theſe was to be found, they directed large ciſterns to be provided for men, and ponds for collecting and retaining rain water for cattle. They eſteemed that running water to be beſt for drinking, which had its ſource in a hill: ſpring, or well-water, from a riſing ground, was deemed the next beſt: well-water in the bottom of a valley was held to be ſuſpicious; and marſhy or fenny water, which creeps ſlowly on, was by them rightly looked upon as the worſt of all.

That water is known to be wholeſome, which has no mineral in it, is perfectly clear, has no taſte or ſmell, depoſits no ſlimy ſediment, leaves no ſpots, or incruſtation when boiled in copper or braſs veſſels, and which boils pulſe in a very little time. "Rain water, ſays Sir Thomas Elliot in his Caſtle of Health, is the moſt ſubtile and pure of any other water. The next is that which iſſueth out of a ſpring facing the eaſt, and paſſeth ſwiftly among great ſtones and rocks. The third is of a clear river, which runneth on hard ſtones and pebbles. There be divers means to try which is the beſt water; for that which is lighteſt in poiſe or weight, is beſt; alſo that whereof cometh leaſt ſcum or froth when it doth boil; alſo that which will ſooneſt be hot. Moreover, dip linen cloths in ſundry waters, and afterwards lay them to dry; and that which is ſooneſt dry, the water wherein it was dipped, is moſt ſubtile."

As ſprings and well-water paſs through beds of ſand, gravel, or ſmall ſtones, theſe clear it of all impurities, unleſs there be mixed with them ſubſtances which are ſoluble in water. If any mineral is mixed with the water, it is unfit for the farmer's uſe. If it be hard, it is thereby rendered unfit for waſhing, and ſome other culinary uſes. This is the kind of water which gives fleſh boiled in it a red colour. But even the hardeſt water may be eaſily rendered perfectly ſoft, and fit for any uſe, by mixing with it a ſmall proportion of pot-aſh, fixed ſalt, or, for want of theſe, the aſhes of any burnt vegetables.

The animal and vegetable ſubſtances which are mixed with ſtagnating water putrify, and taint that water. This taint is moſt effectually carried off by boiling, during which all the putrid particles evaporate: and whatever elſe remains in it will ſubſide when it is cold. It may likewiſe be much mended by having air forced through it by means of Dr. Hales's ventilator; or it may be corrected by mixing with it acids, ſuch as vinegar, juice of ſour fruits, ſpirit of nitre, vitriol, &c.

When there is neither running nor ſpring water, artificial ſprings may be made in the manner thus pointed out by Lord Bacon, who does not indeed ſay that he had experienced it himſelf; but it has been repeatedly tried ſince his time, and found to anſwer very well. "Upon a hanging ground, where there is a quick fall of rain-water, lay a half trough of ſtone, of a good length, three or four feet deep in the ground, with one end upon the high ground, the other upon the low. Cover this trough with brakes, to a good thickneſs, caſt ſand upon the top of the brakes, and you will ſee, after ſome ſhowers are paſt, the lower end of the trough run like a ſpring of water." This will continue for a long time after the rain is paſt, "as if, ſays that great philoſopher,

loſopher, the water did multiply itſelf upon the air, by the help of the coldneſs and condenſation of the earth, and the conſort of the firſt water." A gentleman in France, whoſe manſion ſtood on a height far from any water, was adviſed to make a long ditch, about a fathom deep, in the neighbouring higher grounds, and to fill it with ſand; he did ſo, and it continued to bring a plentiful ſupply of water, for all domeſtic purpoſes.

M. de la Hire obſerves, in the Memoirs of the Academy of Sciences for the year 1703, that rain-water which has been purified by paſſing through clean ſand, and is afterwards collected in ſubterranean reſervoirs, will keep a long while without becoming putrid. He thinks this water the beſt that can be made uſe of, either for drinking, or for other economical purpoſes, becauſe it is not impregnated with any mineral, as ſpring waters ſometimes are. The only thing requiſite in the conſtruction of ſuch reſervoirs or ciſterns is, to have a place which will hold water, made of ſuch materials as will not communicate any bad quality to the water, which is to remain there a conſiderable time. The firſt water that falls from the roofs of houſes, when it begins to rain, ſhould be thrown away; as having ſerved only to waſh the roof, which, in dry weather, is always covered with dung of birds, and other filth. He rejects ſnow water for the ſame reaſon; and likewiſe the water of rain brought by winds which paſs over places infected with ill ſmells, as large cities, ſinks, &c. He computes, that water enough for the uſe of any family runs off the roof of the houſe which is inhabited by that family.

The buildings on the farm ſhould be proportioned to the produce, eſpecially as to ſtore-rooms. The expence of building ſhould be ſuch, as that, in caſe of accidents, one, or at moſt, two years rent may repair them. The farm-houſe ſhould be ſomewhat elegant, to give pleaſure to its poſſeſſors, and, as Columella adds, to allure the wife to take delight in it. It ſhould be built on the moſt healthy ſpot of the farm, in a temperate air, ſuch as the middle of a hill commonly enjoys, where it is neither ſtifling in the ſummer, nor expoſed to the rage of winds and ſtorms in the winter. It may be ſeated near a quick running river, if the banks are high, and the channel clear of mud: but if the river is large, care muſt be taken to ſituate it ſo that the winds may carry off the vapours in ſummer, and the fogs in winter, which otherwiſe would prove hurtful to the health of men and cattle. The front of the houſe ſhould be turned from ſuch a river. In a healthy ſituation, a houſe ſhould front the ſouth-eaſt, which is ſhaded during the hotteſt part of the day in ſummer, and enjoys the morning ſun in winter. A houſe facing weſterly will have the morning fogs longer retained, and will be too much heated by the afternoon ſun. In an unhealthy ſituation, the front ſhould be turned toward the north.

In ſouthern climates, where the ſun is within a few degrees of being vertical in ſummer, and yet the country is ſubject to ſevere cold in the winter, as is the caſe of ſome of our North American colonies, a ſouth front is rather convenient: for in the heat of ſummer, the ſun, being high, paſſes over the roof from the eaſt ſide to the weſt, and ſhines but little, or not at all, in at the front windows, and very weakly, becauſe obliquely, upon the front wall. But in the winter, being low, it ſhines full in at theſe windows, at a time when the cold renders its cheering preſence quite agreeable.

Places in this kingdom intended for defence, before the invention of cannon, were built either on riſing grounds difficult of acceſs, or where they could eaſily be ſecured by moats filled with water. Villages and farm-houſes were moſt frequently built in vallies, that they might be ſheltered from ſtormy winds; or near brooks or rivers, for the conveniency of water. In general, every means have not been uſed to provide againſt the inconveniencies of theſe ſituations: though as Mr. Worlidge obſerves, "were we for the future but duly to obſerve the beſt ſituations of places, and the compleateſt methods of building, in ſuch houſes as may hereafter be raiſed, our England would in a few years appear a kingdom beſet and adorned with curious and admirable habitations, poſſeſſed by noble and ingenious inhabitants."

Houſes built on too lofty a ſituation are expoſed to the violence of the winter's ſtorms, and to the ſcorching drought of the ſummer: yet we too generally find them without the only ſhelter their ſituation admits of, which is wood. The reaſon of this ſeems to be, that the inhabitants, finding that trees do not thrive well when they are firſt planted on dry heights, are at once diſcouraged. But where the plants are fenced from nipping winds while young, and protected from cattle till they become ſtrong, ſuch ground would be found abundantly favourable to the growth of trees which delight in a dry ſoil. "Theſe, as Mr. Worlidge expreſſes it, would yield a cooling, refreſhing, ſweet, and healthy air and ſhade during the heat of ſummer, and very much break the cold winds and tempeſts from every quarter in winter."

One might be apt to think from the unhealthineſs of low and fenny countries, that moats full of water about houſes ſhould be prejudicial to health: yet many facts ſhew the contrary. In Numb. 310, of the Philoſophical Tranſactions, a particular inſtance is given of two pariſhes which were ſurrounded with a moraſs, and yet were very healthy. Many houſes ſurrounded with moats are drier than others in a ſeemingly better ſituation; for books and furniture are often leſs apt to grow mouldy in the former, than in the latter. Hence it would ſeem probable, that the unhealthineſs of low marſhy countries muſt ariſe, rather from the putrefaction of animals and vegetables in ſlow moving or ſtagnating waters, than from a too great moiſture of the air, occaſioned by the quantity of water evaporated. Of this Dr. Pringle gives a remarkable inſtance in his judicious and uſeful Treatiſe on the Diſeaſes of the Army, when he ſays: "Another cauſe of the moiſture and corruption of the air were the inundations made about the fortified towns ſince the commencement of the war; which were particularly noxious upon letting the water off in the beginning of the ſummer, after the preliminary articles of the peace were ſigned. For theſe grounds, which were once entirely covered, being now half drained and marſhy, filled the air with moiſt and putrid exhalations. The ſtates being made ſenſible of this, by the ſickneſs that raged at Breda, and the neighbouring villages, gave orders to let in the water again, and keep it penned up till winter."

All phyſical writers point out the great danger to which health is expoſed from a moiſt and warm air; eſpecially if it be attended with a putrid vapour. Too much care cannot therefore be taken to guard againſt both. The too great moiſture may probably be prevented by collecting all the waſte water into deep ditches or ponds. We frequently ſee that ponds which have no ſupply of water but from rain, retain water during a very dry ſummer, when, according to the uſual calculations of evaporations, the whole muſt have diſappeared in half the time: from whence it ſeems more than probable, that the quick evaporation of water, in ſome caſes, muſt ariſe from a heat reaching to, or affecting the earth under the water; and that, if care be taken to make the ditches or ponds ſo deep that the heat of the ſun ſhall not warm the earth at their bottom, the quantity evaporated will be but ſmall, and ſuch as will not be prejudicial to the health of the neighbouring inhabitants, if neither animal nor vegetative bodies are ſuffered to rot in them. The way to prevent this is by keeping the water free from graſs, or other impurities, which may give ſhelter to animals, whoſe rotting, as well as that of the graſs, or of thoſe impurities, communicates a putrid taint to the exhalations. It is in this caſe neceſſary, that the banks of ditches, or ponds, be ſloped as little as the ſtrength or ſtiffneſs of the earth will permit.

Though lofty and bleak ſituations are too often deſtitute of trees, villages built in vallies are as frequently too much crowded with them; which muſt be attended with the inconvenience of not having a free circulation of air, to carry off the moiſture ariſing from the earth, and perſpiring from ſo many trees. The antients would have built ſuch villages on riſing grounds, to avoid the too ſultry heat of the ſummer; or they would have preſerved a free circulation of the atmoſphere, to prevent the bad effects of a ſtagnating moiſt air.

On the firſt ſettlement of the Engliſh in North America, they imitated our cuſtom of building in vallies, and near rivers: but experience ſoon taught them, that ſuch places are more ſubject to the ſuffocating ſultry heat of the ſummer, and, what they little expected, to a greater ſeverity of froſt in the winter, than riſing grounds generally are. We have been informed by one of the moſt curious and intelligent obſervers of the laws of nature of perhaps any man on that continent, that the cold there, in their hardeſt froſts, is found to be ſo ſevere in the vallies, to a certain height, as ſometimes to kill every tender vegetable, while thoſe on the higher grounds eſcape. This generally takes place to a regular determined height, above which the Americans now build their houſes. If we be allowed to offer a conjecture concerning the cauſe of this, we ſhould ſay, that the effect of the cold ſeems to be limitted to the height to which the great moiſture of the air ariſes at that ſeaſon. In the hard winter of 1739-40, the ſame happened in this kingdom, when the froſt was much leſs ſevere in its effect in the hilly countries, than in the low lands.

Dr. Pringle, in his excellent treatiſe before mentioned, points out the diſadvantages of planting ſo many trees as there generally are in moſt parts of the Netherlands. The ſame practice may be as juſtly blamed in many of the flat moiſt counties in England, eſpecially where they border on marſhes. Their ſpeedy growth tempts the inhabitants to plant, at the ſides of their ditches, willows, and other trees, which delight in a moiſt ſoil; and theſe not only prevent a free circulation of air, but alſo perſpire a great deal of moiſture. Dr. Pringle confirms this by the following inſtances.

“ At Eyndhoven, two battalions of the guards were quartered in the town, and the third lay without, in the peaſants houſes, all within the compaſs of a mile; yet, what was remarkable, this without the town had always three times more ſick in the returns, than either of the other two, notwithſtanding one of them had been very ſickly the year before in Zealand. Now, the height of the ground being alike in all, the difference in point of health could be aſcribed to nothing, but to the greater moiſture of the cottages; for in all other points, theſe corps were equal, as in diet, duty, and exerciſe. A ſimilar caſe occurred in the cantonment of a regiment of foot, whereof one company being quartered in houſes that ſtood upon a heath, enjoyed a tolerable degree of health, while the reſt that dwelt in a wood were remarkably ſickly. As a further proof how prejudicial it is to have the air confined by cloſe plantations in ſo moiſt a country, it was obſervable, that the Dutch camp at Gilſen, bordering on our cantonment, but lying on an open heath, preſerved a good ſhare of health, while we were at the worſt. It was not a little curious to obſerve, how the agues declined proportionably with the withering and falling of the leaf. At this time leſs moiſture aſcends, and by the ſhedding of the leaves the villages come to be more open and perflated, and of courſe more dry and healthful. While the troops were very ſickly in Zealand, commodore Mitchel's ſquadron, which lay at this time at anchor in the channel, between South Beverland and the iſland of Walcheren, in both which places the diſtempers raged, was neither afflicted with fever or flux, but amidſt all that ſickneſs enjoyed perfect health: a proof that the moiſt and putrid air of the marſhes was diſſipated, or corrected, before it could reach them; and that a ſituation open to the winds is one of the beſt preſervatives againſt the maladies of a neighbouring low and marſhy country.”

The drieſt ſpot in a low flat or fenny country ſhould be choſen for a dwelling-place. Even where there is gravel or ſand on the ſurface, care ſhould be taken that the ſprings do not riſe high. Dr. Pringle points out the neceſſity of this caution, from what he obſerved in the lower parts of Brabant, “ which is a barren ſand, where ſo little water is ſeen, that, at firſt ſight, the country is deemed dry and healthful: but the appearance is deceitful; for water is every where to be found at two or three feet from the ſurface: and in proportion to its diſtance from thence, the inhabitants are more leſs free from diſeaſes.”

Mr. Worlidge directs, that, in low moiſt grounds, cellars ſhould be made under the houſe, with good cielings, or rather arched walls; for that this will conduce much to its dryneſs and healthfulneſs. The importance of rendering houſes dry appears in many inſtances mentioned by Dr. Pringle: but we ſhall give only that in his twelfth page. “ One quarter of Ghent, called St. Peter's-hill, ſtands high above the reſt of the country; and in this the barracks, having drains and free air, were quite dry; ſo that the men who lay there enjoyed perfect health. But the reſt who were quartered in the low part of the town, where their barracks were moſtly the ground-floors of waſte houſes without drains, and of courſe very damp, were all ſickly.”

The bed-chambers, in ſuch ſituations, more eſpecially, ſhould be in the drieſt and moſt elevated part of the houſe, and where the morning ſun may contribute moſt to keep them dry. If they are ſo ſituated, that the ſun does not warm and dry them, they ſhould be frequently aired with fires; the oftener in proportion to the greater dampneſs of the place: for this has been found to contribute greatly to the health of the inhabitants. We are informed by a gentleman who has experienced it in many inſtances, that, by this ſole precaution, he has preſerved ſeveral families from the ague, when that diſtemper was very epidemic in the neighbourhood. How much the dryneſs of bed-chambers contributes to health is confirmed by what Dr. Pringle obſerves to have happened at Bruges, where the ſoldiers that lay in the upper ſtories kept their health remarkably better than thoſe who were below on the ground floors.

As brick walls render houſes drier than thoſe of ſtone, and of a more equal warmth than plaiſtering, Mr. Worlidge directs, that, “ where bricks can be had, the walls ſhould be built with them, as may be done for little coſt, if you raiſe firm and ſtrong columns at the corners of the houſe, and where it is neceſſary to ſupport the main beams. You may build theſe ſquare, and between them raiſe the walls with the ſame materials, and work them up together with the corners and columns, leaving one half of the extraordinary breadth of the column without, and the other within the walls, whereby you will ſave much charge in materials and workmanſhip, and yet your houſe will be firm and ſtrong.”

We are too little attentive to the ſituation of houſes with regard to rivers; though a judicious choice in this muſt be of great conſequence to the health of the inhabitants. A quick flowing ſtream, with a clean channel and dry banks, will rather add to the beauty and healthineſs of a country: but oozy banks, over-run with reeds, or other ſtrong coarſe graſs, ſhould be carefully avoided, as being a ſhelter to all manner of putrid filth, whence unſalitary vapours muſt ariſe. It is a general opinion, that it is ſafer to dwell on the north than on the ſouth-ſide of a river; but experience ſeems to prove the contrary, eſpecially in warm climates. Marſhes, which are ſometimes overflowed with ſalt water, are found to be more unwholeſome than freſh water marſhes. Their neighbourhood ſhould, therefore, be carefully avoided.

The Romans were univerſally agreed, that it was much better to occupy a ſmall farm than a large one; and laid it down as a rule, that the farmer ought to be ſtronger than the farm; becauſe in the ſtruggle which will ariſe between them, if the farm be too ſtrong for the farmer, he muſt be ruined; that is, if the extent of the farm be ſuch, that he cannot beſtow a due culture on every part of it, he muſt be a loſer: for, as Columella remarks, “ it is certain, that a large tract of land, not rightly cultivated, will yield leſs than a ſmall ſpace well cultivated.”

A judicious correſpondent of the editors of the Muſeum Ruſticum rightly obſerves, that the ſtocking of a farm is a point of great importance, and requires as much judgment and foreſight as any other point in huſbandry.

“ The bad ſucceſs of great numbers, continues he, is owing to their not having a ſufficient ſum of money to begin with, which inevitably involves them in difficulties, and reduces their profit on every article of their produce. Their farms are underſtocked; they ſell at a conſtant diſadvantage; their fields are not half cultivated; and in a ſhort ſeries of years, unleſs ſome lucky hit ſets them up, they grow poor, in ſpite of all poſſible induſtry, judgment, and application.

“ Even a low and eaſy rent will ſeldom remedy the want of mony at ſetting out.

“ The want of judgment, in proportioning the quantity of each particular kind of ſtock to the quantity and nature of the lands of a farm, is alſo attended with great loſs.

“ For inſtance; if a farm requires four horſes, or two ploughs, and the farmer keeps only three, or a plough and a harrow, his field cannot be ſufficiently cultivated, even according to the ideas of culture common among farmers; and of courſe in a few years his lands muſt be in very bad order, to his great annual loſs.

“ On the contrary, to overſtock himſelf with horſes, is to keep what will inevitably eat him out of houſe and home: the expences attending them are very great, and if they are not kept conſtantly at work, their owner muſt neceſſarily loſe by them. But it will not be amiſs to explain myſelf more particularly on this head.

“ I am ſpeaking at preſent of the practice of farmers, ſome of whom overſtock themſelves with horſes, without giving their lands extraordinary ſtirrings on that account. If a farm, which commonly requires three horſes, has four kept, and is conſequently ploughed and harrowed proportionably more, the farmer will be no loſer by his fourth horſe; but the caſe is very different when he is kept without being worked to the beſt advantage of the farm.

“ It is not to be at once perceived how much is loſt by not having the number of horſes proportioned to the land; nor can this always be done.

“ A farmer may find it neceſſary to keep four horſes, and when he has got them, it is a chance but he could perfectly well manage ſeveral fields more with them; and when a man has an opportunity of hiring additional fields, then ſhould his judgment come into play, to take no more than his old ſtock will manage to advantage, unleſs he has a ſum of money ready to make an addition to it.

“ The ſame ill conſequences attend either over or underſtocking a farm with all other cattle: and it would be the farmer's advantage was he always to remember, that three beaſts, of any kind, well fed, pay better than four without their bellies full. On the contrary, not to keep the ſtock neceſſary, is to ſubmit to a conſtant loſs. Both theſe ſorts of conduct are frequently followed, to the great unprofitableneſs of farming.

“ The proportion of the paſture and arable lands of a farm is of great conſequence towards the occupier's making a profit of his buſineſs.

“ The unprofitable practice of ploughing up paſtures, and not laying them down again, which is ſo univerſal in this country among farmers, whenever their landlords will allow it, tends perpetually to impoveriſh them. They are all, to a man, mad after ploughed lands, and would willingly break up every acre of graſs in their farms.

“ So general an opinion among them would make one think the practice really profitable; but the contrary appears beyond all contradiction to be the truth; I mean, according to the culture at preſent purſued in this country.

“ Two thirds of the land of a farm in a rich country ſhould be graſs; and a little one had better all be ſo. The vaſt expences of the plough, without doubt, keep many farmers poor, who, if their farms were graſs, would not run half the hazard, and enjoy a much better income.

“ Particular points of bad management, for want of ſenſe or knowledge, through ſlovenlineſs, idleneſs, or other obſtructions to any profitable huſbandry, are not what I mean to ſpeak of here, ſince they are ſo very various, and ſo totally ruinous, that no reaſoning can be concluſive, unleſs all ſuch exceptions are made.

“ The improper quantity of land in a farm is often againſt the farmer's profit.

“ Very large tracks, of two or three thouſand acres, which are common in Norfolk, are too extenſive for one farm. It is impoſſible for one man to cultivate ſuch a quantity of land well: much of it muſt be neglected, and but little perfectly managed.

“ Great profit indeed ariſes from moſt of theſe farms; but they take a very large ſum of money to ſtock and manage them properly.

“ Very ſmall ones, unleſs the farmer does the whole buſineſs himſelf, are equally liable to objection. The medium, which is ever, in proportion, the moſt profitable, is that quantity of land which will admit of being ſtocked and farmed without the want of either any addition or diminution. What I mean is this:

“ Let us ſuppoſe a farm to conſiſt of ſeventy acres of land, twenty of them graſs, and the reſt arable, in a rich country, the land from ten to ſixteen and ſeventeen ſhillings *per* acre; the occupier muſt keep one ſervant, and if he does not work hard himſelf, one labourer all the year, beſides ſome additional help at buſy times.

“ I know there are many ſlovenly men, who cultivate (if their management deſerves that name) ſuch farms with fewer hands than I have mentioned; but their conduct can be no rule to good farmers. Four horſes are alſo neceſſary for ſuch a farm.

“ Now, for the ſame ſtanding expences of ſervants wages, horſes, &c. the ſame number of ploughs, harrows, tumbrils, waggons, &c. &c. one hundred acres, or better, might be farmed with the ſame proportional profit: in this caſe, therefore, the tenant of ſeventy acres loſes conſiderably for want of thirty or forty more. Indeed we ſeldom meet with a farm nicely proportioned to the ſtock on it.

“ There are many very evident reaſons why farming ſhould prove unprofitable to gentlemen who undertake to cultivate a part of their eſtates, whether for their amuſement or convenience, or, generally ſpeaking, even for profit.

“ A very fine Norfolk farm, of a large extent of country, the rent exceeding low, and a gentleman willing to be at the expence of marling, in ſuch a caſe, there is no fear of a conſiderable profit, even without perpetual attention: but in common farms, in rich countries, no profit can ariſe to any gentleman that does not give the buſineſs conſtant attention, and deſcend to *minutiæ*; which may be too diſagreeable for him to ſubmit to.

“ What I mean by profit, is not making the rent which he might receive from the tenant without trouble, and without hazard, but that additional ſum which is the farmer's profit after his rent and all expences are paid. This is ſcarcely ever made by gentlemen, who farm either for convenience or amuſement; and, excepting graſs grounds, I am perſuaded they loſe conſiderably by keeping land in their hands. The plea of growing enough for family uſe of wheat, oats, &c. is a miſtaken one; they had better by far buy every article, than have any thing to do with the plough.

“ When I am told that farming anſwers to gentlemen, who I know do not give the farmer's attention to the buſineſs, I never believe it, or, at leaſt, am perſuaded that no regular accounts are kept. It will not be difficult to produce ſome good reaſons for this incredulity.

“ It ſhould be remembered, that the farms which gentlemen keep in their own hands are ſeldom above fifty, ſixty, ſeventy, or an hundred a year, and not often ſo much. It is no eaſy matter for a farmer, with induſtry, ſobriety, and application, to make above a rent profit in ſuch a farm; and I believe but ſeldom ſo much. This is with every advantage of underſtanding his buſineſs, applying cloſe to it, and doing ſome work (if his farm is ſmall, a great deal) himſelf: how unlikely is it therefore that a gentleman, who may probably want theſe advantages, ſhould make near that profit, or, indeed, any at all!

“ In the firſt place, a principal part of his buſineſs, his buying and ſelling, is tranſacted by his bailiff, or head ſervant, who muſt be paid for his trouble. He may be lucky enough to meet with an honeſt one; but I would never adviſe any one to let the profit of his farming depend on the honeſty of other people. Suſpicion, to the open generous mind, is irkſome and grating: but the farmer ſhould ſet out with the maxim of Deſcartes—to doubt of his very exiſtence, and ſuppoſe every man a knave till he finds him honeſt.

“ But there are many inconveniencies, beſides theſe, in truſting to bailiffs.

The gentleman we muſt certainly ſuppoſe to be ignorant of farming; and he is then, of courſe, in danger of having an ignorant ſervant, without the ability of detecting him. However, the ſingle expence of a bailiff, or a head ſervant, which are much the ſame, is too great to be kept conſtantly for a ſmall farm; and in their abſence the gentleman muſt depend on himſelf.

" This is palpably no dependence at all; for can it be expected that he will forego his diverſions, his excuſions of pleaſure, the company of his friends, the joys of ſociety, to attend to his farm? I could almoſt as ſoon believe, that his wife would renounce an opera or a ball for the pleaſure of dancing attendance on her butter and cheeſe in the dairy. The rural joys of romance are pretty much out of date now; and, alas! there is great difference between the employment of a farmer's wife in England, and keeping ſheep in the plains of Arcadia.

" But to return:

" There are, even in a ſmall farm, a thouſand objects which require conſtant attendance.

" Cattle of no kind will thrive but in the maſter's eye: every variation of the ſeaſon to be remarked; the lucky moment for ploughing, harrowing, ſowing, reaping, &c. to be caught, and uſed with diligence and foreſight; fences for ever to be attended to; and, in ſhort, a million of other things, which require conſtant thought and endleſs application.

" That ſingle article, the employment of labourers, will alone run away with the profit of the whole farm.

" But ſurely it appears plainly, from what I have ſaid, that the unprofitableneſs of farming is ſcarcely ever owing to the art itſelf, but to the miſtakes of thoſe who practiſe it.

" As I have been ſo particular in diſtinguiſhing ſeveral points by which the followers of it loſe, I ſhall now treſpaſs a little longer on your patience, and give my ſentiments on the cuſtom of gentlemen's farming, in other reſpects than that of profit, to thoſe who are not ſolicitous about it, and in relation to it, to thoſe whoſe fortunes will not allow an indifference to ſuch a point.

" It is ſcarcely poſſible for a gentleman to live in the country without finding many inconveniencies in not keeping a team of farming horſes, with waggons, carts, &c. and other implements uſed in the buſineſs of huſbandry. While profit is not conſidered, there will flow a multitude of agreeable circumſtances from farming, which will have ſome relation to almoſt every particular of a country life.

" In reſpect of entertainment, what more rational, or more amuſing, than country buſineſs, without the anxiety of caring for profit! The public good calls loudly to all gentlemen to keep ſome land in their hands, that experiments may be made, and modes of agriculture purſued, different from the practice of the neighbourhood, for the farmers, at leaſt, to ſee that their own cuſtoms are not the only good ones, and that there are improvements to be made even on their practice.

" All the improvements and new inventions in agriculture come from gentlemen; ſcarcely one, that I ever heard of is known to have been diſcovered by farmers.

" I do not wonder at this, for I think it is natural enough; but at the ſame time, it is a ſtrong reaſon for gentlemen's farming, whether they make profit by it or not. The expenſive uſe of manures, and introducing a garden culture into the field-huſbandry, were the effects, among a hundred other inſtances, of gentlemen's farming.

" But if the public good was not to be conſidered, yet the mere amuſement of farming to a gentleman of fortune, who has the leaſt taſte for country buſineſs, muſt plead warmly for its practice. Such farmers ſoon make a garden of their eſtates, at the ſame time that they improve the value of them.

" What can be more amuſing than experimental agriculture? trying the cultivation of the new-diſcovered vegetables, and all the modes of raiſing the old ones; bringing the earth to the fineſt pitch of fertility, and growing plants infinitely more vigorous and beautiful than any in the common tillage; uſing the variety of new machines perpetually invented, and obſerving their effects; and, in a ſmall extent of ground, ſee the growth of an infinite variety of vegetables, unknown in the common practice; perpetually enjoying the neatneſs of huſbandry, that *ſimplex munditiis* of farming, which gives the moſt beautiful colouring to every object around, and pleaſes the refined imagination with the enchanting proſpect of all the elegance of nature.

" Thoſe gentlemen of ſmall fortunes, who, if they practice any thing of farming, find it neceſſary not to be indifferent to profit, have many points to conſider.

" Such an one ſhould remember, that though a farm will afford amuſement, it will not yield profit without application. A conſtant attention to every article is highly neceſſary. He ſhould keep the exacteſt accounts, and make memorandums of what knowledge he can pick up. For a few years he muſt employ a bailiff; and he will find that every day and hour will increaſe his own knowledge, if he is attentive to buſineſs." *Muſeum Ruſticum, vol.* IV. *page* 264.

We ſhall conclude this article with the following

" *Prices of Implements of Huſbandry, Corn, and Farming-Work, in the North Part of Hertfordſhire, about Hitchin, Baldock, and Stevenage.*

A waggon complete, from 16 to 20 l.

A cart complete, from 8 to 10 l.

A two-wheeled plough complete, with draught-chain, and ſplinter-bars, or whipple-trees, 3 l.

A wheat two wheeled ſowing-plough, as the ſame wheels ſerve for both, 1 l. 1 s. 6 d.

A foot, ſwing, or dray-plough complete, 1 l.

A roller complete, 15 s.

A five-barred harrow ditto, 17 s.

A four-barred harrow ditto, 15 s.

A three-barred harrow ditto, 12 s.

Firſt ploughing per acre, 6 s.

Second ploughing per acre, 5 s.

Harrowing per acre, 6 d.

Rolling per acre, 4 d.

Hoeing turnips per acre, 4 to 5 s.

Hockling, or cutting up and raking haulm, 2 s. 6 d. per acre.

A harveſt-man has per month from 33 to 40 s. and his diet.

A ploughman, for a day's work, 8 d.

A labourer, 1 s. per day, and ſmall beer.

Price of threſhing per quarter, wheat 2 s. barley 1 s. oats 9 d. peaſe 1 s. 4 d.

Price of horſes, from 5 to 15 l.

Price of cows, from 3 to 8 l.

Price of ſheep, from 10 to 20 s.

Hogs, from 5 to 40 s.

Wheat per load, 30 to 35 s. Five buſhels make a load, and eight loads, or forty buſhels, a waggon-load.

Barley, 24 s. per quarter.

Oats, 16 s. per quarter.

Peaſe, 17 s. per load.

Thetches, or vetches, 25 s. per load.

Malt, 4 s. 6 d. per buſhel.

Note, Our buſhel is nine-gallon meaſure.

Turnip-ſeed, 3 d. per pound.

Red clover-ſeed, 4 d. per pound.

Trefoil-ſeed, 2 d. per pound.

Cinquefoil-ſeed, 4 s. per buſhel.

Wheat-ſtraw, 10 s. per load.

Barley and oat-ſtraw, 6 s. per load.

Cinquefoil-hay, per hundred, 2 s. 6 d.

Clover-hay per hundred, 2 s. 6 d.

Thatching per ſquare, yelming and ſerving included, 2 s. 6 d.

A carpenter per day, 1 s. 8 d.

A bricklayer ditto, 1 s. 10 d.

Brick at the kiln, 17 s. per thouſand.

Plain tiles, 17 s. per thouſand.

Pan-tiles, 10 s. per hundred.

Lime, 6 d. per buſhel.

Tiling-lath, 2 s. 10 d. per bunch.

Plaiſtering-lath, 1 s. 5 d. per bunch.

Hurdles per dozen, 8 s.

Faggots, from 6 to 16 s. per hundred.

Making, plaſhing, and laying live-hedges, and ditching, 4 d. per pole of ſixteen feet and a half." *Muſeum Ruſticum, vol.* IV. *page* 78.

FARM-YARD, the place adjoining to the farm-houſe, where cattle are foddered, and ſeveral other neceſſary works, belonging to the farm, are performed.

FARTHING-DALE, or *farding-dale*, the fourth part of an acre of land, now generally called a rood.

FATHOM, a long meaſure, containing ſix feet.

FEABES, or *feaberries*, gooſeberries.

FEBRIFUGE, having the power of curing fevers. *See* FEVERS.

FEBRUARY, the ſecond month of the year.

This is a principal ſeed month for ſuch as they commonly call lenten grain, and is uſually ſubject to much rain or ſnow, which is not unſeaſonable.

Now ſow all ſorts of grey peaſe, fitches, beans, and black oats: in dry weather carry out dung, and ſpread it before the plough, and alſo on paſture-ground: this being the principal month for that purpoſe.

This is a very proper time for planting trees and quickſets, and alſo to plaſh them; to ſet willows, plants, or pitchers, and alſo poplars, oſiers, and other aquatics; and to lop trees, or cut coppices.

Sow muſtard-ſeed and hemp-ſeed, if the ſpring prove mild: feed your ſwans, and make their neſts where the floods cannot reach them.

Soil ſuch meadows as you cannot overflow or water; catch moles, and take great care of ewes and lambs where they are forward. *Mortimer's Huſbandry, vol.* II. *p.* 413.

FEED, the quantity of oats, &c. given to a horſe or other animal.

FEEDING *of cattle. See the article* CATTLE.

FEET, the baſes or ſupports of an animal.

The knowledge of the feet is of the utmoſt importance in purchaſing a horſe. Nor is it enough that the creature have a well-proportioned foot; for if it chance to be thin or weak, the buyer will be diſappointed in his expectations; as ſuch a foot is liable to be ſpoiled in ſhoeing, by travelling on hard ſtony ground, by too much draught in hot ſeaſons, or by too much moiſture in winter. A thin foot is that where the cruſt or horn is thin. This may be very eaſily ſeen when the ſhoe is taken off, becauſe the verge all round the ſole will appear thin, and where it is ſo a horſe will winch with the leaſt touch of the pincers. The heel and frog are alſo apt to be ſoft and tender to the touch, and by reaſon of the weakneſs natural to ſuch a kind of foot, it often turns awry, and one point of the heel ſtands higher than the other.

FELL, the ſkin or hide of a beaſt.

FELLING, the act of cutting or hewing down.

When any tree is intended to be cut down for timber, the firſt thing to be taken care of is a ſkilful diſbranching, or lopping off, ſuch limbs, as may endanger it in its fall, many trees being annually ſpoiled for want of a previous care of this kind; and therefore in very large arms, chop a nick under them cloſe to the bole, and then meeting it with downright ſtrokes, it will be ſevered without ſplitting. Take care alſo to cut the tree as near the ground as poſſible, unleſs you deſign to grub them up, the doing of which will be of advantage both to the timber and to the wood; for timber is never ſo much valued, if it be known to grow out of old ſtocks.

M. de Buffon has very juſtly obſerved, that the trees intended to be felled for ſervice ſhould firſt be ſtripped round of their bark, and then ſuffered to ſtand and die upon the ſpot before they are cut. For by this means the ſappy part, or blea of the tree, becomes as hard and firm as the heart, and the real ſtrength and denſity of the wood has been proved, by many experiments, to be greatly increaſed by it.

FEN, a general name for boggy, mooriſh, or marſhy land, generally overflowed with water. *See the articles* BOG, DRAINING, MARSH, *and* MOOR.

FEN, is alſo the name of a very pernicious diſtemper to which hops are ſubject. It conſiſts of a quick growing mould, or moſs, which ſpreads itſelf with great rapidity, and occaſions dreadful ravages in the hop-grounds. *See the article* HOPS.

FENCE, a hedge, wall, ditch, bank, or other incloſure, made round fields, woods, gardens, &c.

No foreſt trees ſhould be admitted into the hedges that divide fields, as their ſhade, and wide extending roots, are found very injurious to corn, graſs, and even to the hedge itſelf. But in countries where inſtead of hedges, the fences are chiefly made of rough flakes of ſtone, piled dry one upon another, or a little earth thrown in between them, to fill up the chaſms, a plantation of trees within theſe walls will hide their deformity, and give a warmth which cannot be expected from ſuch walls.

The moſt uſual way of incloſing land is with a ditch and a bank ſet with hawthorn, crabs, black thorn, holly, or white thorn, commonly called quick. Mr. Miller's inſtructions in this reſpect are very full, and contain among others, the following directions.

“ It will be proper before planting to conſider the nature of the ſoil, and what ſorts of plants will thrive beſt in it; and alſo what the ſoil is from whence the plants are to be taken: for if the ground they are taken from be better than that into which they are to be put, it will be more difficult to make them grow. Thoſe which have been raiſed on the ſpot near the place where they are intended to be ſet, will always do beſt, if they are to be tranſplanted; and the next to them will be ſuch as are taken from a nurſery.

“ I would recommend the white thorn, the black thorn, and the crab for outward fences to good ground: but I do not approve of intermixing them.

“ The white thorn is the beſt quick to plant, becauſe it is the moſt eaſily procured, is very hardy and durable, and may be rendered the cloſeſt of any fence, by proper clipping. It, therefore, is preferred to all others for outward fences, or for the diviſion of fields, where they are expoſed to cattle, &c. It may be raiſed either from ſets or from ſeeds. The former is the moſt common way of propagating it: for the latter, which may very properly be ſown where the hedge is intended to ſtand, do not riſe till the ſecond ſpring. The white thorn will thrive on almoſt any well looſened ſoil, except the drieſt gravel or ſand.

“ The black thorn and crab make very good fences, and are to be raiſed in the ſame manner as the white thorn: but if the kernels of apples or crabs be ſown, it is beſt to ſow the pommace with them; for they will then come up the ſooner, that is to ſay, the firſt year.

“ The black thorn is not accounted ſo good for fences as the white thorn, becauſe it is apt to run more into the ground, and is leſs certain as to the growing: but, on the other hand, its buſhes are much better, and more laſting, than thoſe of the white thorn, or indeed any other ſhrub, for dead hedges, or to mend gaps: nor are they ſubject to be cropt by cattle, as the others are. The richer the mould is, the better the black thorn will proſper: but it will grow on the ſame ſort of ſoil as the white thorn.

“ The holly makes an excellent fence, and is preferable to all the reſt; but it is difficult to be made to grow at firſt, and is a ſlow grower. However, when it does grow, it makes amends by its height, ſtrength, and thickneſs. It delights moſt in ſtrong grounds; but will grow upon the drieſt gravel, even among rocks and ſtones. It is raiſed from ſets, or berries, like the hawes of the white thorn, and lies till the ſecond ſpring before they come up. Theſe two are beſt ſown in the place where they are intended to ſtand. They ſhould be well weeded, both before they come up, and afterwards, till they are grown to ſuch a ſize, as, of themſelves, to kill the weeds.

“ French furze will make good hedges upon dry ſandy banks, where few other plants will grow: but they muſt be kept very clean at the bottom, and never ſuffered to grow too high: nor ſhould they be clipped either in dry weather, late in autumn, or early in the ſpring; becauſe the cutting of them at thoſe ſeaſons is apt to make them die in patches, which is irrecoverable; as no new ſhoots will here ever proceed from the old wood.

“ Alder planted on a bank, the ſide of which is waſhed by a river or ſtream, will make an extraordinary fence, and preſerve the bank from being undermined by the water; becauſe the alder is continually putting forth from the lower roots ſuckers, which are of great advantage where the current of the water waſhes away the earth.

“ If there is to be a ditch along the hedge, that ditch ſhould be at leaſt ſix feet wide at top, three feet deep, and only one foot and a half over at the bottom, that each ſide may have a proper ſlope: for where its ſides are dug too perpendicular, they are very apt to fall in after a hard froſt, or heavy rain; and if the ditch is made narrower than here directed, it will ſoon be choaked up in autumn, by the falling leaves, and the growth of weeds: nor will it be a ſufficient defence for the hedge againſt cattle.

“ When the bank at the ſide of this ditch is to be planted with quicks, the ſets ought to be about as thick as a gooſe quill, and their tops ſhould be cut off within four or five inches of the ground. They ſhould be freſh taken up, ſtrait, ſmooth, and well rooted. Part of the turf taken off the ſurface of the ground where the ditch is to be dug, ſhould be laid, with the graſſy ſide downward, on the ſide of the ditch, where the bank is intended to be made, and ſome of the beſt mould ſhould be laid upon it, to bed the quick. The ſets of quick, prepared as before directed, are then to be laid upon that mould, a foot aſunder, with their cut ends ſomewhat ſloping upward. When this firſt row of quick is thus laid, it muſt be covered with mould; ſome of the remaining turf muſt then be laid upon that mould with the graſs ſide downward, as before; and more mould muſt afterwards be laid upon this turf. When the bank has, by theſe means, been raiſed about a foot high, a ſecond row of ſets ſhould be laid in the ſpaces between the lower quick, and with their ends turned the oppoſite way, in order to thicken the bottom of the hedge. Theſe are then to be covered in the ſame manner as the former: the bank is to be topped with the bottom of the ditch; and a dry or dead hedge muſt be made on the other ſide, to defend the young plantation from cattle.

“ To make theſe dead hedges, ſtakes ſhould be driven into the looſe earth, ſo low as to reach the firm ground. They ſhould be about two feet and a half aſunder. Oak ſtakes are reckoned the beſt, and black thorn and ſallow the next. When they are fixed, ſmall buſhes ſhould be laid at the bottom, but not too thick; for that would make the buſhes rot. The upper part of the hedge ſhould be laid with long buſhes, to bind the ſtakes in, by interweaving them: and, to render this hedge yet ſtronger, it may be eddered as it is called, that is, the tops of the ſtakes may be bound in on each ſide, with ſlender long poles or ſticks. When this eddering is finiſhed, the ſtakes ſhould be driven anew; becauſe the doing of that, together with the weaving of the hedge, will probably have looſened them.

“ The quick muſt be kept conſtantly weeded, and ſecured from being cropped by cattle, and in February it ſhould be cut to within an inch of the ground; for this will make it ſhoot ſtrong, and greatly help its growth.

“ When a hedge of this kind is about eight or nine years old, it will be proper to plaſh it; the beſt time for which is in October, or February.

“ After it has ſtood twenty or thirty years, and there is in it old ſtubs, as well as new ſhoots, thoſe ſtubs ſhould be cut ſloping off within two or three inches of the ground, except the beſt and longeſt of the middle ſize, which ſhould be left to lay down, and ſome of the ſtrongeſt, which ſhould be cut off at the height of five or ſix feet, according to the intended height of the hedge. Theſe laſt may be left to ſerve inſtead of ſtakes, and freſh ſtakes ſhould be put wherever they are wanted. The hedge ſhould be thinned, ſo as to leave on the ſtubs only ſuch ſhoots as are deſigned to be of uſe, that there may be room left to put a ſpade in between them, in order to give the earth as good a ſtirring as poſſible. The ditch alſo ſhould be cleanſed, and its ſlopes carefully repaired; and where the earth has been waſhed from the roots of the quick, or is hollow, it ſhould be faced anew with ſo much of the firſt ſpit of earth as there is occaſion for. The ſecond ſpit of this earth ſhould be laid on the top of the bank: for if it be laid on the ſide, or face of the bank, it will ſlip again into the ditch when wet comes, and perhaps drag down a great deal of the bank.

“ Two extremes are to be avoided in the plaſhing of quicks: the firſt is, the laying the plaſhes down too low, and too thick; becauſe that makes the ſap run wholly into the ſhoots, and leaves the plaſhes without nouriſhment, which, with the thickneſs of the hedge, kills them. The ſecond is, not to lay them too high; becauſe this draws all the ſap into the plaſhes, ſtints the ſhoots at the bottom, and renders the hedge ſo thin, that it will neither hinder cattle from going through, nor from cropping of it.

“ When the ſhoot deſigned to be plaſhed is bent, give it a ſmall cut with a bill, half through, ſlanting a little downward; then weave it about the ſtakes, and trim off the ſmall ſuperfluous branches that ſtraggle too far out on either ſide of the hedge.

“ If the ſtubs are very old, cut them quite down: ſecure the chaſms with a good dead hedge on each ſide, till the young ſhoots are got up tall enough to plaſh; and plant new ſets in the vacant ſpaces.

“ If the bank for a fence be without a ditch, and it is intended to make a hedge of quicks, the ſets, prepared as before, ſhould be planted in two rows, almoſt perpendicular, at the diſtance of a foot from each other, in the quincunx order; ſo that, in effect, they will be only ſix inches aſunder.” *Miller's Gard. Dict.*

When the plants of the thorn are themſelves ſtinted, or much decayed, as they generally are pretty ſoon, through the unmerciful wounds given them by unſkilful hedgers; inſtead of plaſhing them, the farmer's beſt way will be to dig them up, and plant young ſets in their ſtead. The only inconvenience attending this renewal is the expence of a dead hedge, which is not wanted in plaſhing: but I queſtion much, whether the healthineſs of the plants, when cut ſmooth, and in ſuch a manner as not to retain water, may not ſufficiently compenſate that charge. For the ſame reaſon, it ſeems to be moſt rational to cut the plaſhes upward; becauſe the wound will then be covered from the wet, at leaſt in ſome degree, by the ſlip which remains prominent over it.

Beſides the plants already mentioned for hedges, the ſweet-briar, or eglantine (dog-roſe) is thus recommended by a correſpondent of the ſociety of improvers in the knowledge of agriculture in Scotland, who had tried in vain, in that country, all the methods of fencing uſually practiſed in Hampſhire and Eſſex.

“ Obſerving that no creature ate up or deſtroyed the ſweet-briar or eglantine (dog-roſe), I gathered the hips of this plant, and laid them in a tub till March: the ſeeds then rubbed out eaſily, and I ſowed them in ground prepared for garden-peas. By this means I got my crop of peas without prejudice to my briars, which came up the next year; and the year after, when they were about a foot high, I planted them in the following manner.

“ After marking out my ditch, I laid my plants about eighteen inches aſunder, upon the ſide graſs, and covered their roots with the firſt turfs that were taken off the ſurface of the intended ditch. The earth ſide of theſe turfs was placed next to thoſe roots, and upon the turfs was laid other earth, taken out of the ditch, which I then finiſhed. In four or five years, theſe plants made a fence which no ſheep, cattle, or horſes could paſs. If old briars are dug up, and divided, they make excellent plants. Where the fences are thin, they may be eaſily thickened, by laying down branches; for theſe will make ſhoots of ſix or ſeven feet in a year. They bear clipping very well.

“ In ſandy places, I ſeldom dare to throw all the earth out of the ditch at once, but wait a year, till what I had thrown up is ſettled and ſwarded a little: then I raiſed my bank to the intended height. In the mean time nothing hurts my briars; and in two or three years after they have been planted, nothing can paſs the fence. Sheep ſometimes attempt it: but they ſoon are ſo entangled, that they would lie there till they die, if they were not taken out.”

In the hedges which divide the farmer's fields only, fruit trees may be planted; and theſe will yield profit, as well as ornament; or the fruit may be grafted upon a ſtock in the hedge, properly ſuited thereto.

Theſe ſtocks ſhould be pruned up every year, till they are brought out of the reach of cattle, and then they may be grafted with the red-ſtreak, gennetmoil, or any other fruit. If they have proceeded from apple-kernels, they may remain ungrafted, and will yield very good cyder fruit: but then it will be longer before they bear. Alſo, if the leaf, ſhoot, and bud of a natural ſtock, promiſe more than common, a trial may be made, whether that ſtock will not perhaps produce a fine new fruit; and if it be not liked afterwards, it may then be grafted.

Mr. Miller reckons the plants raiſed from the kernels of the ſmall wild crab much better for hedges, than thoſe which are raiſed from the kernels of any other ſort of apple; becauſe the former never ſhoot ſo ſtrong as the latter, and therefore may be better kept within the proper bounds of a hedge; and as they generally have more thorns upon them, they are better guarded againſt cattle.

Fences made in marſhy grounds require plants which delight in moiſt ſoils. Of this kind are, particularly, the black alder, the willow, and the poplar: the birch tree, and the aſh will likeways grow very well in ſuch places: but the firſt of theſe, viz. the alder, is reckoned the beſt and moſt profitable.

It likes a ſoil ſo moiſt as few other trees will thrive in, and is propagated either by layers, or planting of truncheons about three feet in length. The beſt time for planting theſe laſt is in February, or the beginning of March, when they ſhould be ſharpened at their larger end, and the ground ſhould be well looſened before they are thruſt into it, leſt the bark ſhould be torn of, which may occaſion their miſcarriage. They ſhould be ſet at leaſt two feet deep, to prevent their being blown out of the ground by violent winds, after they have made ſtrong ſhoots; and they ſhould be keept clear from all ſuch weeds as grow tall, at leaſt till they have got good heads; after this, they will keep down the weeds, and require no farther care.

If alders are raiſed by laying down the branches, this ſhould be performed in October, and by the ſame time twelvemonth they will have roots ſufficient to be tranſplanted, which muſt be done by digging a hole, and looſening the earth in the place where each plant is to ſtand. The young ſets muſt be planted at leaſt a foot and a half deep, and their top ſhould be cut off to within about nine inches of the ground; for this will make them ſhoot out many branches.

The alder tree may be trained into very thick cloſe hedges, to the height of twenty feet and upwards. It will thrive exceedingly on the ſides of brooks, for it grows beſt when part of its roots are in the water, and may, if planted there, as is uſual for willows, be cut for poles every fifth or ſixth year. Its wood makes excellent pipes and ſtaves; for it will laſt a long time under ground, or in water: and it is likewiſe much eſteemed by turners, plough-wrights, &c. and for making ſeveral utenſils neceſſary in agriculture. Its bark yields a good black dye.

All the ſorts of willows, of which Mr. Miller enumerates fourteen, grow beſt in moiſt boggy land, and may be eaſily propagated by planting cuttings or ſets, either in the ſpring or autumn: for theſe readily take root, and are of quick growth.

Thoſe ſorts which grow to be large trees, and are cultivated for their timber, are generally raiſed from ſets about ſeven or eight feet long, ſharpened at their larger end, and thruſt into the ground by the ſides of ditches and banks, where the ſoil is moiſt: but the beſt way is to make holes for them with an iron inſtrument, in order to avoid tearing off their bark. Theſe will afford very profitable loppings every fifth or ſixth year.

The middle ſized, or long leaved red willow (*Salix folio longo ſubluteo non auriculata*, Raii Syn.) and the common ſallow (*Salix folio ex rotunditate acuminato)* C. B. P. 474; willow with a rounded acute pointed leaf, have very pliable ſhoots, and therefore are the fitteſt for baſket-makers, for which reaſon they are much planted in oſier grounds. The cuttings of theſe plants ſhould be about three feet along, and taken from ſtrong ſhoots of the former year. They are commonly thruſt down two feet deep into the ground, and ſhould be about eighteen inches aſunder, if intended only for a fence; but if they are deſigned alſo for an oſier plantation, the rows, in which they may ſtill be at that diſtance, ſhould be three feet aſunder; obſerving always to plant the rows the ſloping way of the ground, eſpecially if tides overflow it; becauſe, if the rows are placed the contrary way, the filth and weeds that will be detained by the ſets will choak them up.

The beſt ſeaſon for planting theſe cuttings, is towards the end of February; for if they are planted ſooner, and a hard froſt comes on, they are apt to peel, which greatly injures them. Theſe plants are cut every year in oſier grounds, and, if the ſoil be good, they will yield ſo great a crop, that the yearly produce of one acre has often been ſold for fifteen pounds: but ten pounds is a common price. It therefore is great pity, that willows are not more cultivated, eſpecially upon boggy land, where few other things will thrive. They will not, however, do ſo well as the alder, in very watery ground. Great care ſhould be taken to ſcreen the young willows from cattle; for they are fond of them, and would ſoon deſtroy them irrecoverably, by nipping off their young ſhoots. In wine countries, the boughs of this tree are uſed either whole or ſplit, according to their ſize, for props to vines; and hoops for barrels are alſo made of them. The large wood, if ſound, is ſold to ſhoemakers for wooden heels, and to turners for many kinds of light ware.

The poplar may be propagated either from layers or cuttings, which will readily take root; and alſo from the ſuckers, which the white ſort, commonly called the abele tree, ſends up in great plenty from its roots. The beſt time for tranſplanting theſe ſuckers, is in October, when their leaves begin to decay. Theſe may be planted in a nurſery for two or three years, to get ſtrength, before they are planted out where they are to remain: but for planting of cuttings, the beſt time is the latter end of February, when truncheons two or three feet long, ſharpened at their lower ends, may be thruſt about a foot and a half deep into the ground, where, if the ſoil be moiſt, they will readily take root, and arrive at a conſiderable bulk in a few years.

The black poplar is not ſo apt to take root from large truncheons: wherefore the better way with this is, to plant cuttings of it about a foot and a half long, and about a foot deep in the ground. Theſe will take root freely, and may afterwards be tranſplanted where they are to remain. This ſort will grow upon almoſt any ſoil, but will thrive beſt in moiſt places. It therefore flouriſhes remarkably on the ſides of rivers, ponds, canals, &c.

Mr. Miller ſays, he has planted cuttings of this tree, which in four years have been bigger in the trunk than a man's thigh, and near twenty feet in height, and this upon a very indifferent ſoil: but in a very moiſt ſoil, it is common for theſe trees to ſhoot eight or ten feet in a ſeaſon: ſo that where a perſon wants to make a ſhelter in a few years, there is ſcarce any tree ſo proper for the purpoſe as this is. The Memoirs of the Berne Society caution us not to plant poplars too much within a meadow, leſt their roots ſhould damage the graſs; to which they add, that their leaves are excellent food for ſheep.

It is rightly obſerved, by the experienced gardener before mentioned, that a conſiderable advantage may be made by planting theſe trees upon moiſt boggy ſoils, where few others will thrive. There are in England many ſuch places, which do not now bring in much money to their owners; whereas, if they were planted with poplars, they would, in a few years, over purchaſe the ground, clear of all expences. But it is a too common opinion, that nothing but corn is worth cultivating in England; or, if timber be planted, it muſt be oak, aſh, or elm; and if the land be not proper for either of theſe, it is deemed of little value: whereas, if the nature of the ſoil was examined, and proper plants were adapted to it, great profit might be made by ſeveral large tracts of land, which at this time lie neglected.

The wood of the poplar, and eſpecially that of the abele, which is much eſteemed on account of its great whiteneſs, is very good for laying floors, where it will laſt many years; but being of a ſoft contexture, it is very ſubject to take the impreſſion of nails, &c. which renders it leſs fit for this purpoſe. It is alſo very proper for wainſcoting rooms, becauſe it is leſs apt to ſwell or ſhrink, than moſt other ſorts of wood. For turnery ware, none is equal to this for its exceeding whiteneſs, and great lightneſs; wherefore trays, bowls, and many other utenſils are made of it; and the bellows makers prefer it for their uſe; as do alſo ſhoemakers, not only for heels, but alſo for the ſoles of ſhoes. It is likewiſe very fit to make light carts; the poles of it are very proper to ſupport vines, hops, &c. and its loppings afford good fuel, which is a valuable article in many countries.

The birch tree, which will grow on almoſt any ſoil, be it ever ſo barren for other plants, thrives equally well in moiſt ſpringy land, or in dry gravel or ſand, though the ſurface be but very ſhallow. It has ſucceeded ſo well, even upon ground which produced nothing but moſs, that it has been fit to cut in ten years after planting, when an acre of theſe trees has ſold for near ten pounds, ſtanding, and the after-produce has been conſiderably increaſed.

The beſt way to cultivate this three, is to take young plants of it from the woods, where they naturally grow, and are generally found in great plenty: but in places where no young plants can be procured, they may be raiſed from ſeeds, which ſhould be carefully gathered in the autumn, as ſoon as the ſcales under which they are lodged begin to open; otherwiſe they will ſoon fall out and be loſt. Theſe ſeeds are ſmall, and therefore ſhould not be buried deep in the ground. The autumn is the beſt ſeaſon for ſowing them; and if this be done in a ſhady ſituation, the plants will thrive better than when they are expoſed to the full ſun.

When young plants of birch are taken from out of woods, in order to be tranſplanted, they ſhould be carefully dug up, ſo as not to injure their roots. The ground in which they are to be ſet will not need any other preparation, than looſening it with a ſpade or mattock, in the places where the plants are to ſtand, making holes to receive their roots, and cloſing the earth hard to them after they are ſet. If the plants are young, and have not much top, they will not require pruning: but if they have buſhy heads at the time of their being tranſplanted, thoſe heads ſhould be trimmed, or ſhortened, to prevent their being ſhaken, and diſplaced by the wind. After the plants have taken root the only care requiſite is, to cut down the great weeds, which would over-hang them. This may be done with a ſickle, ſo as not to cut or injure the young trees: nor need it be repeated oftener than twice in a ſummer during the two firſt years; for the plants will afterwards be ſtrong enough to keep down the weeds, or at leaſt to be out of danger from them.

Theſe young birches may be tranſplanted at any time between the middle of October and the middle of March, when the ground is not frozen: but autumn is the beſt ſeaſon for planting them in dry lands, and ſpring for ſetting them in a moiſt ſoil. The diſtance at which they ſhould be planted, is ſix feet ſquare, that they may ſoon cover the ground, and by ſtanding cloſe draw up each other; for they will not thrive ſo well, if they are not pretty cloſe, in ſituations where they are much expoſed.

If the plants take kindly to the ground, they will be fit to cut in about ten years; and after that they may be cut every ſeventh or eighth year, if they are deſigned for broom makers only; but when they are intended for hoops, for which they are excellent, they ſhould not be cut oftener than every twelfth year. The larger trees are often bought for turners ware; and this wood is alſo uſed for making ox-yokes, and other inſtruments of huſbandry. In ſome of the northern parts of Europe, it is much eſteemed for making carriages and wheels, being hard and durable. In France, it is generally uſed for making wooden ſhoes. It makes very good fuel; and the author of a diſſertation in the Memoirs of the Berne Society ſays, that its aſhes are an excellent remedy for an eryſipelas, or St. Anthony's fire: but he does not tell us how they are to be uſed.

In ſome places, theſe trees are tapped in the ſpring, and the ſap is drawn out to make birch wine, which has been recommended for the ſtone and gravel; as is alſo the ſap unfermented. The bark of the birch-tree is almoſt incorruptible. Many houſes in Sweden are covered with it, and it laſts many years. It frequently happens, that the wood of this tree is entirely rotten, and the bark perfectly ſound and good.

To make a plantation of birch in places where the young plants can be eaſily procured, will not coſt above forty ſhillings an acre, and the after expence of cleaning will not exceed twenty ſhillings more; ſo that the whole will not be more than three pounds: and if the land be of ſo little value as not to be worth attempting to fit it for any other growth, the proprietor cannot make a better uſe of his money; for when the wood is cut, it will repay the diſburſement with intereſt, and a perpetual ſtock will remain upon the ground. Mr. Miller ſays he has ſeen ſeveral of theſe plantations made upon land which would not let for one ſhilling an acre, and which has afterwards produced from ten to twelve pounds an acre, clear of the expence of cutting, every twelfth year.

The aſh, of which our common ſort is the moſt hardy, moſt laſting, and fineſt grained, and conſequently the moſt valuable, will likewiſe thrive in low and moiſt places, as well as on high and dry grounds.

The ſeeds of this tree ſown as ſoon as they are ripe, will come up the following ſpring; but if they are not ſown till the ſpring, they will remain a year in the ground, which, in the mean time, ſhould be kept clear of weeds, and not diſturbed, for fear of turning out the ſeeds, or burying them too deep. When the plants are come up, they muſt be carefully weeded during the enſuing ſummer, and if they make good progreſs in the ſeed-bed, they will be fit to tranſplant by the autumn; the moſt proper time for which is, when their leaves begin to fall. Great care ſhould be taken not to break or tear off their roots in tranſplanting them; for which reaſon it is much better to dig them up with a ſpade, than to draw them out by hand, as is commonly practiſed, in order to have the largeſt only, and leave the others for a ſecond year's growth before they are removed. But the purpoſe of thus ſeparating them is very eaſily anſwered, without the danger of injuring their roots, by digging up all, and then planting them in different rows, according to their ſizes. The younger they are planted out, the larger they will grow: and it is of conſequence that the ſoil from whence they are taken, or in which they are raiſed, be not better than that in which they are to remain: for when any plants are raiſed in good land, and afterwards tranſplanted into worſe, they very ſeldom thrive. The beſt way of all is therefore to ſow them on the ſpot where they are moſt wanted: for they may eaſily be thinned afterwards; and it will be found that thoſe which are left ſtanding will grow to a larger ſize than ſuch as are tranſplanted.

People who live in the neighbourhood of aſh trees, may eaſily ſupply themſelves with plenty of ſelf-ſown plants, if cattle have not been ſuffered to graze on the land; for if they can come at them, they will eat them up as faſt as they appear. If, indeed, the ſeeds of the aſh happen to fall under hedges, where they are protected by buſhes, the plants will come up and thrive; and, through the ignorance and inattention of ſome huſbandmen, they are too frequently permitted to grow there till they have deſtroyed the hedge itſelf; for there is ſcarce any tree ſo hurtful to all kinds of vegetables, as the aſh, which robs every plant of the nouriſhment that is within the reach of its roots. This tree ſhould, therefore, never be ſuffered in hedge-rows; nor ſhould it ever be permitted to grow near paſture grounds; for if cows eat of the leaves or ſhoots of the aſh, all the butter that is made of their milk will be exceſſively rank. Such is the quality of the butter which is made about Guildford, Godalmin, and ſome other parts of Surry, where there are aſh trees about all the paſtures. In the good dairy countries, not an aſh tree is ſuffered to grow.

This timber is of excellent ſervice to wheel-wrights and cart-wrights, for ploughs, axle-trees, wheel-rings, harrows, &c. It is alſo uſed by cabinet-makers, when it is ſound and knotty; and likewiſe for oars, blocks for pullies, and many other purpoſes.

The beſt ſeaſon for felling theſe trees, is from November to February; for if it be done either too early in autumn, or too late in the ſpring, their timber will be apt to become worm-eaten: but for lopping of pollards, the ſpring is moſt eligible for all ſoft woods.

In countries where there is great plenty of rough flat ſtones, the fences which bound an eſtate, or farm, are frequently made with them. It is a pretty common practice in Devonſhire and Cornwall, where they build as it were two walls with theſe ſtones laid one upon another, firſt two, and then one between; and as the walls riſe, they fill the intermediate ſpace with earth, beat the ſtones in flat to the ſides, which makes them lie very firm, and ſo proceed till the whole is brought to the intended height. They then plant upon theſe walls quick hedges, and even timber trees, which thrive exceedingly; and they eſteem theſe fences the beſt ſecurity that can be to their ground and cattle. However, if theſe ſtones are laid rough and dry, they cannot but be diſagreeable to the eye, and muſt certainly require frequent repairs, becauſe they will frequently be forced out of their places, or beaten down by cattle.

To prevent this, let ſuch walls be built in the bottom of a ditch, made wide enough for the purpoſe, and ſloped down on each ſide. The deformity will then be hid: and as the cattle cannot ſtand facing the wall, ſo as to attempt to leap over it, the ſtones of which it is compoſed will be the leſs liable to be beaten down. The earth taken out of the ditch may be ſpread on the adjacent ground, and its ſides may be planted with ſuch trees, or under-wood, as beſt ſuit the ſoil. If a ſpace of ſeveral feet, proportioned to the demand which there may be for timber, is left on the inſide of the fence, it will be attended with every advantage ariſing from a ſupply of that neceſſary commodity, without prejudice to the arable or more valuable paſture.

Another very ſtrong and durable fence may be formed thus, in graſſy places. Dig pieces of turf, four or five inches thick, the breadth of your ſpade, and about a foot long. Lay theſe turfs even, by a line, on one ſide, with the graſs outward, at the diſtance of ten or twelve inches within the mark at which the ditch, afterwards to be dug in the ſolid ground, is to begin. Then lay in the ſame manner, but with their graſs ſides turned out the contrary way, another row of turfs, at ſuch diſtance as to make a breadth of foundation proportioned to the intended height of the bank. The reaſon for placing theſe turfs thus much within what is to be the edge of the ſolid ground dug away on each ſide, is to prevent the bank from falling in, if the ground underneath it ſhould be any way defective. A ditch, of what breadth or depth you pleaſe, may then be dug; or the ground may be lowered on each ſide with a ſlope; in which laſt caſe there will be no loſs of paſture by the fence, becauſe it may be ſowed with hay ſeeds, and will bear graſs on both ſides. Part of the earth taken out of the ditches or ſlopes, will fill the chaſm between the rows of the turf, and the reſt may be ſcattered over the adjacent ground. Three, four, or more layers of turf may be thus placed one upon another, and the interval between them filled up as before, till the bank is brought to the deſired height; only obſerving to give each ſide of it a ſmall ſlope, for greater ſtrength. The top of this bank ſhould be about two feet and a half wide, and the whole of it ſhould be filled up with earth to a level with the turfs, excepting a little hollow in the middle, to retain ſome rain. Quick ſets ſhould then be planted along this top, and they will ſoon form an admirable hedge. By this means, a bank four feet high, and a ſlope only two feet deep, will make, beſides the hedge, a fence ſix feet high, through which no cattle will be able to force their way: for the roots of the graſs will bind the turfs ſo together, that, in one year's time, it will become entirely ſolid, not a joining will appear, nor a turf can be got out; and it will be yet much ſtronger, when the roots of the quick ſhall have ſhot out among it. The only precautions neceſſary to be obſerved here, are, firſt, not to make this bank when the ground is too dry; becauſe, if a great deal of wet ſhould ſuddenly follow, it will ſwell the earth ſo much, as, perhaps, to endanger the falling of ſome of the outſide, which, however, is eaſily remedied if it ſhould happen; and, ſecondly, if the ſlope be ſuch as ſheep can climb up, to ſecure the young quicks, at the time of planting them, by a ſmall dead hedge, either on or near the top, on both ſides. If any of the quicks ſhould die, which they will hardly be more apt to do here than elſewhere, unleſs, perhaps, in extreme dry ſeaſons, they may be renewed, as in other places, by planting new ones, or by layers from thoſe which remain.

A fence like this will do even for a park; eſpecially if poſts and rails, about two feet high, are placed a little ſloping over the ſide of the bank, on or near its top: for no deer will be able to jump over this, nor can they creep through it.

This is one of the beſt fences to afford ſhelter for cattle; and if the quick on the bank is kept well clipped, it will form a kind of green wall, pleaſing to the eye.

When the bounding fence is only to guard againſt accidents from without, it may be made in the ha-ha manner; only taking care that the earth be ſo well rammed down at the back of the wall, as that the ſtones may be properly ſupported, and bear equally.

The ingenious author of the Eſſays on Huſbandry recommends the horn-beam plant, as one of the beſt yet known for making fences, according to the method uſed in Germany, where ſuch fences are common.

“ When the German huſbandman, ſays he, erects a fence of this nature, he throws up a parapet of earth, with a ditch on each ſide, and plants his horn-beam ſets in ſuch a manner, as that every two plants may be brought to interſect each other, in the form of St. Andrew's croſs. In that part where the two plants croſs each other, he gently ſcrapes off the bark, and binds them with ſtraw thwart-wiſe. Here the two plants conſolidate in a kind of indiſſoluble knot, and puſh from thence horizontal ſlanting ſhoots, which form a ſort of living paliſado, or *chevaux de friſe*; ſo that ſuch a protection may be called a rural fortification. Theſe hedges, being pruned annually, and with deſcretion, will, in a few years, render the fence impenetrable in every part. *Eſſays on Huſbandry, eſſay* I. *page* 14.

FENNEL, the name of a well known plant cultivated in kitchen gardens. It is propagated by the ſeeds, which ripen in autumn, and ſhould be ſown ſoon after. They will come up in the ſpring, and require no other care than to keep them clean from weeds. This plant will grow in any ſoil or ſituation.

FENNY, mooriſh, marſhy, boggy.

FENNY-LAND. *See the articles* BOG, MARSH, *and* MOOR.

FERMENT, the ſubſtance uſed to raiſe a fermentation, as yeaſt, wine, lees, leven, &c.

FERMENTATION, an inteſtine motion excited in vegetable ſubſtances, whereby the coheſion of their parts are deſtroyed, and may eaſily be ſeparated from one another.

In every fermenting liquor, an inteſtine motion is generated in all its parts. It is called inteſtine, becauſe it is excited by the internal principles contained in the vegetable juices; for vegetable juices or infuſions made in water, however bright at firſt, and apparently homogeneous, on being kept in a moderately warm place, in veſſels not cloſely ſtopped, become turbid, conceive an inteſtine motion, emit numerous air-bubbles, and diſcharge a pungent vapour of extreme ſubtilty.

All bodies which may be ſo changed by this inteſtine motion, as to produce wine, are ſaid to be fermentable: and as this was never found to happen in any other than vegetable ſubſtances, vegetables alone are ſaid to be fermentable.

The fermentable claſs of vegetables are extremely various, and might be diſtributed into as many claſſes, as they require different methods of fermenting. We ſhall, however, mention them no further than they relate to the pleaſure and profit of the huſbandman.

The firſt claſs of fermentable ſubſtances includes all the pulpous ſummer fruits, which, when ripe, abound with a tartiſh ſweet juice; ſuch as grapes, apples, pears, elder-berries, gooſberries, raſberries, currants, cherries, plums, and all other ſummer fruits, provided they be kept free from a tendency to putrefaction.

The ſecond claſs contains the freſh expreſſed and native juice of plants, provided they be of a tartiſh and ſweetiſh taſte; ſuch as the juice of the ſugar-cane, of liquorice, and other ſimilar plants. To this claſs may be added all the juices which diſtil from certain trees when wounded, eſpecially in the ſpring; as the birch, the plane or maple, the vine, the walnut-tree, &c. The maple has this remarkable property, both in the ſmall kind and in the great, which is called the ſycamore, that, being tapped, it will bleed freely in the winter, and its juice will flow very plentifully even after a hard froſt. All theſe juices generally run into a ſpontaneous fermentation.

The third claſs compriſes thoſe vegetable juices which are formed and inſpiſſated by nature into a certain ſaponaceous ſubſtance, conſiſting of ſaline and oily particles; ſuch as honey, manna, and all other juices which are not gummy or unctuous.

The fourth claſs comprehends all thoſe ſeeds which, when ripe and dry, may be ground into a fine meal, without their forming an unctuous paſte; ſuch are barley, wheat, oats, rye, &c.

Certain phyſical circumſtances are requiſite to render theſe different ſubſtances fit for fermentation; namely, firſt, a perfect degree of maturity ſuitable to each kind. All ſeeds and fruits which are ſo perfect, as, when ſown in fertile ground at a proper ſeaſon, and in a proper climate, to produce a plant of their own ſpecies, are fit for this operation. Another requiſite to fermentation is a moderate proportion of oil: for though fat ſubjects are more apt to grow rancid, than to ferment, yet if they are entirely deprived of their oils, they are hereby alſo rendered unfit for fermentation. Thus, bruiſed almonds, which are rich in oil, will ſcarcely ferment; but they may be ſo far freed from their oil by art, as to be made fitter for this purpoſe. Solubility in water is a third and principal requiſite in fermentable ſubjects.

The methods of preparing each fermentable ſubſtance for fermentation will be given under the articles wine, cyder, and beer.

The juices of ſummer fruits are, of their own nature, greatly diſpoſed to ferment, ſo as immediately to begin this operation, without the addition of any other ferment. Other liquors may, however, ſtand in need of the help of other ferments, to begin this inteſtine motion, which, under proper conduct, proceeds afterwards of itſelf. The chief of theſe ferments is the recent flowers, commonly called yeaſt, thrown up to the top of beer in the act of fermentation: for if this rarified frothy matter be mixed with other fermentable liquors, it greatly promotes their fermentation. The ſame matter become heavier, and ſunk to the bottom, provided it be not too ſtale, ſtill retains the ſame vigour, though in a leſs degree than in its former ſtate. The remains of former fermenting liquors ſticking to the ſides of caſks, have the ſame effect: for caſks thoroughly penetrated by the ſubtilty of wines which they formerly contained, are extremely apt to raiſe a violent and quick fermentation in the freſh liquors put into them. Acid paſte of flour fermented, or bakers leaven, may all be employed for the ſame purpoſe: for though meal may be preſerved freſh and ſweet during years, if it be kept in a dry ſtate, and perfectly free from inſects; yet if it be wrought with water into a ſoft cloſe paſte, and lightly covered in a warm place, it will ſoon begin to heave, be all over full of cavities, change its ſmell, colour, and tenacity, prove acid both to taſte and ſmell; and thus become that proper ferment from which the whole of this operation firſt took its name. When thus prepared, if part of it be mixed with other paſte, freſh and not yet fermented, it will cauſe this to ferment much ſooner, and more ſtrongly, than it would otherwiſe do. Hence, we need not be ſolicitous about a firſt ferment, becauſe nature affords it ſpontaneouſly every where. The great promoters of all the ſtages of this proceſs are warmth, a moderate admiſſion of air, and the addition of actually fermenting matter.

If we take large glaſs bodies, place them upright where they may be kept in an equal heat, and then fill each of them three quarters full with a crude fermentable liquor well prepared for the operation, the orifice being ſlightly covered with a cloth, and a heat kept up to above ſixty degrees, it will be pleaſing to obſerve the ſeveral degrees of fermentation.

The maſs, at firſt reſting, and poſſeſſing a certain ſpace for the veſſel, gradually begins to ſwell, rarify, and conceive an inteſtine motion through its whole body, acting upwards, downwards, and ſideways, in ſtrange circumvolutions, without ceaſing, though with a different force. In the mean time bubbles are every moment formed in every part of the maſs, and conſtantly endeavour to riſe up to the ſurface, where they burſt with a hiſſing noiſe, or often break in the mid-way. Hence the whole maſs froths, diſcharging with an audible ebullition a certain tartiſh ſpirit, which proves acrimonious to the noſe, ſurpriſingly elaſtic, and capable of burſting almoſt any veſſel by its great expanſive force. If a large veſſel full of fermenting muſt, in the height of its action, ſhould diſcharge this condenſed ſpirit through a ſmall orifice, and a ſtrong healthy man ſhould draw in at his noſtrils the vapour ſo iſſuing, he would inſtantly fall down dead; or if he received but little thereof, he would become apoplectic, and remain an idiot his whole life. When this vapour is confined and accumulated in cloſe rooms, it will extinguiſh fire, and ſuffocate animals. Its producing the firſt of theſe effects is a ſign that it is collected in ſufficient quantity to cauſe the other. While candles continue to burn, we need not be afraid that this wild gaſs, as Helmont calls it, will be dangerous to life. It is on account of this ſpirit, that people are obliged to air wine-vaults, where wines are fermenting in the vintage ſeaſon, by ſetting open the windows, lighting fires, and letting in the wind.

In the progreſs of fermentation, the groſſer parts of the maſs begin to riſe to the top, and ſeparate there from the other liquor below, ſo as to collect into a ſpungy cruſt, which exactly covers the liquor underneath, and keeps in the more active parts thereof, in ſuch manner as to prevent their being exhaled and diſſipated before they have performed their effect. Now, it is curious to obſerve how great the agitation conſtantly is every where, even in the ſmalleſt part of the fluid matter, below this cruſt. A greater attrition can ſcarcely be conceived, than that which is here made with the utmoſt rapidity among all the particles. The cruſt being ſucceſſively broke, and raiſed up with a conſiderable noiſe, upon the returns of the exploſions, the exhalations eſcape, while the cruſt, preſently falling together, cloſes again, and prevents the active principles from exhaling otherwiſe. Thus, the formation and continuance of the cruſt is greatly aſſiſting in the due performance of fermentation.

As ſoon as all the groſs parts of the mixture are thus collected at the top, ſome leſs rarified particles of the lower part of the cruſt, being no longer ſuſtained by the light bubbles which cauſed them to aſcend, begin to ſink through the fluid, and are agitated upwards and downwards by bubbles in and about themſelves, by means of which they are again raiſed to the top, from whence, upon the breaking of the bubbles there, they again fall downward; and when they have done this ſeveral times, they at length remain quiet at the bottom. After this, new little maſſes do the ſame; and after ſome continuance thereof, it frequently happens that all the upper cruſt, then grown heavier, or leſs rarified, on account of the air diſcharged, ſinks of a ſudden downward, but ſoon after rolls upward, almoſt entire, with ſuch a force as would ſeem incredible, if it were not ſeen. When the upper cruſt is thus gradually conſumed and fallen to the bottom, the fermentation ceaſes, though the ſame degree of heat be continued; and the liquor, then floating over the fæces which remain at the bottom, becomes tranſparent.

So long as the cruſt remains at top, it is called the flowers of the fermenting liquor, and is the moſt proper and immediate ferment. What falls to the bottom is called lees.

The time requiſite for the perfect completing of fermentation can hardly be determined, becauſe it is different in different liquors, and depends much on the ſeaſon of the year, and heat of the weather. The juice of the palm tree finiſhes its fermentation in a few hours in Africa; and this operation is likewiſe very ſoon ended in Aſia; but in the northern countries, it proceeds ſlower. In the heat of ſummer, it proceeds quick; but in winter more languidly. It is, however, eaſy to know when the fermentation is finiſhed, viz. when the whole ſeries of the phenomena above deſcribed, has ſucceſſively appeared, and is at length ſpontaneouſly gone off. Then the veſſel ſhould be immediately ſtopped down; and the liquor ſhould be kept for ſome time on its lees, a great part of which will be aſſumed and aſſimilated by the liquor, which will thereby become ſtronger and richer in ſpirit than it was before. If the veſſel is not ſtopped down, the ſpirit produced in the fermented liquor will ſoon exhale, and leave behind only a vapid uſeleſs fluid; but if the liquor is kept quiet in a cloſe veſſel, it will gradually become more pure and ſpirituous. The ſweeter and richer the juice is, the longer does the fermentation continue, and the ſtronger and more ſpirituous is the wine or other liquor.

The diſtinguiſhing marks of a vinous liquor are as follow: It has the faculty of inebriating, or of altering the actions of the ſpirits and animal functions, by refreſhing, animating, and exhilirating the drinker: after this, it raiſes the latent paſſions (*in vino veritas*;) and finally, it deſtroys the external and internal ſenſes and voluntary motions, and thus brings on palſy, ſleep, or at laſt death.

Fermentation alſo changes the relaxing, ſaponaceous, cooling, and generally purging virtues of vegetable juices, into ſuch as are ſtrengthening, coagulating, and healing. Thus, the freſh infuſion of malt, before fermentation; ſolution of ſugar or honey in water; the freſh expreſſed juices of ripe ſummer fruits, &c. when plentifully drank, prove flatulent, purgative, weakening, and cooling; but when properly fermented into beer, mead, or wine, they have quite contrary qualities, which they had not before. It is a very ſingular property of fermentation, that it produces from fermented liquor a ſpirit which is convertible into a liquid flame, and yet may be perfectly mixed with water.

The things, which promote fermentation, or tend to the better performance thereof, are free admiſſion and emiſſion of air, a warmth between fifty and ſeventy degrees, and the addition of a proper ferment.

It is found that when ſweet juices are boiled down to a thick conſiſtence, they not only do not ferment in that ſtate, but are not eaſily brought to ferment, when diluted with as much water as they had loſt in the evaporation. Juices and decoctions in general, which have ſuffered much fire, however ſweet, are little diſpoſed to ferment.

One of the chief checks given to fermentation, is the fumes of burning ſulphur, received in a large quantity at ſeveral times, and ſhut up along with the air remaining on the top of the fermenting liquor. If the whole caſk be penetrated and filled with the fumes of burning ſulphur before the fermenting liquor is put in, and if the empty part on the top of the liquor be afterwards well filled with the ſame, and the veſſel cautiouſly bunged down, the fermentation will certainly be ſtopped: and if, after ſome time, it ſhould begin again, from the prevalency of its own cauſe, it may again be ſuppreſſed by the ſame fumes. The ſame end is alſo obtained by mixing with the fermenting matter a large quantity of any powerful acid, ſuch as acid ſpirits of vitriol, or nitre; though theſe at the ſame time prove hurtful to the fermenting liquor. Alkaline ſalts likewiſe, if added in a large quantity to fermenting liquors, immediately excite an increaſe of effervefcence, which preſently ceaſing, all farther fermentation is ſtopped. But here too fermenting liquor is ſpoiled, ſo that it can ſcarcely be brought again to ferment, though it may to putrify. In the ſame manner, thoſe things which deſtroy acidity by drinking it up, hinder fermention. Thus, chalk, teſtaceous and calcarious ſubſtances, iron, lead, tin, have this effect. Stopping up the containing veſſels ſo cloſe, that nothing can eſcape or enter, will ſtop the fermentation, provided the veſſel be ſo ſtrong as not to be burſt by the force of the confined liquor. This is manifeſt in new malt liquors, which, when included in ſtrong bottles, well corked, effervefce violently upon receiving the air. The extracting of the elaſtic air ſtops fermentation: too great heat rather diſſipates and throws off the active principles of fermentation, than excites and promotes them; and, laſtly, too great a degree of cold likewiſe ſtops fermentation.

FERN, the name of one of the worſt of weeds, and one of the moſt difficult to deſtroy where it has a deep ſoil to root in. Mr. Mortimer ſays, he has ſeen its root eight or ten feet deep in ſome grounds; and adds, that the beſt way of killing it is by cutting it often while it is in graſs; that the moſt proper ſeaſons for this purpoſe are the ſpring, midſummer, and Michaelmas: that is, when the circulation of the ſap is ſtrongeſt. Moſt of the roots being then cut aſunder, and thereby deprived of the channels through which nature intended to convey the ſap, will bleed to death, or, if it ſtagnates in them, they will ſoon rot. The fern itſelf, if cut when full of ſap, and left to rot upon the ground, will greatly improve the ſoil, and mellow it ſo as to prevent its binding: or, if it be burnt when ſo cut, it will yield a much greater quantity of ſalt, than any other vegetable. If it be ploughed up, plentiful dunging of the land, and ſprinkling it well with aſhes, have been found to kill this weed: but the moſt certain cure for it is urine. In ſeveral parts of the North, where they keep their fern under, and deſtroy a great deal of it by mowing it frequently when green, they alſo find that rolling of it is of great ſervice; and when they burn it, the poor people make the aſhes of it up into balls, with a little water, dry them in the ſun, and uſe them in waſhing their linnen, for which they think them nearly as good as ſoap. Often treading down theſe plants, and feeding Scotch ſheep on them, is ſaid to be almoſt an infallible way of killing the fern.

Trees planted among fern will thrive very much, though it be on a hot gravel; the fern ſhading their roots, and keeping them moiſt and cool.

FERTILE, fruitful, abundant, plenteous.

FERTILITY, fecundity, abundance, fruitfulneſs.

FESCUE, the name of a genus of graſs, of which there are ſeveral ſpecies; as the flote-feſcue, the ſheep's feſcue, &c. *See the articles* FLOTE-FESCUE, SHEEP'S FESCUE, &c.

FESTING-PENNY, earneſt given to ſervants when hired.

FETLOCK, the tuft of hair that grows behind the paſtern-joint of many horſes; thoſe of low ſize have ſcarce any ſuch tuft.

FETTERS, chains for the feet.

FEVER, a diſeaſe that frequently attacks ſeveral ſorts of cattle, particularly horſes.

The ſymptoms which denote the horſe to be afflicted with a fever, are great reſtleſſneſs, the creature ranging from one end of the rack to the other; his flanks heat; his eyes are red and inflamed; his tongue parched and dry; his breath hot, and of a ſtrong ſmell; he loſes his appetite, and nibbles his hay, but without chewing it, and is frequently ſmelling to the ground; the whole body is hotter than ordinary (though not parched, as in ſome inflammatory diſorders) he dungs often, little at a time, uſually hard, and in ſmall bits; he ſometimes ſtales with difficulty, and his urine is high coloured; he ſeems to thirſt, but drinks little at a time and often; his pulſe beat full and hard, to fifty ſtrokes and upwards in a minute.

The firſt intention of cure is bleeding, to the quantity of two or three quarts, if the horſe is ſtrong and in good condition; then give him a pint of the following drink four times a day; or an ounce of nitre mixed up into a ball with honey, may be given thrice a day, inſtead of the drink, and waſhed down with three four horns of any ſmall liquor.

> Take of baum, ſage, and chamomile flowers, each a handful; liquorice root ſliced, half an ounce; ſalt prunel, or nitre, three ounces: infuſe the whole in two quarts of boiling water, and when cold ſtrain it off; then ſqueeze into it the juice of two or three lemons, ſweeten it with honey.

As the chief ingredient to be depended upon in the drink is the nitre, it may, perhaps, be as well given in water alone; but as a horſe's ſtomach is ſoon palled, and he requires palatable medicines, the other ingredients may in that reſpect have their uſe. Soleyſel for this purpoſe adviſes two ounces of ſalt of tartar, and one of ſal armoniac to be diſſolved in two quarts of water, and mixed with a pail of common water, adding a handful of bran or barley-flower to qualify the unpleaſant taſte: this may be given every day, and is an uſeful medicine.

The following alſo may be given for this purpoſe:

> Take Ruſſia pearl aſhes one ounce, diſtilled vinegar one pint, ſpring water two pints, honey four ounces; give a pint three or four times a day.

This neutral mixture, and the nitre drink above, may be taken alternately; they are both efficacious remedies, and in ſome caſes may properly enough be joined with the camphor drink.

His diet ſhould be ſcalded bran, given in ſmall quantities; which, if he refuſes, let him have dry bran ſprinkled with water: put a handful of picked hay into the rack, which a horſe will often eat, when he will touch nothing elſe: his water need not be much warmed, but ſhould be given often, and in ſmall quantities: his cloathing ſhould be moderate, too much heat and weight on a horſe being improper in a fever; which ſcarce ever goes off in critical ſweats (as thoſe in the human body terminate) but by ſtrong perſpiration.

If, in a day or two he begins to eat his bran, and pick a little hay, this method with good nurſing will anſwer; but if he refuſes to feed, more blood ſhould be taken away, and the drinks continued: to which may be added two or three drams of ſaffron, avoiding at this time all hotter medicines: the following clyſter ſhould be given, which may be repeated every day, eſpecially if his dung is knotty and dry.

> Take two handfuls of marſhmallows, and one of chamomile flowers; fennel ſeed an ounce; boil in three quarts of water to two, ſtrain off, and add four ounces of treacle, and a pint of linſeed oil, or any common oil.

Two quarts of water-gruel, fath broth, or pot-liquor, with the treacle and oil, will anſwer this purpoſe; to which may be added a handful of ſalt. Theſe ſort of clyſters are properer than thoſe with purging ingredients.

The following opening drink is very effectual in theſe fevers, and may be given every other day, when the clyſters ſhould be omitted; but the nitre-balls or drink may be continued, except on thoſe days theſe are taken.

> Take of cream of tartar and Glauber's ſalts, each four ounces; diſſolve in barley-water, or any other liquor: an ounce or two of lenitive electuary may be added, or a dram or two of powder of jallap, to quicken the operation in ſome horſes.

Four ounces of Glauber ſalts or cream of tartar, with the ſame quantity of lenitive electuary, may be given for the ſame purpoſe, if the former ſhould not open the body ſufficiently.

In four or five days the horſe generally begins to pick his hay, and has a ſeeming reliſh to food: though his flanks will heave pretty much for a fortnight; yet the temper of his body, and return of appetite, ſhew that nothing more is requiſite to complete his recovery, than walking him abroad in the air, and allowing plenty of clean litter to reſt him in the ſtable.

This method of treating a fever is ſimple, according to the laws of nature; and is confirmed by long experience, to be infinitely preferable to the hot method.

The intention here is to leſſen the quantity of blood, promote the ſecretions of urine and perſpiration, and cool and dilute the fluids in general.

How far vinous cordials, ſtrong beer drinks loaded with fiery powders, and ſuch methods are likely to anſwer theſe purpoſes, is ſubmitted to the judicious obſerver; as alſo, whether adopting the cool one in its ſtead is not as real an improvement in farriery as phyſic.

There is another ſort of fever that horſes are ſubject to, of a more complicate and irregular nature than the former; which, if not properly treated, often proves fatal.

The ſigns are a ſlow fever with languiſhing, and great depreſſions; the horſe is ſometimes inwardly hot, and outwardly cold; at other times hot all over, but not to any extreme; his eyes look moiſt and languid; he has a continual moiſture in his mouth, which is the reaſon he ſeldom cares to drink, and when he does, it is but little at a time. He feeds but little, and leaves off as ſoon as he has eat a mouthful or two; he moves his jaws in a feeble looſe manner, with an unpleaſant grating of his teeth; his body is commonly open; his dung ſoft and moiſt, but ſeldom greaſy; his ſtaling is often irregular, ſometimes little, at other times profuſe, ſeldom high-coloured, but rather pale, with little or no ſediment.

When a horſe's appetite declines daily, till he refuſes all meat, it is a bad ſign. When the fever doth not diminiſh, or keep at a ſtand, but increaſes, the caſe is then dangerous. But when it ſenſibly abates, and his mouth grows drier, the grating of his teeth ceaſes, his appetite mends, and he takes to lay down (which perhaps he has not done for a fortnight) theſe are promiſing ſigns. A horſe in theſe fevers always runs at the noſe, but not the kindly white diſcharge, as in the breaking of a cold, but of a reddiſh or greeniſh duſky colour, and of a conſiſtence like glue, and ſticks like turpentine to the hair on the inſide of his noſtrils. If this turns to a gleet of clear thin water, the horſe's hide keeps open, and he mends in his appetite; theſe are certain ſigns of recovery.

The various and irregular ſymptoms that attend this ſlow fever, require great ſkill to direct the cure, and more knowledge of the ſymptoms of horſes diſeaſes, than the generality of gentlemen are acquainted with. The experienced farrier ſhould therefore be conſulted and attended to, in regard to the ſymptoms; but very ſeldom as to the application of the remedy, which is generally above their comprehenſion; though it may be readily ſelected, by duly attending to the obſervations here inculcated.

Firſt then, a moderate quantity of blood, not exceeding three pints, may be taken away, and repeated in proportion to his ſtrength, fullneſs, inward ſoreneſs, cough, or any tendency to inflammation. After this, the fever drink may be given, with the addition of an ounce of ſnake-root, and three drams of ſaffron and camphor, diſſolved firſt in a little ſpirit of wine; the quantity of the nitre may be leſſened, and theſe increaſed, as the ſymptoms indicate.

The diet ſhould be regular; no oats given, but ſcalded, or raw bran ſprinkled; the beſt flavoured hay ſhould be given by handfuls, and often by hand, as the horſe ſometimes cannot lift up his head to the rack.

As drinking is ſo abſolutely neceſſary to dilute the blood, if the horſe refuſes to drink freely of warm water or gruel, he muſt be indulged with having the chill only taken off, by ſtanding in the ſtable; nor will any inconvenience enſue, but oftener an advantage; for the nauſeous warmth of water, forced on horſes for a time, palls their ſtomachs, and takes away their appetites, which the cold water generally reſtores.

Should the fever after this treatment increaſe, the horſe feed little, ſtale often, his urine being thin and pale, and his dung ſometimes looſe, and at other times hard, ſhould the moiſture in his mouth continue, his ſkin being ſometimes dry, and at others moiſt, with his coat looking ſtaring, and ſurfeited. Upon theſe irregular ſymptoms, which denote great danger, give the following balls, or drink; for in theſe caſes there is no time to be loſt.

> Take of contrayerva-root, myrrh, and ſnake-root powdered, each two drams, ſaffron one dram, mithridate or Venice treacle half an ounce, make into a ball with honey, which ſhould be given twice or thrice a day, with two or three horns of an infuſion of ſnake-root, ſweetened with honey; to a pint and a half of which may be added, half a pint of treacle-water, or vinegar, which latter is a medicine of excellent uſe, in all kinds of inflammatory and putrid diſorders, either external or internal.

Should theſe balls not prove ſucceſsful, add to each a dram of camphor, and where it can be afforded, to a horſe of value, the ſame quantity of caſtor. Or the following drink may be ſubſtituted in their ſtead for ſome days.

> Take of contrayerva and ſnake-root, of each two ounces, liquorice-root ſliced one ounce, ſaffron two drams; infuſe in two quarts of boiling water cloſe covered for two hours, ſtrain off, and add half a pint of diſtilled vinegar, four ounces of ſpirit of wine, wherein half an ounce of camphor is diſſolved, and two ounces of mithridate or Venice treacle; give a pint of this drink every four, ſix, or eight hours.

A more ſimple drink, and perhaps full as efficacious may be thus prepared:

> Take camphor one dram diſſolved in rectified ſpirit of wine one ounce, then gradually pour on a pint of diſtilled vinegar warmed, and give for two doſes. The quantity of camphor may be increaſed.

Should the horſe be coſtive, recourſe muſt be had to clyſters, or the opening drink: ſhould he purge, take care not to ſuppreſs it, if moderate; but if, by continuance, the horſe grows feeble, add diaſcordium to his drinks, inſtead of the mithridate; if it increaſes give more potent remedies.

Let it be remembered, that camphor is a very powerful and effectual medicine, in theſe kinds of putrid fevers; being both active and attenuating, and particularly calculated to promote the ſecretions of urine and perſpiration. It has been long celebrated in malignant fevers, as it gives motion to ſtagnant humours, in the moſt diſtant parts, and promotes their expulſion by the common outlets; nitre may be advantageouſly joined with it in many caſes. Theſe are the medicines that are chiefly to be depended on in putrid epidemic fevers, where the circulation is ſlow and languid, the blood and juices tending to coagulate, putrify, and run into grumes.

A horſe ſhould drink plentifully to promote the operation of theſe medicines; but inſtead of them, to a horſe of ſmall value, give an ounce of diapente, and half an ounce of mithridate, and one dram of camphor, with a ſtrong infuſion of rue, ſcordium, and ſnake-root, in the manner as above directed.

Regard ſhould alſo be had to his ſtaling; which, if in too great quantities, ſo as manifeſtly to depreſs his ſpirits, ſhould be controuled by proper reſtringents, or by preparing his drinks with lime-water. If, on the contrary, it happens that he is too remiſs this way, and ſtales ſo little as to occaſion a fullneſs, and ſwelling of his body and legs, recourſe may be had to the following drink:

> Take of ſalt-prunella, or nitre, one ounce; juniper-berries, and Venice turpentine, of each half an ounce; make into a ball with oil of amber.

Give him two or three of theſe balls, at proper intervals, with a decoction of marſhmallows, ſweetened with honey.

But if, notwithſtanding the method we have laid down, a greeniſh or reddiſh gleet is diſcharged from his noſtrils, with a frequent ſneezing; if he continues to loſe his fleſh, and becomes hide-bound; if he altogether forſakes his meat, and daily grows weaker; if he ſwells about the joints, and his eyes look fixed and dead; if the kernels under his jaws ſwell, and feel looſe; if his tail is raiſed and quivers; if his breath ſmells ſtrong, and a purging enſues, with a diſcharge of fætid, dark coloured matter, his caſe may then be looked on as deſperate, and all future attempts to ſave him will be fruitleſs.

The ſigns of a horſe's recovery are known by his hide's keeping open, and his ſkin feeling kindly; his ears and feet will be of a moderate warmth, and his eyes briſk and lively; his noſe grows clean and dry; his appetite mends; he lays down well, and both ſtales and dungs regularly.

Be careful not to overfeed him on his recovery; let his diet be light, feeds ſmall, and increaſed by degrees as he gets ſtrength: for by overfeeding, horſes have frequent relapſes, or great ſurfeits, which are always difficult of cure.

This is the moſt ſucceſsful method of treating theſe irregular, malignant fevers; where it is evident, by the various efforts nature makes to relieve herſelf, ſhe wants aſſiſtance, and a ſpur to quicken her motions. For by the uſe of theſe warm medicines, a criſis, or termination of the diſeaſe is quickened and promoted, as appears by the alteration made both in the urine and ſkin; the former of which, by its thickneſs, ſhews ſigns of concoction, as it is called, or of a ſeparation of the feveriſh matter from the blood; and the latter by its ſmoothneſs and gloſſineſs proves that a regular and free perſpiration is obtained: theſe two ſecretions are of ſuch importance to the welfare of every animal, that the neceſſity of rectifying them, when diſordered, is obvious from the conſequences.

If this fever ſhould be brought to intermit, or prove of the intermitting kind, immediately after the fit is over, give an ounce of jeſuits-bark, and repeat it every ſix hours, till the horſe has taken four or ſix ounces; ſhould eruptions or ſwellings appear, they ought to be encouraged, for they are good ſymptoms at the decline of a fever, denote a termination of the diſtemper, and that no further medicines are wanted.

The true reaſons perhaps why ſo many horſes miſcarry in fevers, are, that their maſters, or doctors, will not wait with patience, and let nature have fair play: that they generally neglect bleeding ſufficiently at firſt; and are conſtantly forcing down ſugar-ſops, or other food in a horn, as if a horſe muſt be ſtarved in a few days, if he did not eat: then they ply him twice or thrice a day with hot medicines and ſpirituous drinks, which (excepting a very few caſes) muſt be extrmely pernicious to a horſe, whoſe diet is naturally ſimple, and whoſe ſtomach and blood, unaccuſtomed to ſuch heating medicines, muſt be greatly injured, and without doubt are often inflamed by ſuch treatment.

From the experience we lately had of the epidemic cold and fever among our horſes, and from the obſervations of others in the years 1732 and 1734, it evidently appeared that the ſimpleſt method of treatment ſucceeded beſt. Thus it is proper to bleed largely at firſt, to the quantity of three quarts, if the horſe is full and ſtrong: and if it appears that his lungs are not relieved by it, but continue ſtuffed and loaded, the bleeding ſhould be repeated; and a rowel may be put in his cheſt or belly.

Dilute the blood with plenty of water, or white drink; let his diet be warm bran maſhes, and his hay ſprinkled. Should the fever riſe, which will be known by the ſymptoms above deſcribed, give him an ounce of nitre thrice a day in his water, or made up in a ball with honey. Let his body be kept cool and open, with the opening drink, given twice or thrice a week; or an ounce of ſalt of tartar may be given every day, diſſolved in his water, for that purpoſe, omitting then the nitre. After a week's treatment in this manner, the cordial ball may be given once or twice a day, with an infuſion of liquorice-root ſweetened with honey; to which may be added, when the phlegm is tough, or cough dry and huſky, a quarter of a pint of linſeed, or ſallad-oil, and the ſame quantity of oxymel ſquills.

As the kernels about the throat are greatly ſwelled in theſe caſes, I need not mention the neceſſity of keeping the head and throat warmer than ordinary, to promote a freer perſpiration, and forward the running at the noſe, which in a horſe anſwers the end of ſpitting, or expectoration in us: but the noſe ſhould never be ſyringed, as is ſometimes done, to promote this diſcharge, which it often checks, and occaſions bad ſwellings in the neighbouring parts and glands; for let it be remembered theſe are critical runnings of nature's own appointment, which by art may ſoon be fruſtrated. The following cooling purge is very proper to give at the decline of the diſtemper, and may be repeated three or four times.

> Take two ounces of ſenna; anniſeed and fennel bruiſed, each half an ounce; ſalt of tartar three drams; let them infuſe two hours in a pint of boiling water; ſtrain off, and diſſolve in it three ounces of Glauber ſalt, and two of cream of tartar: give for a doſe in the morning.

This purge generally works before night very gently; and in fevers, and all inflammatory diſorders, is infinitely preferable to any other phyſic.

Before we cloſe this account of fevers, it may be no improper hint to the curious, to take notice that a horſe's pulſe ſhould more particularly be attended to than is cuſtomary, as a proper eſtimate may thereby be made both of the degree and violence of the fever preſent, by obſerving the rapidity of the blood's motion, and the force that the heart and arteries labour with, to propel it round. The nigheſt calculation that has been made of the quickneſs of the pulſe in a healthy horſe, is, that it beats about forty ſtrokes in a minute; ſo that in proportion to the increaſe above this number, the fever is riſing, and if farther increaſed to above fifty, the fever is very high.

How often the pulſe beats in a minute may eaſily be diſcovered by meaſuring the time with a ſtop-watch, or minute ſand-glaſs, while your hand is laid on the horſe's near ſide, or your fingers on any artery; thoſe which run upon each ſide of the neck are generally to be ſeen beating, as well as felt a little above the cheſt. *Bartlet's Farriery, page* 31.

FEWEL, combuſtible matter; as fire, wood, coal, &c.

FIELD, a piece of ground encloſed, whether for tillage, or paſture.

Field *ſcabinus*, a perennial weed common among the corn. It is all over rough and hairy. The ſtalk is upright, and often a foot or a foot and a half high, ſpotted, and branching. The lower leaves are oval, and indented about the edges. Thoſe which grow on the ſtalk are divided, and of that ſort which botaniſts called pinnatifid. The flowers are blue, and of the compound kind, conſiſting of a conſiderable number of ſmall flowers, each divided into four parts, and having one ſeed under them. The taſte of the plant is a diſagreeable bitter.

FIG-TREE, the name of a fruit-tree common in the warmer climates, and which ripens its fruit very well in our gardens.

Method of cultivating Fig-Trees.

Theſe trees are always planted as ſtandards, in all warm countries; but in England they are generally planted againſt walls, there being but few ſtandard fig-trees, at preſent, in the Engliſh gardens: however, ſince the fruit is found to ripen well upon the ſtandards, and the crop of figs is often greater upon them, than upon thoſe trees againſt walls, it may in time become the general practice to plant them either in ſtandards or eſpaliers: the latter, I think, will ſucceed beſt in England, if they were managed as in Germany; where they untie the fig-trees from the eſpalier, and lay them down, covering them from the froſt with ſtraw or litter, which prevents their ſhoots being injured by the froſt; and this covering is taken away gradually in the ſpring, and not wholly removed until all the danger of the froſt is over; by which management they generally have a very great crop of figs: whereas, in England, where the trees grow againſt warm walls, if the ſpring proves warm, the young figs are puſhed out early; and the cold, which frequently returns in April and May, cauſes the greateſt part of the fruit to drop off, ſo that our crop of figs is generally more uncertain than moſt other ſort of fruit; and it frequently happens, that trees which are planted againſt north and eaſt aſpected walls, produce a greater quantity of fruit in England, than thoſe which are planted againſt ſouth and ſouth-eaſt aſpects, which muſt happen from the latter putting out their fruit ſo much earlier in the ſpring than the former: and, if there happen cold froſty nights, after the figs are come out, which is frequently the caſe in this country, the forwardeſt of the figs are generally ſo injured as to drop off from the trees ſoon after. In Italy, and the other warm countries, this firſt crop of figs is little regarded, being few in number; for it is the ſecond crop of figs which are produced from the ſhoots of the ſame year, which is their principal crop; but theſe rarely ripen in England; nor are there above three or four ſorts which ever ripen their ſecond crop, let the ſummer prove ever ſo good; therefore it is the firſt crop which we muſt attend to in England: ſo that when theſe trees are growing againſt the beſt aſpected walls, it will be a good method to looſen them from the wall in the autumn; and, after having diveſted the branches of all the latter fruit, to lay the branches down from the wall, faſtening them together in ſmall bundles, ſo that they may be tied to ſtakes, to keep them from lying upon the ground; the damp whereof, when covered in froſty weather, might cauſe them to grow mouldy; and hereby they will be ſecured from being broken by the wind. When they are thus managed in the autumn, if the winter ſhould prove very ſevere, the branches may be eaſily covered with peaſe-haulm, ſtraw, or any other light covering, which will guard the tender fruit-bearing branches from the injury of froſt: and when the weather is mild, the covering muſt be removed, otherwiſe the figs will come out too early; for the intention of this management is to keep them as backward as poſſible: then in the ſpring, when the figs are beginning to puſh out, the trees may be faſtened up to the wall again. By this management I have ſeen very good crops of figs produced in two or three places.

I have alſo ſeen great crops of figs in ſome particular gardens, after very ſharp winters, when they have, in general, failed in other places, by covering up the trees with reeds made into panels, and fixed up againſt the walls.

In the pruning of fig-trees, the branches muſt never be ſhortened; becauſe the fruit are all produced at the upper part of the ſhoots; ſo, if theſe are cut off, there can be no fruit expected; beſides, the branches are very apt to die after the knife; ſo that, when the branches are too cloſe together, the beſt way is to cut off all the naked branches quite to the bottom, leaving thoſe which are beſt furniſhed with lateral branches at a proper diſtance from each other, which ſhould not be nearer than a foot; and, when they are well furniſhed with lateral branches, if they are laid four or five inches farther aſunder, it will be better.

The beſt ſeaſon for pruning of fig-trees is in autumn, becauſe, at that time, the branches are not ſo full of ſap; ſo they will not bleed ſo much as when they are pruned in the ſpring; and, at this ſeaſon, the branches ſhould be diveſted of all the autumnal figs; and the ſooner this is done, when the leaves begin to fall off, the better will the young ſhoots reſiſt the cold of the winter. There are ſome ſeaſons ſo cold and moiſt that the young ſhoots of the fig trees will not harden, but are ſoft and full of juice: when this happens, there is little hope of a crop of figs the ſucceeding year; for the firſt froſt in the autumn will kill the upper part of theſe ſhoots, for a conſiderable length downwards: whenever this happens, it is the beſt way to cut off all the decayed parts of the ſhoots, which will prevent the infection from deſtroying all the lower part of the branches; and by this method I have ſeen a moderate crop of figs put out from the lower part of the ſhoots, where, if the ſhoots had not been injured, there would have been no fruit produced; becauſe it is chiefly from the four or five uppermoſt joints of the ſhoots that the fruit comes out: and it is for this reaſon, that as many of the ſhort lateral branches ſhould be preſerved as poſſible, thoſe being the moſt productive of fruit; for, where the long ſtrait ſhoots are faſtened up, there will be no fruit, but at their extremities; ſo that all the lower part of the trees will be naked, if there be not a particular regard had to ſupply young ſhoots in every part of the trees. *Miller's Gard. Dict.*

FIG, the name given by farriers to a ſort of wart on the fruſh, and ſometimes all over the body of a horſe. The figs that appear on the fruſh or ſole, diſcharge a malignant ſtinking humour, which is very difficult to cure.

FIG-WORT, *pile-wort*, or *leſſer centaury*, a perennial weed common in paſture-grounds. The roots conſiſt of oblong knobs. The leaves are heart-ſhaped, cornered, and placed on foot-ſtalks. The flowers in general reſemble thoſe of the crowsfoot, but differ ſomewhat from them in having the cup divided into three parts only, the petals being about eight in number, and narrower. This low plant runs very much by the roots, and choaks all others which are near it.

FILBERT, or *filberd*, a ſpecies of the hazel propagated in gardens.

Filbert-trees may be raiſed by planting their nuts in February; till which time they ſhould be kept in ſand in a moiſt cellar, where no vermin can get at them: but the moſt expeditious way, and at the ſame time the ſureſt of obtaining the ſorts deſired, is to raiſe them from layers.

FILLER, or *thiller* horſe, that faſtened immediately to the cart, and which ſupports the ſhafts.

FILLY, a female or mare colt.

FIMBLE-*hemp*, early ripe hemp.

FINE-BENT, the name of a very excellent ſpecies of graſs found in great plenty on the beſt ſheep-paſtures. We have given a figure of this graſs on Plate XV. Fig. 4. *ſee the article* Grass.

FIRE-BLAST, an accident to which hops are very liable. *See the article* Hops.

FIRE-BOTE, a quantity of fuel.

FIRING, an operation often performed on different parts of a horſe. It is done in the following manner: when the firing-iron is red hot, the farrier applies the thinneſt part to the horſe's ſkin, in one or more places, according to the nature of the diſeaſe.

Firing, or cauterizing, is often neceſſary after ſtrains and other accidents, which may occaſion a long continued weakneſs, or where there is a fullneſs, and the part is grown hard and callous, eſpecially about the joints, ſinews, and nervous parts, thoſe parts being compoſed of an infinite number of fibres and nervous threads, which lie ſo cloſe together, that nothing but what is of the moſt powerful nature is ſufficient to relieve them when obſtructed. This is performed in the moſt effectual manner, by burning the outſide, and giving vent to the incloſed matter to diſcharge itſelf; and ſometimes proves beneficial, when all other helps have been found ineffectual.

In firing about the ſinews and nervous parts, great care is to be taken not to go too deep at firſt, but by gentle repeated razes on lines, till they come to a pale red colour; for if the fire once touches the ſinew, it will make the horſe go lame as long as he lives: the ſame ought to be drawn pretty cloſe together on each ſide the joints or ſinews, following the courſe of the hair, without making of croſs lines, which are of no uſe in theſe parts, and are only apt to disfigure the horſe afterward.

When the more fleſhy parts, or an obſtinate humour, that cannot be brought to ſuppuration, requires firing, the ſkin ought to be pierced deeper, in order to draw away a ſufficient quantity of matter from the part; the ſame ought to be performed upwards, to prevent any ulcerous diſpoſition attending it: and in ſuch caſes little ſoft doſils of tow, dipped in warm baſilicon, and ſpirit of wine, may be thruſt gently up into the orifices.

The firing inſtrument, or knife, ought to be ſomewhat rounded on the edge, and gradually thicker to the back, ſufficient to keep the heat of the fire for ſome time; the ſame ſhould be rubbed clean, that no dirt or aſhes may ſtick to it, and not uſed until the flaming redneſs is in part gone off. All the ſeared parts ought immediately to be bathed with ſpirits of wine, and where nothing elſe is requiſite to complete the cure, the place is only to be anointed with oil and bees-wax melted together. *Gibſon's Farriery, vol.* I. *page* 251.

FIRING-IRON, a piece of iron about a foot long, one end of which is made flat, and forged like a knife, the back of it being half an inch thick, and the edge about the eighth of an inch.

FIR, a timber tree very common on mountainous and barren places, eſpecially in the colder climates. It differs from the pine, in having ſingle leaves, which are, for the moſt part, produced on every ſide of the branches; whereas the pine has two or more leaves produced out of the ſheath or cover.

Fir trees are raiſed from ſeeds taken out of their polyſpermous cones. The way to get out the ſeeds is, either by expoſing the cones to a gentle fire, or by ſoaking them all night in water, which will cauſe their ſquamous cells to open, and readily emit their ſeeds. The former method is the beſt, provided they are not expoſed to too great heat. But this ought not to be done until you are ready to ſow them, which is beſt performed in the beginning of March.

Theſe plants ſhould be all raiſed in a nurſery, where they may be protected from the birds, otherwiſe they will be in danger of being deſtroyed, when they firſt come up: for as they bring up the huſk of the ſeed on the top of the plant, the birds in picking off the huſk will break off the plant, whereby a whole bed may be loſt in a few hours, if they are not carefully guarded from them.

The beſt time of ſowing theſe ſeeds is about the latter end of March, or the beginning of April, on a bed of light earth, covering the ſeeds about half an inch deep with the ſame ſort of earth. In this bed the plants ſhould remain until the following ſpring, when there ſhould be a number of beds prepared in the nurſery to receive theſe ſeedling plants; and the beginning of April they ſhould be tranſplanted into the beds, at the diſtance of ſix inches row from row, and at three inches aſunder in the rows. If the ſeaſon ſhould prove dry, it will be proper to water the plants every week once or twice, according to the warmth of the weather; and the beds ſhould be covered with mats, to ſcreen the plants from the ſun, and drying winds, until they have taken good root; after which time they will require no farther care, but to keep them clear from weeds. In theſe beds the plants may remain two years; at the end of which they ſhould be tranſplanted into an open ſpot of ground; for their roots will in that time meet quite over the beds.

The diſtance which theſe plants ſhould be placed in this nurſery, ſhould be four feet row from row, and two feet aſunder in the rows.

When the plants are planted, if the ſeaſon ſhould prove dry, they ſhould be watered, to ſettle the earth to their roots; and if this is repeated three or four times, if the ſeaſon ſhould continue dry, it will greatly promote their taking new root, and ſecure them from the injuries of the drying winds. In this nurſery the plants may remain two or three years, according to the growth they ſhall have made; and, during this time, the ground between the plants ſhould be conſtantly keept clean from weeds, and dug between the rows every ſpring; in doing of which, care muſt be taken not to cut or injure the roots of the plants: this is all the culture they will require during their continuance in the nurſery: and, when they are tranſplanted into the places where they are to remain, the neceſſary care to be taken is, in taking them up, not to injure or cut off their roots, and let them be as little time out of the ground as poſſible; and, when they are out, to guard their roots from the drying winds. The ſureſt time for removing of theſe trees is about the beginning of April; though they may, and often are removed with ſucceſs at Michaelmas, yet the ſpring is the more ſure ſeaſon, eſpecially in moiſt land.

Moſt of the kinds of firs may be removed at the height of ſix or ſeven feet; but thoſe of two feet high are much better, and will in a few years get the better of thoſe taller trees. *Miller's Gard. Dict.*

FISH-PONDS, reſervoirs of waters, applied to the breeding or feeding of fiſh.

Fiſh-ponds are no ſmall improvement of watery and boggy lands, many of which are fit for no other uſe. In making of a pond, its head ſhould be at the loweſt part of the ground, that the trench of the flood-gate, or ſluice, having a good fall, may not be too long in emptying. The beſt method of making the head ſecure, is to drive in two or three rows of ſtakes above ſix feet long, at about four feet diſtance from each other, the whole length of the pond head, whereof the firſt row ſhould be rammed at leaſt about four feet deep. If the bottom is falſe, the foundation may be laid with quick-lime, which ſlacking, will make it as hard as a ſtone. Some lay a layer of lime, and another of earth dug out of the pond, among the piles and ſtakes; and when theſe are well covered, drive in others, as they ſee occaſion, ramming in the earth as before, till the pond-head be of the height deſigned.

The dam ſhould be made ſloping on each ſide, leaving a waſte to carry off the over-abundance of water in times of floods or rains; and as to the depth of the pond, the deepeſt part need not exceed ſix feet, riſing gradually in ſhoals towards the ſides, for the fiſh to ſun themſelves, and lay their ſpawn. Gravelly and ſandy bottoms, eſpecially the latter, are beſt for breeding; and a rich ſoil with a white fat water, as the waſhing of hills, commons, ſtreets, ſinks, &c. is beſt for fattening all ſorts of fiſh. For ſtoring a pond, carp is to be preferred for its goodneſs, quick growth, and great increaſe, as breeding five or ſix times a year. A pond of an acre, if it be a feeding and not breeding one, will every year feed two hundred carps of three years old, three hundred of two years old, and four hundred of a year old. Carps delight in ponds that have marl or clay bottoms, with plenty of weeds and graſs, whereon they feed in hot months.

Your pond ſhould be drained every three or four years, and your fiſh ſorted. If it is a breeding one, the ſmaller ones are to be taken out to ſtore other ponds with, leaving a good ſtock of females, at leaſt eight or nine years old, as they never breed before that age. In feeding ponds, it is beſt to keep them pretty near of a ſize. *Mortimer's Huſbandry, vol.* I. *page* 290.

FISTULA, a deep, narrow, and callous ulcer, generally ariſing from abſceſſes. *See* ULCER.

FISTULAR, FISTULOUS, an epithet applied by farriers to wounds and ulcers, which degenerate into fiſtulas.

Fiſtular, or *fiſtulous*, is alſo an epithet applied by botaniſts to leaves and flowers which are tubular, or that reſemble a hollow pipe.

FLAGS, the turf, or ſurface of the ground, which they pare off for burning. *See* BURN-BAKING.

FLAIL, a well known implement of huſbandry, uſed in threſhing all ſorts of corn. *See the article* THRESHING.

FLAX, the name of a plant cultivated both for the ſake of its ſtalk and ſeed, the former being uſed in making linen, and the latter for oil.

The ſtem of this plant, which is round and hollow, grows to the height of about two feet, and then divides into ſeveral branches: theſe are terminated by blue flowers, conſiſting of five petals, and are ſucceeded by capſules divided within into ten cells, in each of which is encloſed a bright, ſlippery, elongated ſeed. Its leaves are long, narrow, ſharp-pointed, and placed alternately along the ſtem and branches.

The ſoil for flax ſhould be a ſtiff loam, rendered fine by tilth, and ſituated in a valley bordering upon water; or ſuch a ſoil as is thrown up by rivers. If there be water at a ſmall depth below the ſurface of the ground, it is thought ſtill better, as is the caſe in Zealand, which is remarkable for the fineneſs of its flax, and where the ſoil is deep and ſtiff, with water almoſt every where, at the depth of a foot and a half, or two feet underneath it. It is ſaid to be owing to the want of this advantage, that the other provinces of Holland do not ſucceed equally well in the culture of this uſeful plant; not but that fine flax is alſo raiſed on high lands, if they have been well tilled and manured, and if the ſeaſons are not very dry.

It is juſtly remarked in the letters which the Dublin Society have publiſhed on the culture of flax, that moiſt ſtiff ſoils yield much larger quantities of flax, and far better ſeed, than can be obtained from light lands: nay, that the ſeed procured from the former may, with proper care, be rendered full as good as any that is imported from Riga or Zealand: but, as M. Du Hamel rightly obſerves, ſtrong land can hardly yield ſuch fine flax as that which grows on lighter ground.

In the ſouthern countries, the huſbandmen who raiſe flax, ſow part of their ſeed in September and October; ſo that the plants which ſpring from thence, remain of courſe in the ground all the winter; and this is a judicious practice in thoſe places, becauſe plants which have not covered the earth well before the ſummer heats come on, are apt to be parched by the heat and drouth which uſually prevail in that ſeaſon. They ſow linſeed again in the ſpring; but the latter do not yield ſo large a crop: the flax, however, which it produces is more eſteemed, becauſe it is finer than that ſown in autumn. M. Du Hamel ſeems, indeed to think, that the autumnal ſowing yields the beſt ſeed; but however that be, in places where the winter is apt to be ſevere, and where the flax, which is but a tender plant, would in courſe be in danger of being deſtroyed during that ſeaſon, almoſt all the flax is ſown about the end of March, or in the beginning of April. This ſpring flax is what we ſhall principally conſider in this article.

It may be laid down as a general rule, that the land which is intended for flax ſhould be brought to exceeding fine tilth by repeated ploughings, and that it ſhould be enriched by a manure ſuited to the quality of the ſoil. Thus, when a paſture is broken up in order to its being ſowed with flax, it muſt be well ploughed during eighteen months, or two years, before it will be fit for producing a crop of flax. To defray the expence of this culture, ſome other crops may be got off the land in the mean time, eſpecially of ſuch plants as do not occupy it long, and particularly of thoſe which are remarkably benefited by frequent ſtirring of the earth whilſt they grow; ſuch as beans, peaſe, turnips, &c. becauſe theſe repeated ſtirrings render the mould fine and looſe, and help to kill the weeds, which would otherwiſe do great damage to the flax. The Memoirs publiſhed by the Society of Britanny inform us, that the Livonians, when they clear woodland, burn the wood upon it, then plough it, and in this ſtate prefer it to any other kind of ſoil for flax.

If the land which is intended for flax be ſtiff, great care ſhould be taken not to till it when it is wet, for fear of kneading it.

If the ground on which flax is to be raiſed has been long in tillage, it ſhould be ploughed deep before winter, and laid up in very high ridges, in order that the winter's froſts may the more effectually moulder or looſen it.

In the month of February, if the land be not too wet, ſome very rotten dung ſhould be laid in the furrows, and immediately covered over. In March, for ſouthern countries, or in the beginning of April, where the climate is colder, another ploughing ſhould be given to lay the land ſmooth, the clods ſhould be broken by hand, or with the ſpiky-roller, and the ſeed ſhould then be ſown and harrowed in with a light or buſh-harrow, ſo as not to bury it above an inch deep. If the ſoil be moiſt and cold a little pigeon's dung may be ſown with the ſeed, for it agrees admirably well with the flax: but this muſt not be done if the ground is very light and too dry. It will alſo be right to lay wet land out in beds thirty or forty feet wide, ſeparated by deep trenches, to drain off the water, and convey it into the ſurrounding ditches.

Moſt of our linſeed is brought from the North, namely, from Riga and Zealand: but we may ourſelves raiſe it very good, by conforming to the directions here given.

Linſeed is reckoned good when it is large, oily, heavy, and of a bright brown colour. To know whether it be oily, a few grains of it are thrown into a red-hot fire-ſhovel, and they in that caſe crackle almoſt inſtantly and blaze briſkly. If it is ſufficiently heavy, it will ſink to the bottom of water; and to judge whether it be new, a number of ſeeds exactly counted ſhould be ſown on the end of a hot-bed, and notice taken whether they all grow.

When the goodneſs of the ſeed is known, more or leſs of it is to be ſown according as the huſbandman intends either to raiſe a quantity of linſeed for ſowing, or to have very fine and ſoft flax. In this laſt caſe, the ſeed ſhould be ſown pretty thick, in order that the plants may riſe the cloſer together, and by that means grow ſlender and tall, which adds much to the fineneſs of the fibres of the flax. If the linſeed is ſown with an intention to let the flax remain for ſeed, a much leſs quantity of it ſhould be uſed, that ſo the plants may come up thin, and thereby have room to grow to their full vigour and extent. As ſtrong ſoils ſhould be choſen for this purpoſe, it may perhaps be moſt adviſable to follow the example of the judicious M. de Chateauvieux, in ſowing it in drills, and horſe-hoeing the intermediate ſpaces. He obſerved in his experiments, that the plants of flax thus raiſed yielded great plenty of excellent ſeed.

Some ſow, with their linſeed, either annual or perennial graſs-ſeeds, when they intend to lay the land down for paſture after the flax is taken off. The plants grow but weakly under the flax, which, however, they do not hurt; but as ſoon as the flax has been pulled, they increaſe apace, to the great benefit of their owner.

Flax is ſometimes damaged by inſects when it is about three or four inches high. It is ſaid that they may be deſtroyed by a ſlight ſtrewing of ſoot, aſhes, &c. At all events, it is certain that this dreſſing will give vigour to the flax, though it ſhould not kill the inſects.

If any weeds appear among the flax, as is almoſt always the caſe, they muſt be thoroughly rooted out; and that the flax may be as little damaged as poſſible in the doing of this, the weeders ſhould work bare-footed: they may indeed ſit down upon the flax, for ſitting upon it is found not to hurt it; but it would be greatly injured, if not killed, by being trod upon with the heels of ſhoes.

The fineſt flax is moſt liable to be laid, particularly in countries ſubject to ſtorms. To guard againſt this accident, ſome people run acroſs their flax field ſlender poles fixed to ſtakes: but a better method, and which is practiſed by the ingenious gentleman who directs the cambrick manufactory at Winchelſea, is, to run ſmall ropes acroſs the field, both lengthwiſe and breadthwiſe; for theſe, being faſtened where they interſect one another, and ſupported by ſtakes at due diſtances, form a kind of netting, which is proof againſt almoſt every accident that can happen from tempeſtuous weather.

Opinions are divided in regard to the degree of ripeneſs at which it is beſt to pull flax. Some think it ſhould be pulled whilſt it is green, in order that its fibres may be the ſofter and finer. Others, with the ſame view, pull it up before its ſeeds are quite formed; and others again think, that it ſhould not be pulled till ſome of the capſules, which contain the ſeeds, have begun to open, being of opinion, that the fibres of green flax are too tender, and that they fall into tow. On the other hand, it is certain, that the fibres of flax which has ſtood till it is very ripe, are always ſtiff and harſh, that they are not eaſily ſeparated from the reed, and that they do not bleach well. Here, therefore, as in moſt other caſes, both extremes ſhould be avoided; and it conſequently ſeems moſt reaſonable to think, that the propereſt time for pulling flax, is when its ſtalks begin to turn yellow, when its leaves begin to fall, and when its ſeeds begin to be brown.

As ſoon as the flax is thought to have attained a due maturity, it is pulled generally by handfuls: but as it is ſeldom all of an equal degree of ripeneſs, or of an equal degree of ſtrength, it would certainly be adviſable to pull firſt the ripeſt and ſtrongeſt plants, and then the weaker and leſs ripe; for by this means they would at once be ſeparated, which is of eſſential importance in the watering, becauſe the weak and green flax requires much leſs ſteeping than the ſtronger and more ripe. All weeds, and the earth which adheres to the roots of the plants, ſhould be carefully taken away, and then the handfuls of flax ſhould be laid regularly on the ground.

The author of the judicious letters concerning flax, in the Dublin Society's Weekly Obſervations, ſeems to direct a too great degree of ripeneſs of the flax when it is pulled, and aſſigns as a reaſon, that it does not otherwiſe ſtand the force of the mill for ſcutching it. But as it has been found by experience, that the force of that mill is too great, and as a better method of performing this operation, in which the force can be ſuited to the ſtrength of the flax, will ſoon be publiſhed, this great degree of ripeneſs will become the leſs neceſſary.

As the flax is pulled, it is laid together by handfuls, with the ſeed ends turned to the ſouth. Theſe handfuls ſhould neither lie quite in a line with each other, nor directly acroſs, but a little ſlanting upwards, ſo that the air may eaſily paſs through them. Some, inſtead of this method, tie the handfuls of flax looſely at the top, then ſpread out their roots, and thus ſet ſeveral of them together upright upon their roots. In either of theſe ways, the flax is generally left twelve or fourteen days in the field to dry it. This drying is certainly not neceſſary for the rippling, becauſe the ripple will ſeparate the capſules from the flax as effectually before it has been dried, as it will afterwards; and if it be done with a view to ripen the ſeed, it ſhould be conſidered, that the flax will be more hurt by the longer time of ſteeping, which will become neceſſary in conſequence of this drying, than the ſeed can be benefited; becauſe the more the membrane which connects the fibres to the reed is dried, the greater muſt be the degree of putrefaction neceſſary to looſen and deſtroy the coheſion of this connecting membrane: the finer parts of the flax itſelf muſt neceſſarily be deſtroyed by this degree of putrefaction; and if the putrefaction does not ariſe to ſuch a degree as to deſtroy the coheſion of this membrane, the fibres of the flax will adhere ſo ſtrongly to the reed, that the force neceſſary in ſcutching will prove equally detrimental to the flax. The practice in ſome parts of Brittany, as we are informed by the Memoirs of the Society of that province, ſeems therefore much more rational; and this is, to ripple the flax after it has lain in the air two or three days: but even one day will be ſufficient if the weather is dry.

If any flax is raiſed on purpoſe for ſeed, or if, through the dryneſs of the ſeaſon, or the badneſs of the ſeed that was ſown, the flax is come up very thin, ſo as manifeſtly to ſhew, that the ſeed which it may produce will be more valuable than the reſt of the crop; in either of theſe caſes, the flax ſhould be let ſtand till its ſeed is perfectly ripe; thus ſacrificing the flax itſelf to the then greater advantage of having good ſeed.

In order to ripple the flax, which is the next operation, a large cloth ſhould be ſpread on a convenient ſpot of ground, with the ripple placed in the middle of it. The manner of performing this work is ſo well known, that there can be no need to deſcribe it here. Its purpoſe is to obtain the linſeed, which is always of conſiderable value, even though the flax has been pulled before its perfect maturity.

After the flax has been rippled, the ſeeds thereby obtained ſhould be ſpread in the ſun, to dry. Thoſe which ſeparate from the pods of their own accord are the fulleſt and ripeſt, and ſhould therefore be ſet apart for ſowing, in caſe the precaution of raiſing ſome flax purpoſely for ſeed has not been attended to. The pods, or capſules, are then broken, either by treading, or by threſhing, in order to get out the remaining ſeeds, the whole of which, as well as the former, ſhould be carefully ſifted, winnowed, and cleaned. When the ſeed is laid up, it muſt be frequently ſtirred, or ventilated, to prevent its heating. Even this ſecond ſeed affords a conſiderable profit, by the oil which it yields, and alſo by being uſed, when broken, for fattening of cattle. The cakes of linſeed, after the oil has been preſſed out of them, are likewiſe found to be uſeful for this laſt purpoſe, though they are thought to render the fat of cattle yellow; for which reaſon it is adviſed not to give them till within a few weeks before the beaſts are to be killed. Their utility as a manure has been already mentioned.

As ſoon as the flax has been rippled, it ſhould be carried with all convenient ſpeed to the watering place. If care has not been taken before to ſeparate the different kinds of flax, that ſeparation muſt now be made; becauſe, otherwiſe, ſome of the flax will be rotted in the water, before the reſt will be ſufficiently ſteeped.

The choice of the water for ſteeping it in is thus very properly pointed out in the Directions for raiſing Flax, publiſhed by order of the Commiſſioners and Truſtees for Fiſheries, Manufactures, and Improvements, in Scotland.

“ All flax ought to be watered in canals, which ſhould be dug in clay ground if poſſible, becauſe that ſoil beſt retains the water: but if a firm retentive ſoil cannot be got, the bottom or ſides of the canal, or rather both the bottom and ſides, may be lined with clay; or, inſtead of lining the ſides with clay, which might fall down, a ditch may be dug without the canal, and filled with clay, which will prevent both extraneous water from entering, and the water within from running off.

“ A canal of forty feet long, ſix broad, and four deep, will generally water the produce of at leaſt an acre of flax.

“ It ſhould be filled with freſh ſoft water from a river or brook, if poſſible, two or three weeks before the flax is put in, and expoſed all that time to the heat of the ſun. The greater way the river or brook has run, the ſofter, and therefore the better, will the water be. Springs, or ſhort runs from hills, are too cold, unleſs the water is allowed to ſtand long in the canal. Water from coal or iron is very bad for flax. A little of the powder of galls thrown into a glaſs of the water, will immediatly diſcover if it comes from minerals of that kind, by turning it into a dark colour, more or leſs tinged in proportion to the quantity of vitriol contained in it.

“ The canal ought not to be under any ſhade, becauſe this, beſides keeping the ſun from ſoftening the water, might render ſome parts of the canal cooler than other parts, and thereby make it water the flax unequally.

“ The flax raiſer will obſerve, that, when the water has been brought to a proper degree of heat by the ſun, ſmall plants will riſe quickly in it, numbers of ſmall inſects and reptiles will generate there, and bubbles of air will riſe up to its ſurface. If no ſuch ſigns appear, he may conclude, that the water is not warm enough, or that it is otherwiſe unfit for flax.”

Running water is not proper for ſteeping flax, becauſe it prevents that degree of putrefactive fermentation which is neceſſary to ſeparate the fibres from the reed; and beſides this, in ſuch ſtreams, the flax is apt to be carried away by ſudden floods, or to be filled with the mud and ſlime which thoſe floods bring with them: but to have a ſmall rill of water paſs through the ſteeping place is very adviſable, becauſe it will ſupply the loſs of that which is evaporated. Stagnant water, which is naturally of a bad colour, ſhould likewiſe be avoided, becauſe this communicates to the flax a colour which is not afterwards eaſily got rid of.

The flax, after it has been rippled and ſorted, as before mentioned, ſhould be tied very ſlack, with a band made of a few ſtalks, in bundles not larger than a man can eaſily graſp with both his hands, in order that the water may the more eaſily and more equally penetrate through them; and in this condition they ſhould be put into the canal, ſomewhat ſloping, or even half-ſtanding upon one end, which, ſay the Edinburgh directions, ſhould be the ſeed end, and conſequently the root end uppermoſt; becauſe, add they, (though I do not find it at all noticed by any other writers on this ſubject) when the ſeed ends are uppermoſt, there frequently breeds a great deal of vermin, deſtructive of the flax, and this, they aſſure us, is effectually prevented by putting the ſeed end downmoſt. However this may be, the flax, when put into the water, ſhould be covered with ſtraw, or fern, upon which a wicker hurdle and ſome ſtones may be laid, to keep it down, but without preſſing too hard againſt the bottom. It is a common opinion, that if the flax is not thus covered, the ſun will diſcolour it, even though it be quite covered with water.

More or leſs time is requiſite for the ſteeping of the flax, according to the nature of the water, the heat of the air, and the greater or leſs degree of woodineſs of the flax. It is ſteeped ſooner with a ſouth than a north wind; and that which has been pulled green is alſo much ſooner ſteeped than that which has been pulled when very ripe: conſequently it is not poſſible to fix any preciſe length of time during which it ſhould remain in the water. The way to know whether it has been ſteeped enough, is to draw a few ſtalks from out of the middle of the heap, and then try it: if the reed ſnaps ſhort, without bending, and if the bark parts eaſily from the reed, towards its point, the hemp has been ſufficiently ſteeped, and it muſt, in this caſe, be ſpeedily taken out of the water, for otherwiſe it will ſoon become too tender, and begin to rot.

In ſome countries, the flax is ſteeped but four days, at the end of which it is taken out of the water, and the little bundles, or handfuls, into which it was before made up, are laid regularly ſide by ſide, till they have formed a pretty thick bed, upon which are then put planks loaded with ſtones. The flax is left in this condition four or five days, or more, according to the heat of the air; and its lying thus in a heap anſwers the intent of farther ſteeping in water: but as a great degree of putrefaction may ariſe in this operation, ſo much judgment and care are neceſſary, that I cannot think it an adviſable method.

The Memoirs of the Society, which the States of Brittany have inſtituted, upon a truly judicious plan, for the improvement of agriculture, arts, and commerce, inform us, in conſequence of an account which the duke of Choiſeuil, miniſter of ſtate in France for foreign affairs, received from the French ambaſſador at the court of Ruſſia, to whom he had written on this ſubject, at the requeſt of the ſociety, that the the Livonians uſe two ſorts of places for ſteeping their hemp and flax; that the moſt ſimple of theſe are only holes dug near the ſide of rivers, and that the flax, or hemp, watered in them (which is very like the method practiſed in France) generally ſells for from twenty-five to thirty per cent. leſs than that which has been ſteeped in the following manner.

When they would have flax or hemp of ſuperior quality, they chooſe a ſpot where there is a fall of clear water, and there make, one under another, five, and ſometimes ſix, baſons or reſervoirs, each of which is at leaſt one foot, and at moſt two feet deep. The water can either be let run from one baſon to another, or be ſtopped at pleaſure. The baſons are ſeparated by ſlight banks of clay; and in each bank is a little opening, which may be cloſed whenever it is thought proper. To prevent the ſtream from overflowing the firſt baſon, and afterwards ſucceſſively the others, it is itſelf turned a little aſide by a ſmall bank of clay, and this bank is broken down whenever the water is to be renewed in the baſons.

The Livonians' put their hemp and flax firſt into the uppermoſt baſon only. At the end of two, three, or four days, they remove it into the ſecond baſon, from thence into the third, and ſo on, till they have brought the ſeveral bundles of theſe plants down into the loweſt. At each of theſe ſhiftings, the firſt baſon is filled with freſh flax, and the water is renewed in all the baſons. By this means, the ſteeping is not completed till the flax or hemp has paſſed through all the baſons, and has remained a proper time in the lowermoſt, which is the laſt. Neither the Engliſh nor the Dutch import any hemp from Riga, but what has been ſteeped in this laſt mentioned manner; whereas a great part of that which the French receive from thence, is ſuch as has been ſteeped in ſtagnant waters, in holes dug on the ſide of rivers.

When the flax is taken either out of the water in which it has been ſteeped, or from the heap above-mentioned, the bundles of it are ſpread out, like a fan, at the root end, and laid on a dry new-mown meadow, that it may dry, bleach, and become ſupple. It is there turned from time to time, and as ſoon as it is quite dry it is carried off: for otherwiſe the moiſture of the dews and graſs will have nearly the ſame effect upon it, as if it had remained longer in the water. This is evinced by the practice of thoſe, who, in ſome places, inſtead of putting their flax into water, only ſpread it on a damp meadow where the graſs is ſomewhat long, leave it there all night, and in the morning, before the ſun has dried it, gather it up in large heaps, and remove it into the ſhade, in order to ſpread it out again upon the graſs the next evening; and this is repeated till the flax is found to be ſufficiently watered. In other places, it is watered by hand during the day, and ſo let it remain conſtantly on the graſs. It is then let dry, and is afterwards houſed. But, as M. Du Hamel rightly obſerves, this method is ſo tedious and troubleſome, that, even if it ſhould, as ſome ſay it does, give a little additional whiteneſs to the flax; yet the advantage in that reſpect is ſo ſmall, as by no means to compenſate for the inconveniencies of the practice, which he therefore thinks is not adviſable in any caſe, unleſs it be when the flax, after being taken out of the water, is found not to have been ſufficiently ſteeped.

The diſadvantage of laying the flax upon long graſs, after it has been ſteeped, in order to dry it, is very juſtly pointed out in the Directions for raiſing Flax, publiſhed by order of the commiſſioners and truſtees for fiſheries, manufactures, and improvements in Scotland, when they adviſe the huſbandman by no means to follow this method, becauſe the graſs, growing through the flax, frequently ſpots, or rots it. Theſe judicious gentlemen therefore recommend ſhort heath, as the moſt preferable place for ſpreading flax upon, after it has been taken out of the water; and this the rather, becauſe, when the flax is wet, it faſtens to the heath, and is thereby prevented from being blown away by the wind, whilſt at the ſame time the heath keeps it a little above the earth, and ſo expoſes it the more equally to the weather: but grounds expoſed to violent winds ſhould alſo be avoided.

“ The flax, continue they, when taken out of water, muſt be ſpread very thin upon the ground; and as it is then very tender, it muſt be gently handled. The thinner it is ſpread, the better, as it is then moſt equally expoſed to the weather: but it ought never to be ſpread during a heavy ſhower, becauſe that would waſh and waſte too much the bark, which is then exceſſively tender; though it ſoon after becomes firm enough to bear the rains, which, with the open air and ſunſhine clean, ſoften, and purify it to the degree deſired, and fit it admirably for parting from the reed: in ſhort, after the flax has acquired a little firmneſs by being a few hours ſpread in dry weather, the more rain and ſunſhine it gets, the whiter and better it will be.

“ The ſkilful huſbandman, who follows this method, ſpreads his firſt row of flax at the end of the field from whence the moſt violent wind commonly comes, placing the root-ends foremoſt: he makes the root-ends of every other row overlap the ſeed-ends of the former row three or four inches, and binds down the laſt row with a rope; by which means the wind does not eaſily get below the flax, to blow it way: and as the ſeed-ends are ſeldom ſo fully watered as the root-ends, this over-laying has an effect like giving the ſeed-ends more watering.

“ The flax is judged to have been ſufficiently graſſed, when it is of a clearer colour than before, when its bark is bliſtered up, when that bark parts eaſily from the reed, and when the reed is become very brittle: but no written deſcription can poſſibly here convey a knowledge of this point, at all equal to that which is acquired by experience.

“ The whole of the flax ſhould be ſufficiently graſſed before any of it is lifted; for if a part be lifted ſooner than the reſt, that which remains will be in great danger from the winds.

“ A dry day ſhould be choſen for taking up the flax; and if there is no appearance of high wind, it ſhould be looſed from the heath or graſs, and left looſe for ſome hours, to make it thoroughly dry.

“ As a great quantity of flax can ſcarcely be all equally watered and graſſed, and as its different qualities will beſt appear at lifting it off the graſs, each different kind ſhould then be collected together, and kept by itſelf, that is to ſay, all of the ſame colour, length, and quality.

“ The ſmaller the bundles are into which the flax is made up, the better they will be for drying, houſing, &c.

and in making up theſe bundles, as in every other operation upon flax, it is of great conſequence that all the ſtems be laid together as they grew, that is to ſay, root-ends to root-ends, and ſeed-ends to ſeed-ends.

The Livonians, ſay the before quoted Memoirs of the Society of Brittany, cut off the roots of their hemp, but not of their flax, when it is taking out of the ſteeping baſons above deſcribed. They then tie the flax or hemp up in bundles about as thick as the lower part of a man's thigh. Theſe bundles are placed upright, and ſupported by a ſtake, around which a few of the tops of their ſtalks are twiſted, the better to ſecure their ſtanding. They are left in this ſituation one day, to drain; then they are ſpread upon the graſs for one or two days, and after this they are laid in heaps, and covered over with haulm, ſtubble, ſtraw, or ſome other ſuch like covering, to make them ſweat. When the hemp or flax has ſweated enough, it is laid in heaps in the ſhade, and there dried: but theſe heaps muſt not be ſo thick, but that the air may penetrate a little into them. It is on this laſt operation that the good or bad quality of the hemp or flax thus managed chiefly depends. Both of them may be kept two or three years, and even longer, upon their reeds, after they have been prepared in the manner above directed; and when it is intended to break them, after this keeping, they are put into an oven properly heated.

In the common way, after the flax has been graſſed, it muſt be dried by heat, to make its reed break readily, and ſeparate the more eaſily from the bark. To guard againſt the danger of fire, this buſineſs is frequently performed in a place diſtant from any other building. The caverns, or hollows under hills, or rocks, before deſcribed for drying hemp, are alſo very proper for this purpoſe.

There are two general ways of drying flax. Some place againſt a wall, upon uprights and croſs pieces, a hurdle of which the bars are ſmall, and about two inches aſunder, and upon this the flax is ſpread four, five, or ſix inches thick: a ſmall fire, made of broken reeds of flax, is cautiouſly kindled under it, and care is taken to turn the hemp from time to time, that it may dry equally in every part: the flax-dreſſer takes off only that part of it which is at the ſide of the hurdle next the wall, then puſhes the reſt forward into its place, and fills with freſh flax the vacancy thereby made at the fore-part of the hurdle. This operation ſhould not be entruſted to any but a very attentive perſon, becauſe if the flame ſhould be ſuffered to riſe too high, it would ſet fire to the flax. It is true, indeed, that this ſeldom happens; and when it does, the loſs is not great, becauſe but a ſmall quantity of flax is laid together on the hurdle. Some ſay, that the ſmoke of the fire thus made of the broken reeds hurts the colour of the flax, and that this leſſens its price when it is ſold; but that the quality of the linen made of it is not at all the worſe, this diſcolouring being eaſily removed by bleaching.

The other method of drying flax is by putting it into a hot oven. The Livonians make their ovens, for this purpoſe, either of clay, brick, or hewn-ſtone. Thoſe which are built with clay, are ſometimes large enough to contain eight hundred bundles at a time: but it is more common to make them for only two, three, or four hundred. They are ſhaped like the ovens for an army, that is to ſay, they are very high arched. They require no greater degree of heat, which is given with dead wood, furze, broom, &c. than is juſt ſufficient to render the reed of the flax brittle; and the ſame of hemp, for the Livonians uſe them for both theſe plants, the bundles of which they ſet upright in them, and as ſoon as they take them out of the oven, they carry them to a kind of a mill, to be broken.

The Dutch build their ovens for drying flax within a large capacious chimney at the end of the building where the breakers and ſcutchers work. The uſual dimenſions of this building, which is well lighted, are, in the clear, thirty feet by fourteen; but it is ſometimes larger where great buſineſs is carried on, though ſeldom, if ever, leſs. The dimenſions of the oven here generally are fifteen feet in depth, ten in breadth, and five feet in height: its roof is arched, its entrance, which is juſt large enough to admit a man with tolerable eaſe, is made to ſhut cloſe with a wooden door. This oven is not heated with wood, excepting at the very firſt; for after the workmen have begun to dreſs the flax, the broken reeds, and other refuſe parts which are beaten off it, and ſwept up, ſuffice to continue the heat, ſo that each parcel affords firing for the next, till the whole is dried. The Dutch kindle the fire in the oven ſome hours before the day's work is over. The ſweepings of the flax light eaſily, and the oven heats and cools again ſufficiently before the breaking, and ſcrutching is finiſhed. They fill it when they leave off work; and the next day when they return to it they find the flax dry and fit for breaking. The flax breaks beſt and moſt eaſily when it is a little warm and criſp: and conſequently the working it then is cheapeſt and moſt advantageous; and accordingly the Dutch never draw two bundles together from the oven, but take them one by one as they want them. It will, perhaps, be needleſs to obſerve, that when the oven is heated, it muſt be well cleaned before the flax is put in; for the leaſt ſpark will ſet the flax on fire, and this would be a conſiderable loſs, as the ovens hold a large quantity.

An ingenious correſpondent of the editors of the Muſeum Ruſticum has given us the following directions for raiſing flax, as practiſed by the flax-raiſers in Scotland.

Of the Choice of the Soil, and preparing of the Ground for Flax.

A ſkilful flax-raiſer always prefers a free, open, deep, loam, and all grounds that produced the preceding year a good crop of turnips, cabbages, potatoes, barley, or broad clover, or had been formerly laid down rich, and kept for ſome years in paſture.

A clay ſoil, the ſecond or third crop after being limed, will anſwer well for flax; provided, if the ground be ſtill ſtiff, that it be brought to a proper mould, by tilling after harveſt, to expoſe it to the winter froſts; and that a little ſharp dung, ſuch as pigeons, ſheep, or horſe-dung, or aſhes, be ſpread upon the ground immediately before ſowing.

All new grounds produce a ſtrong crop of flax, and pretty free of weeds. When a great many mould heaps appear upon new ground, it anſwers the better for flax after one tilling.

Flax-ſeed ought never to be ſown on grounds that are either too wet or dry, but on ſuch as retain a natural moiſture: and ſuch grounds as are inclined to weeds ought to be avoided, unleſs prepared by a careful ſummer fallow.

Before ſowing, the bulky clods ſhould be broken, or carried off the ground; and ſtones, quickenings, and every other thing that may hinder the growth of the flax, ſhould be removed.

Of the Choice of Linſeed.

The brighter in colour, and heavier the ſeed is, ſo much the better: that which, when bruiſed, appears of a light or yellowiſh green, and freſh in the heart, oily and not dry, and ſmells and taſtes ſweet, and not fuſty, may be depended upon.

Dutch ſeed of the preceding year's growth, for the moſt part, anſwers beſt; but it ſeldom ſucceeds if kept another year. It ripens ſooner than any other foreign ſeed. Philadelphia ſeed produces fine lint and few bolls, and anſwers beſt in wet cold ſoils. Riga ſeeds produces coarſer lint, and the greateſt quantity of ſeed. Scots ſeed, when well winned and kept, and changed from one kind of ſoil to another, ſometimes anſwers pretty well; but ſhould be ſown thick, as many of its grains are bad, and fail: it ſprings well, and its flax is ſooner ripe than any other; but its produce afterwards is generally inferior to that from foreign ſeed.

Of Sowing Linſeed.

The quantity of linſeed ſown ſhould be proportioned to the condition of the ſoil; for if the ground be in good heart, and the ſeed ſown thick, the crop will be in danger of falling before it is ready for pulling. From eleven to twelve pecks, Linlithgow meaſure, of Dutch or Riga ſeed, is generally ſufficient for one Scots acre; and about ten pecks of Philadelphia ſeed, which, being the ſmalleſt grained, goes fartheſt.

The time for ſowing linſeed is from the middle of March to the end of April, as the ground and ſeaſon anſwer.

It ought always to be ſown on a dry bed.

Of Weeding Flax.

It ought to be weeded when the crop is about four inches long. If longer deferred, the weeders will ſo much break and crook the ſtalks, that they will never, perhaps, recover their ſtraightneſs again; and when the flax grows crooked, it is more liable to be hurt in the rippling and ſwingling.

Quickening graſs ſhould not be taken up; for, being ſtrongly rooted, the pulling of it always looſens a deal of the lint.

If there is an appearance of a ſettled drought, it is better to defer the weeding than by that operation to expoſe the tender roots of the flax to the drought.

How ſoon the weeds are got out, they ought to be carried off the field, inſtead of being laid in the furrows, where they often take root again, and at any rate obſtruct the growth of the flax in the furrows.

Of Pulling Flax.

When the crop grows ſo ſhort and branchy, as to appear more valuable for ſeed than flax, it ought not to be pulled before it be thoroughly ripe; but if it grows long and not branchy, the ſeed ſhould be diſregarded, and all the attention given to the flax. In the laſt caſe it ought to be pulled after the bloom has fallen, when the ſtalk begins to turn yellow, and before the leaves fall, and the bolls turn hard and ſharp pointed.

When the ſtalk is ſmall, and carries few bolls, the flax is fine; but the ſtalk of coarſe flax is groſs, rank, branchy, and carries many bolls.

When flax has fallen and lies, ſuch as lies ought to be immediately pulled, whether it has grown enough or not, as otherwiſe it will rot all together.

When parts of the ſame field grow unequally, ſo that ſome parts are ready for pulling before other parts, only what is ready ſhould be pulled, and the reſt ſhould be ſuffered to ſtand till ready.

The flax-raiſer ought to be at the pains to pull, and keep by itſelf, each different kind of lint which he finds in his field; what is both long and fine, by itſelf; what is both long and coarſe, by itſelf; what is both ſhort and fine, by itſelf; what is both ſhort and coarſe, by itſelf; and, in like manner, every other kind by itſelf, that is of the ſame ſize and quality. If the different kinds be not thus kept ſeparate, the flax muſt be much damaged in the watering, and the other ſucceeding operations.

What is commonly called under-growth, may be neglected as uſeleſs.

Few perſons that have ſeen flax pulled are ignorant of the method of laying it in handfuls acroſs other, which gives the flax ſufficient air, and keeps the handfuls ſeparate and ready for the rippler.

Of Stacking up Flax during the Winter, and Winning the Seed.

If the flax be more valuable than the ſeed, it ought by no means to be ſtacked up, for its own natural juice aſſiſts it greatly in the watering; whereas, if kept long unwatered, it loſes that juice, and the harle adheres ſo much to the boon, that it requires longer time to water, and even the quality of the flax becomes thereby harſher, and coarſer. Beſides, the flax ſtacked up over year, is in great danger from vermin and other accidents; the water in ſpring is not ſo ſoft and warm as in harveſt; and near a year is thereby loſt of the uſe of the lint: but if the flax be ſo ſhort and branchy as to appear moſt valuable for ſeed, it ought, after pulling, to be ſtacked and dried upon the field, as is done with corn, then ſtacked up for winter, rippled in ſpring, and, after ſheeling, the ſeed ſhould be well cleaned from bad ſeeds, &c.

Of Rippling Flax.

After pulling, if the flax is to be regarded more than the ſeed, it ſhould be allowed to lie ſome hours upon the ground to dry a little, and ſo gain ſome firmneſs, to prevent the ſkin or harle, which is the flax, from rubbing off in the rippling; an operation which ought by no means to be neglected, as the bolls, if put into the water along with the flax, breed vermin there, and otherwiſe ſpoil the water. The bolls alſo prove very inconvenient in the graſſing and breaking.

The handfuls for rippling ſhould not be great, as that endangers the lint in the rippling-comb.

After rippling, the flax-raiſer will perceive, that he is able to aſſort each ſize and quality of the flax by itſelf more exactly than he could before.

Of watering Flax.

A running ſtream waſtes the lint, makes it white, and frequently carries it away. Lochs, by the great quantity and motion of the water, alſo waſte and whiten the flax, though not ſo much as running ſtreams. Both rivers and lochs water the flax quicker than canals.

The flax-raiſer will obſerve, when the water is brought to a proper heat, that ſmall plants will be raiſing quickly in it, numbers of ſmall inſects and reptiles will be generating there, and bubbles of air riſing on the ſurface. If no ſuch ſigns appear, the water muſt not be warm enough, or is otherwiſe unfit for flax.

Moſs-holes, when neither too deep nor too ſhallow, frequently anſwer well for watering the flax, when the water is proper, as before deſcribed.

The proper ſeaſon for watering flax is from the end of July to the end of Auguſt.

The advantage of watering flax as ſoon as poſſible after pulling has been already mentioned.

The flax being ſorted after rippling, as before mentioned, ſhould next be put up in beets, never larger than a man can eaſily graſp with both his hands, and tied very ſlack, with a band of a few ſtalks.

The beets ſhould be put into the canal ſlope-ways, or half ſtanding upon end, the root-end uppermoſt. Upon the crop ends, when uppermoſt, there frequently breeds a deal of vermin, deſtructive of the flax, which is effectually prevented, by putting the crop-end downmoſt.

The whole flax in the canal ought to be carefully covered from the ſun with divots; the graſſy ſide of which ſhould be next the flax, to keep it clean. If it is not thus covered, the ſun will diſcolour the flax, though quite covered with water. If the divots are not weighty enough to keep the flax entirely under water, a few ſtones may be laid above them; but the flax ſhould not be preſſed to the bottom.

When the flax is ſufficiently watered, it feels ſoft to the grip, and the harle parts eaſily with the boon or ſhow, which laſt is then become brittle, and looks whitiſh. When theſe ſigns are found, the flax ſhould be taken out of the water, beet after beet; each gently rinſed in the water, to cleanſe it of the naſtineſs which has gathered about in the water; and as the lint is then very tender, and the beet ſlackly tied, it muſt be carefully and gently handled.

Great care ought to be taken that no part is overdone; and as the coarſeſt waters ſooneſt, if different kinds be mixed together, a part will be rotted when the reſt is not ſufficiently watered.

When lint taken out of the canal is found not ſufficiently watered, it may be laid in a heap for twelve, eighteen, or twenty-four hours, which will have an effect like more watering; but this operation is nice, and may prove dangerous in unſkilful hands.

After the flax is taken out of the canal, freſh lint ſhould not be put a ſecond time into it, until the former water be run off, and the canal cleaned, and ſupplied with freſh water.

Of Graſſing Flax.

Short heath is the beſt field for graſſing flax, as, when wet, it faſtens to the heath, and is thereby prevented from being blown away by the wind. The heath alſo keeps it a little above the earth, and ſo expoſes it the more equally to the weather. When ſuch heath is not to be got, links, or clean old ley ground is the next beſt. Long graſs grounds ſhould be avoided, as the graſs growing through the lint frequently ſpots, tenders, or rots it; and grounds expoſed to violent winds ſhould alſo be avoided.

The flax, when taken out of the water, muſt be ſpread very thin upon the ground; and being then very tender, it muſt be gently handled. The thinner it is ſpread, the better, as it is then the more equally expoſed to the weather: but it ought never to be ſpread during a heavy ſhower, as that would waſh and waſte the harle too much, which is then exceſſively tender, but ſoon after becomes firm enough to bear the rains, which, with the open air and ſun-ſhine, clean, ſoften, and purify the harle to the degree wanted, and make it bliſter from the boon. In ſhort, after the flax has got a little firmneſs, by being a few hours ſpread in dry weather, the more rain and ſunſhine it gets, the better.

The ſkilful flax-raiſer ſpreads his firſt row of flax at the end of the field oppoſite to the point from whence the moſt violent wind commonly comes, placing the root-ends foremoſt: he makes the root-ends of every other row over-lap the crop-ends of the former row three or four inches, and binds down the laſt row with a rope; by which means the wind does not eaſily get below the lint to blow it away: and as the crop-ends are ſeldom ſo fully watered as the root-ends, the aforeſaid over-lapping has an effect like giving the crop-ends more watering. Experience only can fully teach a perſon the ſigns of flax being ſufficiently graſſed; then it is of a clearer colour than formerly; the harle is bliſtered up, and eaſily parts with the boon, which is then become very brittle. The whole ſhould be ſufficiently graſſed before any of it is lifted; for if a part be lifted ſooner than the reſt, that which remains is in great danger from the winds.

A dry day ought to be choſen for taking up the flax; and if there is no appearance of high wind, it ſhould be looſed from the heath or graſs, and left looſe for ſome hours, to make it thoroughly dry.

As a great quantity of flax can ſcarcely be all equally watered and graſſed, and as the different qualities will beſt appear at lifting the flax off the graſs, therefore at that time each different kind ſhould be gathered together, and kept by itſelf, that is, all of the ſame colour, length, and quality.

The ſmaller beets the lint is made up in, the better for drying, and the more convenient for ſtacking, houſing, &c. and in making up theſe beets, as in every other operation upon flax, it is of great conſequence, that the lint be laid together as it grew, the root ends together, and the crop ends together.

Of keeping Flax after it is graſſed.

Nothing needs be ſaid here, but that if the flax is to be ſtacked, it ſhould be ſet in an airy place, upon a dry foundation, ſuch as pob-middings, or the like, and well covered from the weather; and if houſed, the floor muſt be dry, and the houſe well aired and water-tight.

General Remarks.

Perſons unſkilful in flax-raiſing frequently neglect altogether the ſorting of the flax, which ought carefully to be done at the three following different times, to wit, when pulling, after rippling, and when lifting it off the graſs; the conſequence of which neglect is, that very different kinds being mixed together, it can neither be watered, graſſed, nor ſcutched equally. They neither prepare proper canals nor water. They make the beets for watering a great deal too large, bind them very hard, and compreſs all their lint ſo cloſe together in the water, trampling it down to the bottom, and putting large ſtones, feals, or logs above it, that the hearts of the beets cannot be half watered, or not at all, when ſome of it is perhaps too much done. They frequently take it out of the water after it has been there a certain time, without examining whether it be underdone, or overdone. They lay it too thick upon the graſs, and upon long graſſy meadows, by which means ſome of it is tendered and rotted. In taking it off the field, they lay root-ends and crop-ends together, or, as is commonly called, head and thraws. Lint ſo managed muſt come out very ill in the dreſſing; and the fault is generally, but very unjuſtly, laid to the lint-mill, which muſt deſtroy what is well watered before it can clean the ill-watered part of the ſame handful. And thus it happens, that the ends are frequently beat away in the ſcutching, when the middle is not well cleaned, the ends of a beet being well watered, perhaps too much ſo, when the heart of the beet has ſcarce felt the water. Such inequality in the watering of the lint appears very remarkable as it lies upon the field, the middle of the rows then generally appearing of an higher colour than either of the ends. *Muſeum Ruſticum, vol.* IV. *page* 453.

The famous M. Tſchiffeli, of Berne, in Switzerland, has obliged the public with a Memoir on the Culture of Flax, the ſubſtance of which we ſhall lay before our readers.

In his directions for the choice of ſeed, he ſays, it ſhould be of a bright ſhining brown colour, not flat, but thick and plump; ſhould crackle much when caſt on live coals, and ſhould ſink to the bottom almoſt as ſoon as thrown into water.

With reſpect to ſoils, this writer obſerves, that any may do for flax, provided it is not too wet, or too ſtoney, and has not too much ſand or gravel mixed with it: ſome, however, are to be preferred, particularly black earth, neither too ſtrong nor too light; and, in general, ſtrong land is to be preferred to light.

To prepare graſs-grounds and paſtures for ſowing flax, M. Tſchiffeli lays down the following rules:

The land ſhould, by the end of July at lateſt, be turned up in ſmall furrows, about two inches deep. Early in the month of September, a heavy harrow ſhould, in dry weather, be drawn over the field, in order to pulverize the ſoil; and the month following, if the land is not in great heart, it ſhould have a good dreſſing of dung, which being firſt regularly ſpread, ſhould, in dry weather, be ploughed in to the depth of ſix inches at leaſt, with narrow furrows, leaving the field rough all the winter.

In the following ſpring this gentleman obſerves, that as ſoon as the ground is dry, the land ſhould have a good harrowing; and about the middle of April, which is in Switzerland the ſeaſon for ſowing, it ſhould, in dry weather, have its third ploughing, ſomewhat deeper than the ſecond; and if the weather ſhould not immediately afterwards be favourable for ſowing, the land ſhould the ſame day be harrowed down ſmooth.

When flax is to be ſown on a fallow, the three uſual ploughings are to be given, obſerving only, that every ploughing is deeper than the laſt; and the dung ſhould be buried by the laſt, leaving it rough during the winter, and managing it as above in the ſpring.

When flax is ſown the ſecond year after a fallow, the land being dunged the preceding year, and in good heart, no manure will be neceſſary; but immediately after harveſt it muſt be ploughed about two inches deep, to prevent the weeds from growing and impoveriſhing the ſoil. As ſoon as any weeds afterwards make their appearance, it muſt be well harrowed with heavy harrows, and about Michaelmas ſhould be ploughed in narrow furrows, about ſix inches deep, lying rough during the winter ſeaſon. The following ſpring the ridges ſhould be harrowed down, and afterwards laid ſmooth with ſmaller harrows, being in April ploughed for the laſt time.

Flax, M. Tſchiffeli remarks, thrives beſt upon land that has the preceding year borne a crop which ſhaded the ground, and prevented the weeds from growing; therefore good flax is ſeldom got after rye.

This writer very juſtly obſerves, that the quantity of ſeed to be ſown ſhould be proportioned to the nature and condition of the land, never leſs than two, nor more than three, buſhels to the acre. Light land ſhould be ſown earlieſt, but always after the dread of white froſts is over, and never in rainy weather, or when the ground is wet: a mild day is beſt for this purpoſe, when the wind is not in the north-eaſt, and dew may be expected in the evening.

It is beſt, our ſenſible huſbandman ſays, to begin to plough for ſowing after noon, the harrow following cloſe at the heel of the plough. A little before ſun-ſet, the ſeed is to be ſpread, beſt at three caſts, and the work left in this ſtate till the next morning, when, without fail, the ſeed muſt be covered with light harrows, or ſtrong rakes. If the ſoil is rather light, and the ſpring likely to be dry, it will be beſt to roll the land ; and if it was not manured before the winter, ſome very rotten dung may be ſpread after the ſeed is harrowed in, and before the field is rolled.

It is better to uſe no dung at all than that which is not well rotted : ſoot and aſhes, hogs or cows urine, are good manures for flax, or in fact almoſt any thing that will not carry weeds on to the land.

When flax is grown to the height of about four inches, it may ſafely be weeded ; but the precautions taken in Switzerland on this occaſion are worth notice. There the work is carefully executed, but with as much expedition as poſſible, the weeders going bare-footed into the field, and working as much as they can, either ſitting or lying down, heaping the weeds, and carrying them away every time they leave off working. The weeders ſhould alſo, if poſſible, always face the wind, by beginning at the corner of the field to which the wind blows, as in this method the flax will riſe the ſooner; and the work ſhould never be done in rainy weather, or when the ground is wet.

If the flax is to be propped, the beſt time to do it is at the time of weeding. To prop flax is to fix ſupporters, about the ſize of a man's finger, branched a little at the top, and about three or four feet long, at the diſtance of every three feet.

Flax ſhould be pulled in dry weather, in general, when the foot of the ſtalk begins to turn yellow, though the ſeed ſhould not be quite ripe. If the crop is not all of equal ripeneſs, the ripeſt ſhould be ſeparated, as, if all were to be graſſed together, the unripe part would be rotten before the other was ſufficiently graſſed : it is alſo beſt to pull, though at one time, the longeſt ſeparate from the ſhorteſt. When it is all pulled, it muſt be ſpread on graſs-ground, or on a ſtubble, the crop-end of the ſtalk being laid to the ſouth, that the ſeed may ripen the better.

M. Tſchiffeli is of opinion, that when the quantity is large, it is beſt to ſeparate the ſeed by threſhing as ſoon as it is got in, in the following manner. The beds muſt be made pretty thick, the crop-ends of the ſtalk touching the wall of the barn ; and over the feet of the ſtalks a heavy plank is to be laid, to prevent the flax from being ſcattered about in threſhing. The wall, by confining the workmen, will prevent them from ſtriking too hard, and thereby damaging the flax.

If the quantity of flax is ſmall, it may be rippled in the ordinary way, obſerving only that the handfuls be not too large. When the ſeed is ſeparated, it muſt be laid on a cloth, expoſed to the ſun for ſeveral days ; and afterwards it ſhould be kept in a very airy place ; but muſt be ſtirred every two or three days for three weeks. It may be kept in this condition two or three years, without the leaſt damage ; but when once this ſeed is deprived of its capſule, it will ſcarcely ever keep above a year.

When the flax has been rippled, it muſt again be laid, but thinner than the firſt time, on a graſs-field that has been about a fortnight before mown, being ſpread, if poſſible, in dry years on damp ground, and in rainy years on dry land, but never on wet meadows. It muſt at this period be carefully turned every other day, if the weather is wet, or the dews heavy.

The time the flax is in graſſing, depends on the coarſeneſs or fineneſs of the ſtaple, the heat and the cold, dryneſs and wetneſs of he weather ; but if, in bruiſing betwixt your fingers, the top of the ſtalk when it is dry, the harle or bark ſeparates eaſily from the woody part or boon, and this laſt is not tough, but brittle, the flax ſhould be taken from the ground, in order to be carried under cover as ſoon as it is dry.

The beſt method of drying flax for braking, this accurate writer ſays, is to dig a hollow place in the earth, two feet deep, three wide, and from twelve to fifteen feet long, lining it with ſtone, over which, at the height of about four feet, is fixed a griddle, or grating, conſiſting of ſmall poles, ſecurely made faſt to four or ſix piles, or ſtakes, driven into the ground.

The moſt proper fuel, we are told, for drying the flax, is either charcoal, or well-dried turf, as well becauſe they give an equal degree of heat, as on account of their not producing much of either flame or ſmoak.

When the workmen begin to brake the flax, they muſt go on briſkly ; for it ſhould be done whilſt it is hot from the grating, and ſhould be effected by an equable motion, beginning at the crop-end.

In this manner does the ſenſible and patriotic Monſ. Tſchiffeli ſay that flax ſhould in this country be cultivated and managed ; and, if we are not greatly miſtaken, the method might, with very little variation, be to advantage adopted in the Britiſh iſlands.

As different countries have different methods in cultivating the various productions of the earth in general ; ſo thoſe relating to flax, in particular, are greatly deverſified. We have, therefore, given under this article every thing we thought worthy the reader's attention. The following is the method practiſed in the Mahera, a diſtrict of the county of Roſcommon in Ireland ; and was wrote by Mr. John Irwin, a gentleman, who has long cultivated flax there with ſucceſs.

Of the Cultivation and Management of Flax in the Mahera.

The poorer ſort of people in the diſtrict I live in, are ſo indigent, that they are almoſt in a ſtate of ſlavery. Indeed, within theſe laſt forty years, they have much recovered from their bare and naked condition, owing in a great meaſure to the conſiderable extenſion of the linen manufacture.

Their chief riches conſiſt in their annual crops of flax, corn, and potatoes, in order to pay their rents, which they help off with day-labour ; a moſt galling article to them; for, as to cattle, few of them have any, or but a milch-cow or two at moſt, which are appropriated for nouriſhing generally a numerous iſſue. The calves, which induſtry ought to be let remain with them to increaſe their funds, or to clothe their families, a rapacious landlord ſeldom wants a pretence of appropriating to himſelf. Theſe people then, from neceſſity, it is evident, muſt be perfectly verſed in the cultivation of flax and potatoes ; and they would ſucceed very well as to corn, had they ſurmounted a few old prejudices reſpecting the form or make of their implements, and the methods of uſing them. It is, however, from ocular knowledge of their proceedings, in my work and their own, that what I now communicate to you is founded.

The ſoil about Oran, being ſtrong, deep, and moiſt, with a clayey loam moſtly at bottom, yields excellent flax. It is here ſcarcely ever produced immediately from the ley. The general practice is as follows : a parcel of ley land in good heart, that is, which has not been ploughed for many years, is proclaimed to be ſet to graſs potatoes (otherwiſe ſpaddane, a very miſtaken practice, eſpecially if a deep ſoil, if not to be ſanded, or if a light, if not marled, or limed, or otherwiſe manured :) for this land the poor are charged from three pounds to five pounds per acre, ſanding not always included : a moſt unconſcionable price!

They generally bargain for two ſucceſſive crops ; and it is for their benefit, as alſo for that of the land, to have it ſanded, becauſe it ſtrengthens it the better to ſtand a continuation of tillage, and to come the ſooner to turf, and yield a good coat of graſs, when let back into the ley ; but the ſky-farmers (thoſe who hold at rack-rents) are moſtly ſo greedy for grain, that it is with reluctance they agree to ſanding, as it abates fourteen ſhillings per acre of their price. When land that requires it is not ſanded previous to this kind of tillage, it is doing it great prejudice ; but farmers are not always ſollicitous about this matter, eſpecially on ſhort leaſes.

Land properly ſet in this way ought to be ſanded at leaſt a year before ſetting, that it might have proper time to penetrate into the earth, and impregnate it with its ſalts ; but they are ſuch bad farmers about me, that they ſet, ſand, and plant their potatoes almoſt at the ſame time. Even in this bad way the land ſhould be ſet and ſanded (or otherwiſe manured) at leaſt in November, and the potatoes planted the March following at fartheſt : but I have ſeen land not ſanded till March or April, and not ſowed till towards the end of May, (a palpable blunder ;) yet this land has yielded a tolerable crop, owing to its great natural fertility ; for the ſand becomes of little uſe, if the land is turned up ſoon after it is freſh laid on. This does much hurt in the country; for ſuch land, after it is let out from a long ſeries of tillage, (ſuppoſe fifteen years) is a long time recovering itſelf, and that which is ſpaddanized out of the ley, and not gravelled at all, unleſs of a moſt ſuperior rich kind, is doubly injured.

The potatoes ſhould be dug towards the end of October, or beginning of November at fartheſt, (froſty weather excepted) to make room for a crop of bere, or a crop of flax, the ſpring following; if for flax, the land ſhould get a deep ploughing before Chriſtmas, to benefit of the winter manure, ſuch as froſt, ſnow, air, &c. and a croſs ploughing the beginning of February; and towards the end of March, it ought to get another ploughing in the track of the firſt; then the ridges to be harrowed down as fine and as flat as poſſible, and the ſeed ſown in, and lightly covered with another gentle harrowing; for the ſeed is not apt, from any cauſe that I have obſerved, to be diſturbed in the ground.

In this ſituation it ſhould be left till June, then weeded. Some weed it when four or five inches high; but treading it ſo young hurts it; and this weeding is of no uſe, for it muſt be weeded again before pulling, eſpecially in deep chiltern countries, where weeds get a-head much more than in light gravelly ſoils. In theſe the flax is always ſhorter and finer, and the ſeed in leſs quantity; but the Iriſh ſeed, though it is often impoſed for foreign, is never ſo good: for example, the firſt year's return of foreign ſeed will produce a middling good ſort of flax, whereas the ſecond return will not. To ſow the ſeed even ſhould be moſt carefully attended to: a commonly ſkilful hand will with eaſe caſt it properly, the method being ſo well known. Sixteen pecks of ſeed, at twelve quarts to each peck, is a proper quantity for an acre of good light ſoil. In my deep grounds I have known fourteen pecks to be ſufficient.

The ſeed now much uſed in Ireland is the Plantation, but the better ſort of the Baltic or Riga ſeed I would prefer. The Dutch agrees worſt of all with our climate. The choice of it is eaſily known. The women are ſurpriſingly ſkilful in every thing that regards this plant: one of them will ſhut her eyes, put her hand into ſeveral hogſheads of flax-ſeed, and fix upon that which is beſt; but they have marks from preſſing it to oil between their fingers, ſo as to obſerve the edges, and from taſte, ſmell, and view, without requiring to make the other common experiments; whence they are ſeldom deceived; not but the merchants play them a thouſand tricks in this article, which is become very lucrative of late years, from the vaſt demands there are for it.

The heavy, pale reddiſh, or rather clear brown looking ſeed, being thick and ſhort, and oily in the feel, is the beſt. Sometimes, among ſome parcels of the ſeed, there are certain mixtures, by which predications the women immediately eſtimate the quality of it. The old Iriſh ſeed, of which quantities are ſtill ſown, is the worſt of all; the returns are extremely bad, and the flax but indifferent for uſe.

Two crops ſucceſſively are common in deep rich lands; but as flax is a great drawer, they are not the better for it, as it greatly retards their coming to graſs.

We always ſow flax after potatoes or corn, (bere) and, if proper care be taken in the preparation of the land, find it to anſwer well. How far better it may be immediately out of freſh land manured, I will not take upon me to ſay: ſome writers recommend this method; but it would never anſwer with our poor people. I have ſeldom known flax to be raiſed immediately from manured grounds: mine being rich, deep, and moiſt, and properly wrought to return a firſt crop of ſome other article, yields afterwards admirable flax. Where different ſoils can be had in the ſame diſtrict, it is needleſs to obſerve, that the richeſt and ſtrongeſt, with a clayey loam at bottom, is beſt: the nature of this plant requires ſuch, being a great drawer of the nutritive parts of the earth; but, on the other hand, there is a medium to be followed in this, as in moſt other things: land may be made too rich for flax, which will undoubtedly lodge it, that is, occaſion its prematurely lying flat to the ground: this prevents its ripening, conſequently occaſions great waſte of it, total loſs of ſeed, and what is recovered of it manufactures but indifferently, and ſtands the teſts of uſe worſe: however, there is much of this ſort ſpun into yarn by the poor, and impoſed for good on the eagle-ſighted yarn-buyer, notwithſtanding his great vigilance.

If middling good land, whether in the ley or not, be fallowed early in the ſummer, and gets the proper tilth till the March following, when it is to be ſown, there is no doubt but it will yield an excellent and abundant crop of flax. Land cannot be ploughed too often, or made too fine, for this purpoſe. Flax ought to be ſown and pulled in dry weather.

It is ripe in my neighbourhood, generally ſpeaking, not till the beginning or middle of Auguſt, and ſometimes later, when late ſown: the better ſort of huſbandmen think it is not neceſſary to ſow it earlier than Good-Friday: about that time moſt people begin.

The poor people have ſeveral marks by which they know when it is fit for pulling: the degree of brownneſs of the colour is the chief, and is a ſufficient guide to any perſon. The men and women, promiſcuouſly ranged in a row abreaſt, pull it expeditiouſly enough, eſpecially if they are a little refreſhed with ſome of the good things of this life, and lay it on the ſwarth. If there be danger of rain, they bind it the ſame evening into ſheaves, and ſtook it, putting commonly eight ſheaves in every ſtook. Here it is ſuffered to remain for ſome days, till it is ſufficiently dry to remove.

The poor, from neceſſity, proceed to manufacture it immediately, by rippling of the rows, and watering it, &c. But my method is as follows. After I let my flax ſufficiently ſeaſon in the field, ſo as to prevent the danger of heating, which deſtroys it, I draw it into my haggard, ſtack it, and thatch it well. Thus I let it remain till the next ſowing time, (March) when I ripple it and water it, and, if I have leiſure, proceed to dreſs it; if not, make it back into a ſtack, and let it lie ſo, without any hazard of danger, as long as convenient: or, (another way) ſoon after pulling, it may be rippled, watered, and ſtacked, ſo as to be ready for dreſſing the ſpring following. But I chuſe the former method, becauſe I thereby preſerve the ſeed, and ſell it, if I take a little care, equal to the foreign, which will go a good way in reimburſing me my expence: it is true, the quantity of flax will be ſomewhat diminiſhed for remaining ſo long unwatered; but then it makes ample amends in meliorating it; for I have obſerved, that the flax thus managed dreſſes and manufactures much better, and when in linen, it wears beſt. But the impatience of our Iriſh ladies, who are the conductors of this branch, from the time the flax is over ground, till made into linen, is ſuch, that they do not reliſh delays of this ſort, though infinitely the beſt method of proceeding.

For watering flax, clear ſtagnated pools or canals, or ponds, are beſt, provided there are no fiſh, as it kills them: ſprings and running waters muſt be avoided. To ſink it under water is proper, and let it lie about three weeks, more or leſs, according to the quality of the flax, and the condition of it at putting in.

About me the poor people ſtill perverſely will water it in bog holes, becauſe they think the water cannot be too ſoft, and that the banks, being unincumbered with long graſs, facilitate the drying of it.

When it is brought home (as they have no ovens) they fix a large hurdle horizontally by a ditch ſide, about four or five feet from the ground: on this they lay a parcel of flax, and underneath make a large turf fire, and keep conſtantly turning it.

They judge it fit for the brake, by rubbing a parcel between their hands, and finding the prickles to detach themſelves eaſily from the flax.

The braking is a very laborious part: it is pity that about where I live there are no engines contrived for this purpoſe, as it would ſave great expence in labour. This part of the proceſs ought, properly ſpeaking, to fall ſolely to the ſhare of the men; but the women as commonly do it, which I think very unſeemly, and ſtill more ſo to ſee a man ſcutching and hackling flax, which is equally as common with us: but the women always ſcutch mine, and I find do it beſt, as I order them refreſhment, it being merry making time, (though but ſhort) like vintage, or ſheep-ſhearing time.

The conſtruction of the brakers I need not explain; they are ſimple engines, and known to every body. The broad ſcutch is beſt, as it hurts the flax leſs; it ought to be made of well-ſeaſoned oak, to be light, that the women, who are dexterous at it, may manage it the more eaſily.

A great deal depends on the ſkill of the hackler, who ought to be very expert and knowing in dividing it properly, and in arranging the ſorts according to their different fineneſs. I have had ſome hacklers manage this matter ſo well, that out of the very tow they produced I had good linen for common uſe. I had other hacklers, who, inſtead of preparing my flax to ſpin to eight or ten dozen of yarn to the pound, of which it was capable, prepared it ſo badly, as to produce me only from four to ſix dozen yarn.

To the ſpinners we keep in our houſes we generally give from thirty-five to forty ſhillings a year: theſe ſpin from four to eight dozen yarn; but if they ſpin finer, they are entitled to get a gratuity in addition, or higher wages. There are girls in plenty in the north of Ireland (where the manufacture moſt flouriſhes) who ſpin ſurpriſingly fine, and many of them with both hands at once, at wheels adapted for the purpoſe; but ſcarcely any of theſe ever come into the parts where I live.

As to the reſt, from the time the yarn is ſent to the weaver, till it is brought home from the bleach fit for uſe, it forms a particular proceſs in itſelf, and ſhall be communicated to the public, when more ample leiſure will permit. However, before I diſmiſs this ſubject, it may not be improper to make a few detached obſervations to illuſtrate ſtill more what I have already ſaid.

There are various ways to know good ſeed, which is one of our moſt eſſential objects. Firſt, To diſcover its thickneſs, by taking ſome grains, and ſqueezing them between the fingers, until the white edges of the inſide pulp or grain are forced to appear. To eſtimate its goodneſs by its weight may be eaſily done, by throwing a handful into water, and if good it will ſink quickly. To prove if it be oily, throw a handful on the fire, and if, as ſoon as it touches the coals, it burns up and crackles, its goodneſs may be depended on. But no ſeed of Iriſh growth, as I ſaid before, will thrive well a ſecond year in any of the ſoils in my neighbourhood; nor will the ſame ſoil anſwer for more than two ſucceſſive ſeaſons, without the intermediate occupation of other crops procured from manures.

As the culture of flax lays down land very ſmoothly and well, if you chuſe to have your land let out, you may ſow graſs-ſeeds with a light roller, or buſk, in ſome little time after your flax is in the ground: they will not hurt it; and by this means you will have a full coat of graſs the ſame ſeaſon, which otherwiſe perhaps would not be the caſe for two or three ſeaſons, flax being a great impoveriſher.

When the flax is a clear yellow, or a clear brown, ſomething reſembling a lemon colour, and begins to drop its leaves, it ſhould be pulled; but never when it is green, though often done, which is a very deſtructive method, for in this caſe it loſes conſiderably in quantity and quality, both with reſpect to flax and ſeed. Thoſe who imagine pulling it green will make it yield the finer linen are miſtaken: they need only conſult the method of the Flemings, who ſuffer it to remain the longer in ground, the finer they want it to prove for their laces, cambricks, &c. Care, however, ſhould be taken not to let it remain too long in ground, as this makes it work badly, yield bad yarn, and not bleach ſo well.

I have kept my flax in ſtack in my haggard ſome two or three ſeaſons, and never found it was damaged by vermin, though I know there are preventatives laid down by ſome writers for this purpoſe.

If the ſeaſon be moiſt, there is no ſtacking it with ſafety, till it remains unheaped a conſiderable time in the barn, as the leaſt heating is certain deſtruction to it.

No land can be too good for flax, if the ſeed be duly proportioned to it. If the crop fails on a rich and ſtrong ſoil, it has too much ſeed; for it ſhould not be ſo thick, bus that every ſtem may have the benefit of the ſun and air to fortify it. *Muſeum Ruſticum, vol.* I. *page* 5.

A ſhort Account of the Advantages of the new Machinery for breaking, ſcutching, and beating Flax and Hemp, invented by Robert Mac Pherſon, Aſſiſtant-Secretary to the Commiſſioners and Truſtees for Improvements in Scotland.

The breaking of flax by the Dutch hand-brake (which is the beſt old method of breaking) the ſcutching with ſtock and hand, and beating with hand-mallets, being laborious, tedious, expenſive, and requiring many hands, it was thought a valuable improvement, when, ſome years ago, a water-mill was invented, by which theſe operations are performed with more eaſe and expedition. But in ſome parts of the country, a ſufficiency of water and water-fall is not to be met with; in other parts where theſe are to be had, lint-mills are not erected, on account of their heavy expence; and where-ever erected, they are found liable to the following inconveniencies. Firſt, The expence of fitting up the mill, making dams, the aqueduct, &c. and keeping theſe in repair, is great; and much damage happens by fire, and by water-floods. Secondly, In Scotland, it has hitherto been found, that on account of the ſcarcity of hands, and difficulty of dreſſing in the old hand-methods, flax never was raiſed in conſiderable quantities, until the country people found the conveniency of a mill in their neighbourhood; and therefore the firſt fitter up of a mill in a part of the country where there was none before, could not for years expect buſineſs adequate to his out-lay of money. This circumſtance obliged the linen board in Scotland to defray part of the expence of fitting up many of theſe mills. Thirdly, This mill is extremely dangerous to the workmen; many have loſt arms by it, ſome their lives, and the nature of the work there is otherwiſe remarkably unhealthy. Fourthly, This mill is ſo conſtructed, that the ſtroke of its ſcutchers is ineffectual, unleſs they are moved with a degree of violence, that nothing leſs than the utmoſt dexterity and cloſeſt care can prevent from deſtroying a very conſiderable part of the flax; and as that ſkill and unremitted attention cannot be expected among a number of common day-labourers, the great waſte of flax always attending theſe mills is eaſily accounted for, eſpecially as unſkilful hands are often employed; for being called to this work only in winter, the lint-miller muſt content himſelf with labourers that, at the beginning of the ſeaſon, are not otherwiſe engaged. Fifthly, The carriage of the rough flax to mills at a diſtance, the delay there, ſometimes for months, till others be ſerved, during which time the flax muſt lie without doors: damage, embezzlement, &c. theſe are much complained of; and, with the waſte before-mentioned, have in general ruined the character of theſe mills. Sixthly, The expence of flax-dreſſing is ſtill kept high, becauſe the proprietor of the mill muſt have a large rent, eſpecially as his outlay upon it is extenſive; the miller muſt have a living; and the workmen extraordinary wages for ſuch dangerous and unhealthy work. In ſhort, it has become very doubtful, whether, upon the whole, theſe mills have not been more hurtful than beneficial to the manufacture.

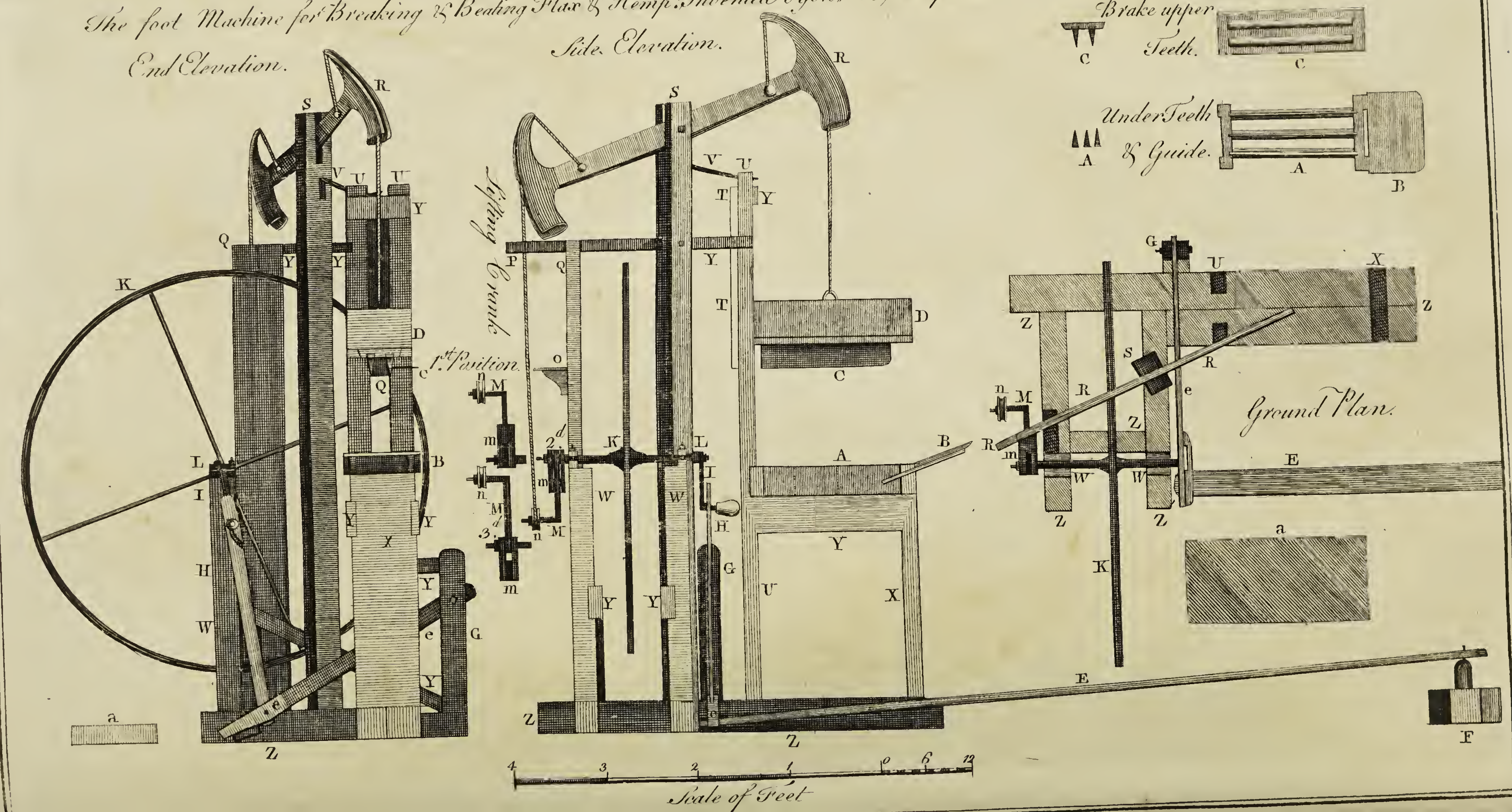
The new water-mill for dreſſing flax and hemp, invented by Robert Macpherſon, removes part of theſe inconveniencies. For, 1. It is much leſs waſteful of the flax; as much ſo, it is preſumed, as water machinery can poſſibly be. It not only yields more flax from the ſcutch, but the flax dreſſed by it yields ſtill more from the heckle. 2. It is fitter for dreſſing long hemp. 3. It is no way dangerous nor unhealthy to the workmen. 3. It requires a leſs expenſive mill-houſe, and leſs annual repair. 5. It requires much leſs water. 6. For one, two, or a few workmen, the parts of its machinery which dreſs the flax or hemp, may be joined to the movement of a corn-mill, or any other mill, by a ſmall iron-axle, or by rope and pully, through any wall or partition, at a ſide, above, or below.

Where much buſineſs in the beating way is to be done, the new machinery with water or a horſe, gives entire ſatiſfaction. But ſcutching proves an operation that requires more judicious management than can be expected at a public water-mill. A lint-miller, who dreſſes flax for others, finds his profit in the diſpatch made by the great velocity which can be given to the ſcutchers by a power of water; but the proprietor of the flax loſes more by the waſte occaſioned by that velocity than the miller gains by the greater diſpatch. In ſhort, the dreſſing of flax by any expenſive public water-mill remains ſtill liable to many of the inconveniencies mentioned in the firſt part of this paper.

The foot-machines (likewiſe invented by Robert Macpherſon) it is preſumed, obviate all theſe inconveniencies, and go far towards towards bringing flax-dreſſing to perfection. For, 1. They waſte the flax or hemp as little as

PLATE XVI.

The foot Machine for Breaking & Beating Flax & Hemp; Invented by Mr. R. Macpherson.



the hand methods of dreſſing. 2. They are much more expeditious, and as much ſo as dare be attempted without deſtroying a conſiderable part of the flax or hemp, which above every thing elſe ought to be avoided. 3. The working with them is not ſo laborious as the hand methods. 4. They are not dangerous to the workmen. 5. They are not too bulky for general uſe: they are portable upon a cart, are of ſmall expence, ſimple conſtruction, can be made by any good carpenter and ſmith, and each machine is wrought by a ſingle perſon.

With theſe foot-machines any perſon may have his flax or hemp dreſſed under his own eye, by his own ſervants, and at times when otherwiſe they would be idle, in the dark afternoons of winter, when the lanthorns uſed by hecklers will prevent accidents by fire, and in the day-time when bad weather hinders working in the fields. Thus the dreſſing of flax and hemp becoming eaſy, the raiſing of theſe crops, of all the moſt profitable to the farmer, and to the country, will become more general; many will have their flax or hemp dreſſed by their own ſervants, without expence; and when others are hired to that work, the expence muſt be much leſs than by the hand methods, as the machines are greatly more expeditious. The water-mills are not taken into this compariſon, becauſe their waſte of the flax or hemp overbalances the profit of their greater diſpatch.

The importance of this new machinery to Britain, Ireland, and the colonies, muſt appear very great, when the following particulars are conſidered.

	l.
The value of the flax and hemp raiſed in England yearly cannot be reckoned leſs than –	250,000
It appears from the Cuſtomhouſe accounts, that there was imported into England, from Chriſtmas 1762, to Chriſtmas 1763, 100,997 buſhels of linſeed. In the fens about Lincoln-Waſh, thirty towns and villages have yearly about 6000 acres of flax and hemp. There are likewiſe ſome thouſand acres of theſe crops yearly in the marſh-lands on the borders of York and Lincolnſhires. The town of Snaith in Yorkſhire has the greateſt flax-market of any place in Britain.	
The value of the flax and hemp raiſed in Scotland yearly is calculated about – – – –	190,000
There is imported into Scotland about 60,000 buſhels of linſeed yearly.	
The value of the flax and hemp raiſed in Ireland yearly may be reckoned about – – – –	500,000
The linen manufacture there is about double that in Scotland, and moſtly made of their own flax.	
Sum of theſe – – –	940,000

The expence of breaking and ſcutching that 940,000 pounds worth of flax and hemp may be reckoned 150,000 pounds; one half of which, or 75,000 pounds per annum, muſt come in time to be ſaved by the uſe of the new machines; for the new ſcutcher does more than double the work of the old hand-ſcutch in the ſame time. The new brake is not ſo advantageous in that reſpect; yet the inventor thinks he errs on the ſafe ſide, when he ſtates the new brake and ſcutcher both together, as doing only double work.

The colonies in America are now encouraged to raiſe flax and hemp, by a parliamentary bounty in Britain.

The great advantages of raiſing our own ſeed, flax, and hemp, inſtead of providing them from foreign countries, need not be here repreſented. What is at preſent imported appears from the Cuſtomhouſe accounts as follows: and it cannot be doubted but the aforeſaid new machinery will be the means of increaſing our own growth, and conſequently decreaſing the foreign importation.

	l.
The linſeed imported into England is annually about 100,000 buſhels, reckoned in value about – – – – – – – – – – –	40,000
Into Scotland, about 60,000 buſhels – – –	25,000
Into Ireland, about 80,000 – – – – – –	34,000
Flax and hemp into England, about – – –	700,000
Into Scotland, about – – – – – – – –	120,000
Into Ireland, about – – – – – – – –	
Sum of theſe, excluſive of the blank for Ireland	919,000

And that there can be no want of market for an extenſion of our linen and hempen manufactures (which the new flax-machinery muſt greatly promote) appears evident from the extenſive importation of theſe manufactures from foreign countries; for, according to the Cuſtomhouſe accounts, there is annually imported into England, from the continent of Europe.

	l.
Linen-yarn, of value about – – – – –	200,000
Linen-cloth, of value about – – – – –	1,500,000
And thread, lace, ſail-cloth, cordage, ſacking, &c. the amount of which muſt alſo be conſiderable.	

Explanation of Plate XVI. *repreſenting the* FOOT-MACHINES *for* BREAKING *and* BEATING FLAX *and* HEMP.

Of the FOOT-BRAKE.

A B	The three under-brake teeth, or ſwords, ſeventeen inches long, three inches deep, one and a quarter inch thick at back or bottom, a quarter of an inch at edge, the edges two and three quarters inches aſunder at the end next the guide B, and two inches aſunder at the other end.
C	The two upper teeth, about one inch ſhorter than the under teeth.
D	The brake-mallet, about thirty-three pounds Engliſh weight.
E, e, F G	A compound foot-treadle. E is eight feet four inches between the fulcrums, raiſed at F eight inches above the ground (or rather five inches higher than the ſtance of the workman.) e is two feet four inches between the fulcrums, and is raiſed at G eighteen inches above the ground; that is, fifteen inches higher than the ſtance of the workman.
H	The ſword or upright timber-rod which turns the wheel by the treadle-crank.
I	The treadle crank, of ſeven and a half inches radius.
K	The fly-wheel, four and a half feet diameter, above ſixty pounds Engliſh weight. As here repreſented it is beat or caſt-iron, but it is alſo made of timber.
L	Braſs cods or buſhes.
M, m	The lifting crank. m is fixed firm upon the axle of the fly, while the crank M, about eight inches radius, plays freely round the axle. In poſition firſt, m begins to take round the crank (which by the lever R pulls up the mallet:) when it comes to poſition ſecond, the mallet is again at liberty, and by its weight pulls up the crank (faſter than the fixed pieces moves) into poſition third.

N. B. The treadle-crank is advanced about one eighth part of the circle before the lifting crank.

a	A ſmall pulley, which turns eaſily round on the end of the crank, and to which a rope is fixed.
O	A piece of timber which prevents the rope from falling in upon the axle, but which ſhould not rub againſt the rope in its coming down.
P	Here the rope paſſes between two friction-rollers, which are ſo placed that the rope comes down there four inches, or half the radius of the lifting crank, to the ſide of a plummet-line croſſing the centre of the wheel; that is, to the ſide on which the crank turns when it pulls down the rope.
Q	A pillar, which ſerves only to ſupport the guard for the rope O, and the friction-rollers at P.
R	The lever.
S	The lever-pillar.
T	Part of the mallet-frame.
U	Two pillars which guide the brake-mallet.
V	An iron ſpring which receives the leap of the mallet, and throws it the quicker down.
W	The pillars which ſupport the fly.
X, U	The pillars which bear the brake-teeth and mallet.
Y	Spur and croſs, ſupports of the pillars.
Z	The bottom frame-piece.
a	A broad ſtool upon which the workman ſtands, three inches above the ground.

The brake-teeth are made of good beech or planetree, the brake-mallet of planetree, aſh, elm, birch, or oak; the

the ſword, or upright timber-rod between the treadle and the treadle crank, of beech, planetree, or birch; and the lever of beech, aſh, or oak. The fly-wheel, if timber, ſhould be made of oak, aſh, beech, elm, or planetree. All the other parts of timber worth mentioning may be made of fir.

Of the Foot-Beaters.

The before-mentioned brake may at any time be converted to a beater of flax and hemp, by removing the brake-teeth, and putting in their place flat boards. In the upper of theſe boards may be driven thirty-two nails, the head about three quarters of an inch long, and the point of the head about a quarter of an inch diameter; the points of the nail-heads may be placed one inch clear aſunder, and in the order marked B, at equal diſtances, as in this way any of the nails may moſt eaſily be drawn out in repairing the mallet. An iron hoop about the mallet will prevent its burſting with the indriving of the nails.

For the ſole purpoſe of beating flax and hemp, the narrow end of the mallet is placed toward the workman; and where there is much work in that way, the mallet and fly may be made heavier, and then two or more workmen can work together upon the foot-treadles, which may alſo be made equally long.

Plate XVII. Fig. 1. repreſents the ſcutching machine, where *h* B G is the foot-board; D, D, ſcutchers; Q, the center of the iron wheel C, C, Q; S, the upright piece, or ſcutching ſtack; A the piece on which the hand reſts in order to ſcrutch the flax. The machine is put in motion by the nunch at M, which is moved by the foot-board.

We have been the more particular in our account of the various methods uſed in cultivating and dreſſing flax, becauſe it is an article, which, with proper encouragment, may become of the utmoſt importance to theſe kingdoms; and, therefore, we were perſuaded that we could not do a more acceptable piece of ſervice to the huſbandman, than by giving the various methods at full length, though we are conſcious that in doing this the reader will meet with ſome repetitions, which could not be avoided without curtailing the whole, and conſequently rendering it leſs valuable. It is for the ſame reaſon, that we think the following account of the progreſs of the flax-huſbandry in Scotland, will be conſidered as a very uſeful and entertaining addition to this article.

Progreſs of Flax-Husbandry *in* Scotland.

[Written by lord Kames; and publiſhed, about the middle of January, 1766, by the Truſtees for Improvements.]

As the power of a ſtate conſiſts chiefly in the number and induſtry of its people, every thing muſt be of importance that contributes to theſe ends. This obſervation puts the linen manufacture in a conſpicuous light; for it employs many hands, and requires the moſt painful induſtry. In Scotland, this manufacture, which, within the memory of man, ſcarce deſerved the name, has of late years made a progreſs ſo rapid, as to become our chief manufacture, circulating more money than all our other manufactures in conjunction. Nor is there any ſymptom of its being ſtationary: on the contrary, it is every year boldly advancing with wider and wider ſteps.

This proſpect muſt be agreeable to every well-hearted Briton; and to gratify the laudable curioſity of ſuch perſons, the following brief account of the progreſs of the manufacture is preſented. The board of Truſtees was eſtabliſhed anno 1727: the value of the linen ſtamped from the 1ſt of November 1727 to the 1ſt of November 1765, not including what was made for private uſe, was as follows. [xii. 351.]

Anno	L.	Anno	L.
1728	103,312	1737	183,620
1729	114,383	1738	185,026
1730	131,262	1739	198,068
1731	145,656	1740	188,777
1732	168,322	1741	187,658
1733	182,766	1742	191,689
1734	185,224	1743	215,927
1735	177,466	1744	229,364
1736	168,177	1745	224,252
1746	222,870	1756	367,721
1747	262,866	1757	401,511
1748	293,846	1758	424,141
1749	322,045	1759	451,390
1750	361,736	1760	523,153
1751	367,167	1761	516,354
1752	409,047	1762	474,807
1753	445,321	1763	552,281
1754	406,816	1764	573,243
1755	345,349	1765	579,227

Though the progreſs of the linen manufacture in general is not the profeſſed purpoſe of this paper, yet I ſhall endeavour to account for it, as a proper introduction to an hiſtorical narrative of the meaſures taken by the truſtees for promoting our flax-huſbandry.

The union of the two crowns of England and Scotland was a fatal event for the latter. The great increaſe of power which our kings thereby acquired, reduced the Scotch nobility to a ſtate of humble dependence. From being petty monarchs, they became ſlaves to the crown, and had nothing left to ſupport their accuſtomed dignity, but, under protection of the crown, to enſlave their inferiors. The national ſpirit, bold and brave, ſubſided by degrees; and a general torpor ſucceeded, the never-failing effect of ſlavery. Though reſtored to liberty and independence, by the union of the two nations, yet mutual jealouſy and enmity obſtructed long the advantages of our new ſituation. At length the bleſſings of liberty and independence became conſpicuous, and invigorated multitudes to exert themſelves in laudable undertakings. And hence that ſpirit for improvement in Scotland, diſplayed upon huſbandry, upon manufactures, upon commerce, and upon literature.

The eſtabliſhing a board of truſtees for directing this national ſpirit, upon fiſheries, and upon the manufactures of linen and woollen, was a meaſure wiſe and political, zealouſly promoted by a worthy patriot, who was rewarded, by the opportunity he long had of ſerving his country, as an eminent member of that board. His ſtatue was erected in the ſenate-houſe, by thoſe of his own profeſſion, in token of their veneration for him, as a judge above all corruption. From his fellow-citizens in general a ſtatue was not leſs due, as a token of their gratitude for his patriotiſm.

But whatever was his zeal for the public good, and whatever zeal he inſpired into others, yet the operations of that board were not at firſt attended with great ſucceſs. The indolence and ignorance of the low people, and their want of honeſty, could not be cured but by perſeverance and artful management. But unluckily we were at that time ill provided with political phyſicians ſkilled in the cure; which is always the caſe in a country where induſtry is dead, and no perſon thinks of it. The truſtees were forced for ſome time to grope in the twilight of knowledge: they frequently miſtook their road, and adopted meaſures that were not always adequate to the ends propoſed. But as the intendment of this paper is neither to make a ſatire nor encomium upon the truſtees, it ſhall only be obſerved in paſſing, that the ignorance of this nation with reſpect to manufactures, and with reſpect to the means of promoting them, may well excuſe the few errors committed by the truſtees at the commencement of their management; and that theſe errors ought not to derogate from their merit, in ſerving their country without the ſlighteſt motive of private intereſt.

The truſtees, having with great aſſiduity ſurmounted endleſs difficulties and obſtructions, were encouraged to redouble their diligence. The people are in a meaſure reclaimed from idleneſs and diſhoneſty: induſtry is gaining ground, and is ſpreading even to diſtant corners: ſpinners and weavers greatly multiplied, are daily acquiring more and more ſkill: many bleachfields are perfected, and the colour of our linens is much improved. Nor have water-mills been neglected for dreſſing flax of our own growth; though theſe, after much expence beſtowed, do not now give general ſatisfaction.

Theſe expenſive articles drew great ſums from the truſtees; ſo great, that little was left for promoting other branches. But theſe articles being now far advanced, ſo as not to require much further ſupport, it is the intention of the truſtees, to promote the growth of our own flax with their utmoſt aſſiduity. This appears the proper time for encouraging that capital article, becauſe a market is now provided for it, viz. a home market, which of all is the beſt; and no perſon can doubt of this market, when he is informed, that foreign flax, to the amount of 110,000l. is yearly imported into Scotland.

The ſaving this annual ſum to the nation is not the only, nor indeed the greateſt benefit that will accrue by promoting flax-huſbandry. A manufacture cannot but be upon a precarious footing, when recourſe muſt be had to a foreign market for the crude materials; and a nation muſt be upon a precarious footing, when it is in the power of foreigners, with a ſingle fiat, to ſtarve a great proportion of its people, by withdrawing from them the means of labour. This obſervation is in part unhappily verified by the preſent ſtate of our flax-commerce; for foreign flax has, within theſe ſeven years, been gradually ſo much raiſed upon us, that we pay now for it fifty per cent. more than formerly. Secondly, For a further encouragement to raiſe flax, the farmer may be aſſured, that our own flax, when ſkilfully managed, and the ground well prepared, is tough, compact, and ſmooth; and conſequently, for thread, lace, gauze, cambrick, and lawn, is better fitted than that of Holland, which generally is ſpungy and cottony. Scotch flax, when brought to its utmoſt perfection, may probably rival even that of Flanders. It is too good for Oſnaburgs, which require coarſe Ruſſian flax. The Dutch flax is only preferable for thick hollands. Thirdly, All the labour beſtowed upon foreign flax purchaſed by us, in preparing the ground, in ſowing and pulling, in watering, graſing, and dreſſing for the heckle, is paid for by us. What a benefit to this nation muſt it be, to give bread to numbers of our own people, by employing them in that work? Fourthly, As a conſiderable proportion of the flax we uſe is of foreign growth, and as the heckler and the ſpinner muſt pay money for it, the one is diſpoſed to over-heckle it, and the other to draw it out into too fine yarn, in order to make the moſt of their money. This evil would be in a good meaſure prevented by having flax in plenty of our own growth; for the heckler and ſpinner would in that caſe uſe it freely, without labouring to draw it beyond its griſt.

The truſtees, for theſe reaſons, cannot direct their management to a more important object than to that of flax-raiſing. This indeed they had early in view, though they did not always hit upon the moſt effectual means. They brought flax-raiſers and flax-dreſſers from Holland, Flanders, and England: they publiſhed directions for raiſing flax: they laid out money for breeding apprentices to flax-raiſing and flax-dreſſing: they encouraged the erection of lint-mills; gave ſalaries to ſtationed raiſers and dreſſers of flax, and diſtributed heckles. The article laſt mentioned did good, and continues to do good; but moſt of the other articles were leſs ſucceſsful than was expected, becauſe the truſtees, inflamed with the ſpirit of patriotiſm, made a more rapid progreſs than was conſiſtent with the circumſtances of the country. For one inſtance, it ſeldom happens that the beſt artiſts are moved by the hope of greater gain to deſert their native country; and therefore to ſend ſome hopeful young men abroad to be thoroughly perfected in the art, is a meaſure more ſlow indeed, but always more ſucceſsful. And had this method been followed, the ſuperior ſkill of the men thus educated, would have procured them good bread, without burdening the public fund with ſalaries. By neglecting this ſafe meaſure, there were few or no ſkilful perſons that could be employed as ſtationary raiſers and dreſſers of flax; and the truſtees were forced to take up with ſuch perſons as could procure the beſt recommendations, which generally proceeded from intereſted motives. The negligence, accordingly, and unſkilfulneſs of theſe perſons, ruined all.

One of the encouragements for flax-raiſing, was a premium of fifteen ſhillings upon every acre prepared for flax-ſeed, according to a method preſcribed. This premium was in effect putting the plough before the horſes. It indeed excited many to ſow linſeed; but it was ſoon diſcovered, and might have been foreſeen, that it was no ſufficient encouragement, without providing a market for the flax, when ſeparated from the ground. The premium was not the half of the price of the ſeed: the product lay upon the farmer's hand, who had neither ſkill nor people for dreſſing it with ſtock and hand, lint-mills being at that time extremely rare; and, by theſe means, he was upon the whole a great loſer by this premium.

Lint-boors came next in play, by a hint taken from Holland and Flanders. The lint-boors there purchaſed all the green lint in the neighbourhood, water and graſe it, and, in a word, prepare it for the heckle. This meaſure had a fair appearance; the truſtees were fond of it, and gave great encouragement for carrying it into execution. But this meaſure proved abortive; and it could not happen otherwiſe. It was not adverted to, that the culture of flax had ſubſiſted in Holland and Flanders for centuries; and that conſiderable ſtocks were acquired by dealing in the different branches of the manufacture, part of which could not be better employed than in the lucrative trade of a lint-boor, ſurrounded with lint fields, that ſave the expence of carriage. In Scotland every article was oppoſite: the manufacture was ſtill in its infancy: no proviſion of ſkilful hands; lint-fields were thinly ſcattered; and it was a great burden upon the lint-boor to carry ſo weighty a crop from a great diſtance: no perſon had a ſtock for building houſes, preparing canals, &c. and had there been ſuch perſons, they would not have ſtooped to an inferior branch, while the higher branches lay open to employ their money upon.

The water-mills, mentioned above, having a ſpecious appearance, met with vigorous encouragement, and exhauſted a great deal of public money. They were favourites of the country-people, by ſaving labour in dreſſing the flax; of which thoſe were the moſt ſenſible who were acquainted with the ſlowneſs and fatigue of the ſtock and hand. It was not doubted but that theſe mills would incline every farmer to raiſe flax; and the truſtees were intent to accelerate that effect. A premium was notified of eighteen-pence per ſtone for dreſſed flax of our own growth; which was confined to the three great linen counties of Perth, Fife, and Angus, becauſe the public fund was not adequate to a more general premium. The ſucceſs of this meaſure has been conſiderable; and would have been ſtill more conſiderable, had a ſufficient number of ſkilful flax-raiſers been provided to inſtruct the country people. The demand for foreign flax has greatly ſubſided in theſe counties; and in a few years will probably vaniſh altogether. This premium is now transferred to the counties of Lanark, Air, Renfrew, Dumbarton, and Stirling, where it will certainly produce the ſame beneficial effects; and the intention is, to carry it progreſſively through the kingdom.

For the ſame purpoſe of promoting flax-raiſing, quantities of linſeed have been diſtributed, moſtly in the highlands, at firſt gratis, and afterward under prime coſt. This meaſure had a good effect; but not equivalent to the ſums beſtowed upon it. For the farmers were not ſufficiently ſkilled in preparing the ground: and they were not ſufficiently anxious to be inſtructed, becauſe they put little value upon ſeed which they got for nothing, or at a low price.

To remedy this evil, and to excite a ſpirit of cultivation, large premiums were given for the greateſt quantities of flax produced upon an acre. This inflamed the induſtry of the farmer, and had the effect of procuring very rich crops. Some farmers became expert in high dreſſing for flax-ſeed, and every one was fond to receive inſtruction; which was the great object of the premium. And yet the truſtees were forced to drop this premium, though with great reluctance, before the effect was completed. Induſtry was not ſo far advanced as to have reclaimed entirely the labouring poor from trick and deceit. The premiums were conſiderable; and if, upon the one hand, they promoted good huſbandry, they, on the other, were a temptation to practiſe fraudulent methods for obtaining falſe reports of the quantities of flax produced. Such frauds are infectious; and the truſtees ſaw no other means to prevent the infection, but to withdraw the bounty altogether. There is no reaſon, however, to repent of having ſet this meaſure on foot; for tho' it may not have had the complete effect intended, it has undoubtedly promoted ſkill in flax-huſbandry, and has alſo given ſufficient evidence to the flax-farmer, that plentiful crops can be produced by high cultivation.

To proceed in the hiſtory of water-mills, experience diſcovered that they were attended with many inconveniencies. The labour of carrying rough lint to theſe mills from a diſtance, came to be felt; as alſo the delay of getting the lint dreſſed, when the mill happens to be much employed. At the ſame time, the ordinary yield of this mill in dreſſed flax, is ſo much inferior in quantity to that of ſtock and hand, as to over-balance fully what is ſaved upon labour; not to mention the hurt that is done to the flax by the violent and ill directed action of the mill. But the worſt of all is, that the lint-miller, being under no check nor controul, is tempted to defraud his cuſtomers of part of their dreſſed flax: and there are inſtances where the whole has been with-held from poor people, who it was thought would not have courage to bring a law-ſuit. In many places there is not ſufficient houſe-room provided for the flax that is brought to the mill: which, in a buſy time, is often expoſed to the air for months together before the miller can reach it. By theſe means, many lint-millers, I am far from ſaying the whole, are ſo ſunk in their credit, that the farmers in their neighbourhood, rather than ſubmit to the foregoing hardſhips, chuſe to abandon flax-raiſing altogether.

It is peculiarly lucky for Scotland, that, during this diſtreſſing ſituation, a flax-machine has been invented, that promiſes not only to remedy the ſaid inconveniencies, but alſo to advance flax-dreſſing to its perfection, with no leſs frugality than expedition. It is wrought by a ſingle hand, takes up little room, is portable in a cart, and ſo little expenſive, that three or four neighbouring farmers may have one in common for a meer trifle contributed by each. Its motion, at the ſame time, is ſo eaſy, and ſo much under command, that it is equal to ſtock and hand with reſpect to the yield of dreſſed flax, and alſo with reſpect to the gentleneſs of its motions. And taking into the account the expedition of this machine, which performs at leaſt thrice the work of ſtock and hand, it muſt be pronounced a happy invention.

But we have not exhauſted all that can be ſaid in its favour, nor indeed the greater part. It is a capital advantage, that by it the farmer can ſuperintend the dreſſing his flax without hazard of being cheated; and, what is ſtill more, to get his flax dreſſed without a farthing of charge; which may be done by the following method. The flax is generally watered and graſed before the corn-harveſt, or at leaſt before the buſy time of it; and therefore may be done by the farm-ſervants, without interrupting other work. The flax may be houſed at the end of a barn, or other convenient place, till winter, when the farm-ſervants, for want of light, are laid idle for ſome hours in the afternoon. During this time, the farmer and his ſervants cannot be more profitably employed than in dreſſing their flax; and the long nights afford more than ſufficient time for dreſſing all that will be raiſed by a knot of neighbouring farmers. And even ſuppoſing the ſwifteſt progreſs of lint-huſbandry, every farmer may afford to purchaſe a machine for his own uſe ſolely, which may be employed, not only during the dark hours of the afternoon, but frequently in day-light, when bad weather forbids all field-operations.

It is difficult, I am ſenſible, to entice people to employ in labour their accuſtomed idle hours; but addreſs and perſeverance will conquer many difficulties. And to operate this converſion of idleneſs into labour, there is one means among many that cannot fail of ſucceſs. An article is commonly ſtipulated by farm-ſervants as part of their wages, which is, to have ground allotted them for ſowing ſome lint-ſeed. They are generally put off with the worſt ſoil, ill prepared: their crops are ſcanty: the expence of dreſſing unconſcionable: and ſtating every article by a juſt calculation, lint purchaſed at a market would come cheaper to them than what they thus procure. To engage them to work at the machine, no more is neceſſary but that the farmer take them in as partners. He has, for example, one hogſhead of linſeed; they another among them. Let it be all ſown promiſcuouſly in the ſame field; upon which, for his own ſake, the farmer will beſtow the higheſt dreſſing. It is watered in common, graſed in common, and dreſſed in common. When a diviſion is made in proportion to the quantities ſown, the poor labourers will rejoice in a double increaſe, purchaſed with a little additional labour, without any expence. Far from grudging this labour, their convening together in one place, with a fire for drying the flax, will afford them high amuſement. Their labour will be eaſy, being divided among many hands, and it is fit that the farmer encourage them by taking part in the labour. A little care, at the ſame time, with proper lanterns, ſuch as are uſed in heckling, will remove all hazard of fire; eſpecially if the farmer himſelf take a narrow ſurvey every evening when the ſervants leave off work.

Though the dreſſing of flax by this machine requires not more ſkill than by ſtock and hand, yet to ſhow the management of it, particularly the dexterous handling of the flax, and to inſtruct the country people in the preceding articles of chuſing and preparing ground, weeding, pulling, watering, and graſing, it muſt be of conſequence that the truſtees educate and employ in different parts a number of itinerants. This method of having the flax dreſſed by the country ſervants in their otherwiſe idle hours, is far ſuperior to that of lint-boors, even ſuppoſing we were ripe for theſe artiſts; becauſe by no other means it is poſſible to get flax dreſſed without expence, and indeed without any labour that can be reckoned upon. The expence of dreſſing has hitherto been a bulky article; and, conſidering the waſte occaſioned by water-mills, is perhaps not under forty per cent. of the flax; all of which may be ſaved by the machine under conſideration.

Though few of the meaſures laid down by the truſtees for promoting flax-huſbandry, have correſponded to the ſanguine hopes at firſt conceived of them; yet theſe meaſures, imperfect as they were, contributed conſiderably to the improvement of flax-huſbandry, which is farther advanced than is commonly thought. The value of flax annually produced in Scotland, after it is heckled, and ready for the ſpinner, may be pretty nearly aſcertained as follows: The value of linen cloth now made in a year, amounts to about 700,000 l. the value of the thread manufactured in a year cannot be leſs than 100,000 l. we are more uncertain about the quantity of the linen yarn exported; but we cannot be far wrong in ſtating it at another 100,000 l. and theſe articles amount in whole to 900,000 l. The next point is to aſcertain the value of heckled flax uſed in theſe different articles. Taking all the different kinds of linen cloth at an average, the value of the heckled flax may be about a third; and the proportion is rather more in thread. Of the yarn exported, the value of the flax cannot be much below the half. Joining theſe particulars together, the value of the heckled flax annually manufactured in Scotland amounts to 316,666 l. Subtract the value of the flax imported, and the price of heckling it, which is performed at home, computed to 125,000 l. the remainder, 191,666 l. or 190,000 l. in round numbers, is the value of the heckled flax from our own growth.

The purpoſe of this paper is, to encourage landholders and farmers to apply vigorouſly to flax-raiſing, which, from what is ſaid above, will appear equally beneficial to themſelves and to their country. The truſtees ſtruggled at firſt with many difficulties; the ignorance, the idleneſs, the indocility of the people. But happily theſe difficulties are in a meaſure ſurmounted. There are not wanting hands expert in raiſing and dreſſing flax; and the truſtees are bent upon increaſing their number. To deal in this article, the encouragement muſt be great, when there is a market at home; and there muſt always be ſuch a market while importation continues. The late premiums for the greateſt quantity of flax upon an acre, have ſpread the art of preparing land for flax-ſeed; and reiterated experiments of the great produce of flax from high dreſſing, muſt rouſe every farmer. The bounty of eighteen-pence per ſtone for dreſſed flax, though limited to a few counties, will in time make its progreſs through every county; and farmers, if they regard their intereſt, will early prepare for receiving the benefit of this bounty when it reaches them. But of all encouragements for flax-raiſing, that of the new machine is in reality the greateſt; by preventing a great waſte of flax, by reſcuing farmers out of the fraudulent hands of lint-millers, and by ſaving an endleſs expence formerly laid out for bringing lint to the heckle. In uſing this machine, a farmer ſuperintends the dreſſing his own flax; it is done by his own ſervants when they cannot be otherwiſe employed; and it is done without expence. A crop of flax, of all the moſt lucrative, will by theſe means pay a conſiderable part of the rent, and make quicker returns of money than moſt other crops. Nor ought it to be overlooked, that the finding employment for ſervants when they would otherwiſe be idle, comes to the ſame with leſſening their wages. The truſtees will diſperſe a few of theſe machines *gratis* in different quarters to ſerve as models. The machine is of eaſy conſtruction, and can be correctly copied by any good workman.

It is zealouſly to be wiſhed, and may reaſonably be expected, that the flax-raiſing will be greatly promoted by this machine, and will creep into every corner. But there is ſomething ſtill wanting to complete the encouragement; and that is, a ready market for the flax when it is prepared for the heckle. To that end the truſtees will conſider whether it may not be proper to appoint lint-markets in certain counties, where buyers and ſellers may reſort: and to proclaim premiums for the greateſt quantities of flax brought by individuals to theſe markets: and we cannot copy a better model than the premiums given for improving the ſtaple of our wool; a regulation that has a fine effect. It is ſubmitted, whether it may not be proper to begin with appointing three or four markets within the five weſtern counties which at preſent enjoy the bounty of eighteen-pence per ſtone for home flax; becauſe frauds that may be committed in claiming the propoſed premiums, will be eaſily checked by the itinerant raiſers and dreſſers of flax appointed for inſtructing the people in theſe counties. The truſtees will alſo conſider, whether it may not be uſeful to proclaim at the ſame time flax-fairs in central places of other counties, aſſuring the inhabitants of the premium in their courſe.

Having diſcuſſed flax-raiſing, we ſhall ſubjoin an appendix regarding the linen manufacture in general. As this manufacture is now advanced much beyond what is neceſſary for our own conſumption, it is the duty of the truſtees to attend to the commerce of that commodity, and to uſe their endeavours to put it upon the beſt footing. To form a ſolid judgment upon this important ſubject, one muſt be previouſly acquainted with the manner in which that commerce is carried on at preſent; a brief view of which is as follows: London is our capital market: our linens are conſigned to factors who ſell upon time; to them it is of little conſequence what the price be, or whether punctual payment be made, becauſe they remit only what money they receive: commiſſion and other charges are ſubtracted; which, with ſlow payments, is a grievous burden upon the dealers in this country. Of a commerce carried on in this manner, the natural and neceſſary effect with reſpect to the dealers here, is to confine it to thoſe who have large ſtocks, and can afford to lie out of their money. This ſtate of our linen-commerce muſt cramp the manufacture exceedingly: it is in effect a monopoly, and a monopoly of the very ſtricteſt kind, confining manufacturers to the wholeſale-dealer who lives among them, or in their neighbourhood; for to try all the dealers where a ſingle web only is to be ſold, would be a great waſte of time, with little proſpect of a better price. There are, it is true, ſome petty dealers engaged in this commerce, known by the name of hawkers, who afford to the weaver ſome ſlight relief againſt this ſlaviſh dependence. Theſe men lay out their ſmall ſtocks in picking up linen cloth as it comes from the loom; which they alſo muſt ſell to the wholeſale-man, for they cannot afford to deal directly with London. But being better able than a weaver with a ſingle web, to cope with the wholeſale-dealers, and having more knowledge of the trade, they generally obtain a more equal price, becauſe they can change about if they be ill treated. Hence it is, that theſe hawkers are no favourites of the wholeſale-men; which remarkably appeared in an application to the board of truſtees, inveighing bitterly againſt hawkers, and calling forth the vengeance of the board upon them as deſtructive to the manufacture. It was poſſibly imagined, that the truſtees might have overlooked a maxim of which none are ignorant, viz. That the more numerous purchaſers are, the better for the manufacture. But this incident may juſtly give reaſon to apprehend a combination among the wholeſale-dealers to deſtroy hawkers: an agreement not to purchaſe from them, or to keep down the price, will produce that effect; and, by this ſimple means, the whole trade may be monopolized by the great dealers without a competitor.

The plan that bids the faireſt for putting this commerce upon its moſt advantageous footing, is, that there be four linen fairs held annually at Edinburgh, as the moſt central place, each of them to continue four or five days; which will naturally produce a conſiderable circulation of ready money, and conſequently afford the poor manufacturer ſome inſtant relieve for carrying on his buſineſs. We indeed can ſcarce hope for commiſſions from wholeſale-merchants in London, who have linen-drapers at hand to furniſh them goods for completing their aſſortments. But an inſtance ſomewhat ſimilar, gives encouragement to hope that other Engliſh dealers may reſort to our fairs. When the commerce of black cattle was laid open by the union, our people carried their droves to England: but expence of travelling, and fluctuation of markets, made this a precarious and hazardous commerce, and reduced to bankruptcy many of our drovers. At length the proſpect of choice and cheapneſs at a public market, drew down to this country the Engliſh dealers; and now the greater part of our cattle are ſold at home for ready money. What reaſon have we to doubt, but that the Engliſh dealers will reſort to our fairs for linen, as they do for cattle? There is no reaſon to doubt, provided we perform our part; which is, to be induſtrious in advancing our linens to their perfection. Our ſituation for ſuch fairs is undoubtedly better than that of Ireland: for, ſuppoſing other articles equal, an Engliſh dealer, unaccuſtomed and averſe to ſea-voyages, will never prefer a perilous navigation before a ſafe and ſnug journey upon *terra firma*.

The trouble and expence of carrying home goods that remain unſold at a fair, have ſuggeſted a linen-hall, as a repoſitory for ſuch goods, where dealers may be provided during the interval between two fairs. But as it is difficult to foreſee the fate of any new project, the truſtees, ſenſible of former diſappointments, will probably be deſinclined to adopt any expenſive plan for a linen-hall. It is the ſafeſt courſe to be frugal in making the experiment: ſucceſs may encourage them hereafter to be more bold.

One capital view of the plan propoſed, which can ſcarce fail of ſucceſs is, to reſcue the poor weavers from the oppreſſion of the wholeſale-dealer, by affording them a choice of markets. If the price offered by their neighbour, the wholeſale-man, be not thought ſufficient, a number of them clubbing together may ſend their goods to an Edinburgh fair, under the care of one of themſelves, or of any truſty perſon. This plan will be a ſignal bleſſing to the hawkers in particular: it will enlarge their field of action; it will make them independent; and it will augment their number: than which nothing can be more beneficial to the manufacturer. Every web is picked up as it comes from the loom, with a view to ſome little profit at an approaching fair; and in ſo ſwift a circulation, a very ſlender profit will content a hawker. This plan will be equally convenient for pedlers, who, inſtead of painful journies through the country to make up their aſſortments, find at hand, in a fair, every ſort they have occaſion for. Nor need we be diffident of commiſſions from Glaſgow, Liverpool, and other trading towns on the weſt coaſt; becauſe the dealers in theſe towns will find themſelves cheaper ſerved here than at London.

Theſe effects of the plan are obvious at firſt view. But there appear other good effects, ſome more, ſome leſs extenſive, that caſt up upon further conſideration. In the firſt place, frugal perſons, who purchaſe for their own uſe, will undoubtedly reſort to the public market, becauſe ready money will afford them both choice and cheapneſs. Secondly, Buyers and ſellers coming to be mutually acquainted, the reputation of the beſt artiſts will procure them private commiſſions for all the linen they make. Thirdly, Theſe fairs will be a great means for improving the fabrick of our linens. At preſent there is little opportunity for a comparative trial; but here manufacturers will ſoon be made ſenſible that they have little chance to vend their goods if the fabrick be in any degree imperfect. Laſtly, The quick circulation of money produced by theſe fairs, will enable the manufacturer to vend his goods at the loweſt price; and the current price for ready money being thus fixed, muſt have the effect to regulate in ſome meaſure the bargains that are made upon time.

Every one who gives attention to what is paſſing in the world, muſt perceive the importance of the linen manufacture to Scotland. Like a ſtone rolled halfway uphill, it muſt be puſhed to the ſummit, or it will fall to the bottom, and involve all in ruin. Honeſt labour and unrelenting induſtry will puſh this manufacture to the ſummit, and produce a moderate degree of opulence, with its never-failing attendants, plenty and population. Opulence ſo acquired, being diſtributed through every vein of the politic body, ſerves to animate every member. May heaven avert from our thoughts the ambition of acquiring wealth independent of labour and induſtry; for profuſe wealth, being always unequally diſtributed, never fails to ſap the foundations of virtue, to erect a throne for luxury, and for depraved ſelfiſhneſs, which reduce a nation to an abject ſtate of degeneracy, and terminate in a total corruption of manners.

FLAYL. *See* FLAIL.

FLEABANE, or *Fleawort*, the name of a pirennial weed common in paſtures, the ſtalk of which is round, bending, ſolid, and hearty. The leaves are oblong, ſharp-pointed, wrinkled, downy, and embrace the ſtalk on which they grow very thick without any regularity. The flowers are yellow, radiated, and incloſed in a flower-cup, made of narrow ſcales like briſtles.

FLEAK, a gate ſet up in a gap.

FLEAWORT. *See* FLEABANE.

FLET-MILK, milk that has been ſkimmed, or had the cream taken off.

FLOATING *of Meadows*. *See the article* MEADOW.

FLOTE-FESCUE graſs, an excellent graſs for cattle, growing in watery places.

The flote-feſcue affords excellent feed for horſes. Mr. Stillingfleet, quoting a piece publiſhed in the Amæn. Acad. Vol. III. entitled *Plantæ Eſculentæ*, takes notice, that the author of it ſays, article 90, " That the ſeeds of this graſs are gathered yearly in Poland, and from thence carried into Germany, and ſometimes into Sweden, and ſold under the name of manna-ſeeds. Theſe are much uſed at the tables of the great, on account of their nouriſhing quality and agreeable taſte."

Our ingenious countryman, in his addition to this paſſage, has the following words: " Mr. Dean, a very ſenſible farmer at Ruſcomb, Berkſhire, aſſured me, that a field, always lying under water, of about four acres, that was occupied by his father when he was a boy, was covered by a kind of graſs that maintained five farm-horſes in good heart, from April to the end of harveſt, without giving them any other kind of food, and that it yielded more than they could eat. He, at my deſire, brought me ſome of the graſs, which proved to be the flote-feſcue, with a mixture of the marſh-bent. Whether this laſt contributes much towards furniſhing ſo good a paſture, I cannot ſay. They both throw out roots at the joints of the ſtalks, and therefore likely to grow to a great length. In the index of dubious plants, at the end of Ray's Synopſis, there is mention made of a graſs, under the name of *gramen caninum ſupinum longiſſimum*, growing not far from Saliſbury, twenty-four feet long. This muſt, by its length, be a graſs with a creeping ſtalk; and that there is a graſs in Wiltſhire, growing in watery meadows, ſo valuable, that an acre of it lets from ten to twelve pounds, I have been informed by ſeveral perſons. Theſe circumſtances incline me to think it muſt be the flote-feſcue; but whatever graſs it be, it certainly muſt deſerve to be enquired after.

" There is a clammineſs on the ear of the flote-feſcue when the ſeeds are ripe, that taſtes like honey, as I have often found; and for this reaſon, perhaps, they are called manna-ſeeds.

" Linnæus Flor. Suec. article 95, ſays, that the bran of this graſs will cure horſes troubled with bots, if kept from drinking for ſome hours." So far the very ingenious Mr. Stillingfleet.

From what has been ſaid above, we may conclude, that the flote-feſcue is one of the beſt graſſes that we can cultivate for the uſe of our horſes, and the more eſpecially, as it appears to thrive beſt in wet, low meadows, where many other graſſes would not grow.

There are at Clacton-Lodge, in the county of Eſſex, not far from Thorp, ſome low meadows, which are every year flooded for months together during the winter ſeaſon: theſe meadows are covered with a graſs of a remarkable fattening quality; for when old cows have been turned into them, though they were ever ſo poor and low in fleſh, they have in a very ſhort ſpace of time grown as remarkably fat; and when killed, their meat would appear as fine, and taſte as well, as that of any ſteer or ox; therefore it is reaſonably to be ſuppoſed, that the graſs growing in theſe meadows is no other than that of the flote-feſcue.

FLY, in turnips. *See* TURNIPS.

FLY, in ſheep, a ſpecies of maggot very troubleſome to that animal. The reader will find an infallible method to deſtroy theſe troubleſome inſects under the article SCAB *in Sheep*.

FOAL-TEETH. *See the article* AGE *of a Horſe*.

FODDER, hay, ſtraw, haulm, &c. given to cattle.

In the foddering-yards of backſides, or other outhouſes, to have ſeveral diviſions, over and above what is conſtantly uſed, has great conveniencies in it; one of which is, that in them you may diſpoſe of a two-yearling cow, or another cow, at the time of bulling; not only to keep them from a bull, but from the other beaſts alſo, that would be leaping ſuch a cow, whereby they may hurt each other, &c. eſpecially cows forward with calf will be apt to warp by leaping a bulling-cow.

The open winters make hay the deareſt, if a hard froſt and ſnow come at the fore-hand of them; for if once cattle come to fodder, they muſt be held to it, or they will receive great damage. In waſhy weather all the hay that can be given to cattle will not make them thrive, but in dry froſty weather they will thrive with their meat very well.

Mr. Liſle ſays, that he let his cows go at large from their foddering-yard, during the winter, and ſo continued till April, when they fed on ſome graſs; and thoſe that had calved, he foddered with hay: the conſequence of which was, that by the middle of April his cows would not ſtand to eat any ſtraw at all, but were, during the months of March and April, ſo weaned from ſtraw, by baits of graſs and hay, that they fell off from the ſtraw quite, and grew much leaner, and worſe in fleſh than they had been, and apparently worſe than the farmers cows, which were, after the winter months, wholly pent up to their ſtraw, and to the pond.

All ſorts of cattle that chew the cud, as ſheep, cows, &c. care not to graze after each other, nor to eat one another's leavings in the foddering-yards; but cattle that do not chew the cud will eat after thoſe that do, and *vice verſa*.

Pliny tells us, where hay was ſcarce, it was uſual to feed their cattle with chaff and barley-ſtraw. Of chaff, ſays he, that is the beſt ſort, which is the thinneſt and ſmalleſt, and neareſt to duſt; the beſt therefore is from millet, the next from barley, and the worſt from wheat, except it be for hard-labouring beaſts.

On ſound experience I am convinced, ſays Mr. Liſle, that in our hilly-country we ought not to have any dependence on ſending our cattle out of the foddering-yard to graſs before the middle of May, and therefore we ought to be provided with winter fodder for cows accordingly.

At the beginning of winter, ſuppoſe the latter end of October, and a great part of November, while cattle ſtill continue out in the field at graſs, it is very neceſſary to fodder them early in the morning, while the hoar-froſt hangs on the graſs, which they will not eat kindly off till the ſun has warmed it.

The ſtraddling racks are beſt for foddering, if made ſtrong enough, that is, ſo as not to be over-turned; for theſe racks may be lifted up as the dung mixen riſes, which thoſe fixed in the ground cannot be.

It is a practice in many places, to tie their cows up to a rack to fodder; but if a perſon would rightly conſider the places where it is done, we ſhould find it only uſed where the fodder is good, being either hay, or very good ſtraw; but in the hill-country of Hampſhire, where the cattle have ſtraw fodder only, and that not ſo good as the ſtraw in the valleys, the cuſtom is to fodder their cows in racks, or cribs, in the open yard, which they think better than tying their cattle up to racks in houſes; for though in cold and rainy weather the houſes may keep their loins dry, yet in countries where the fodder is coarſe, eſpecially after wet and backward harveſts, when the ſpirit of the ſtraw is waſhed out by the rain, the giving cattle ſtraw from racks, from whence they cannot pick and chooſe, as from cribs they may, is judged to tend to the impoveriſhing the cattle, whereas in cribs they can pick the ſweet from the coarſe.

There is a very remarkable difference in cattle eating their fodder, when freſh threſhed, and when it has been threſhed two or three days, eſpecially if the ſtraw be but indifferent fodder. *Liſle's Huſbandry, vol.* I. *page* 392.

FOGGE, long graſs remaining in paſtures till winter.

FOISSEN, the natural juice or moiſture of the graſs or other herbs.

FOLD, the moveable incloſure wherein ſheep are confined during the night.

It appears that the ſheep-folds of the eaſtern nations were not ſuch as ours, but houſes erected for that purpoſe.

Mr. Garret, who has lived four years in Spain, ſays the ingenious Mr. Liſle, aſſures me, that in thoſe parts where he was, they fold their ſheep as we do ours, only their fold is made netwiſe with ſtrong cords, and about ſix feet high, with the bottom ſtaked down to the ground, and two cur-dogs, of a breed between a maſtiff and a greyhound, lie within the fold to guard the ſheep from the wolf.

“ In favour rather of keeping a weather-flock than an ewe-flock on the hill country, beſides other conveniencies, you may have the benefit of the fold for barley at the principal time when it does moſt good, viz. on the fallows between the latter end of February and the middle of April, when the ewes cannot be folded.

“ The limitation of an ewe-flock for folding and keeping on throughout the winter, or be it a weather-flock, ought to depend on theſe rules; Firſt, Not to keep more at winter than you can winter either by meads, or ſowed graſſes and hay. Secondly, Not to be ſatisfied that you can provide hay for them by ſowed graſſes, as broad clover, &c. in caſe ſuch lands as are fitteſt to carry ſuch graſſes, lie at a diſtance for mowing, whereby you muſt maintain them with dung, where, by reaſon of carriage, it will be chargeable, unleſs your fold can maintain more ground than your out-lying lands to your farm, which, in the hill country, is not likely: and to carry but ſeven or eight pots of dung in a day, by reaſon of the diſtance, and mowing, is not reaping a profit, but bare exchanging: but if you have much land round about, and near your houſe, whereto you can carry thirty or forty load of dung a day, and which will bear broad clover hay, then you may increaſe your flock proportionably.

“ As to fatting your ewes and lambs out of your flock, if you have lands diſpoſed for fatting, you ought to conſider, if you break your flock by drawing out ewes with their lambs for that purpoſe, what flock you will have left to fold on your wheat fallows, and how far your wheat land ſtands in need of a fold; for if you leave yourſelf not ſufficient, it will be indiſcretion to weaken your fold; beſides, it will hurt your breed; for you will draw off many forward lambs, which might, perhaps, have carried on the breed otherwiſe, and when a hill country farmer is ſettled in a flock, it is not good to be buying yearly, to keep up his complement, on account of many dangers which may from thence enſue: it is better, therefore, in ſuch caſe to buy ewes with their forward lambs to put into your fatting grounds; but in caſe you ſow wheat land good enough without the fold, or have another way of manuring it, by liming, &c. then it may be very well to fat off certain numbers of your flock.

“ Though, ſays a very good farmer of my acquaintance, I have but a mean opinion of winter-folding, or to fold on barley ſown, and may in time fallow on graſs-ground inſtead of barley-land, yet I would fold on barley-land fallowed or ſtirred, from the time my lambs were ſtiff enough after lambing to go on ſuch fallows; for, ſays he, the benefit of an acre ſo folded, is three times as good as one winter-folded for barley.

“ Farmer Glyde, of the Iſle of Wight, with whom I was talking of huſbandry affairs, told me, there was one thing he believed I knew not of, which he would tell me; he would, he ſaid, adviſe me to fold my ewes and lambs on the barley-land in the ſpring, and divide my flocks in folding; for, ſaid he, two hundred ewes and their lambs will do as much, if not more good, by folding on an acre of land, as four hundred weathers: I have, ſaid he, folded a part of the ſame land at the ſame time two hundred ewes and their lambs, and in another fold of equal dimenſion five hundred weathers, and I have always found, that the folding of the ewes did me the beſt ſervice, and brought me the beſt corn.

“ My ſhepherd is of opinion, that ewes ought not to be folded on the barley fallows, or any other fallows in lambing-time, but weathers only; for the lambs, being wet when lambed, would be dirted with the fallows, and the ewes would preſently forſake them; therefore the ewes ought in lambing-time to be folded in the meadows, where it is clean, and the folds removed as often as the cold wind ſhould change from corner to corner. And afterwards, he ſaid, they ought to fold weathers on the barley till a fortnight after May, but the ewes never after Candlemaſs.

“ It is plain, that the early folding an ewe-flock, and lambs in April, on wheat fallows, pinches the lambs, and ſo does folding them at that time on the barley grounds, both which are too cold for them, eſpecially in our hill country; care ought therefore to be taken, that thoſe lands do not of neceſſity want folding on in thoſe months, but that they may be otherwiſe provided for, and that during that time the ewe-fold may be on graſs-grounds, or lay-grounds deſigned for fallows.

“ We muſt be more cautious in April and May of folding an ewe-fold on the barley-land, they being wettiſh, than of folding them on the wheat ſown in Auguſt or September; becauſe the lambs in April and May make the ewes riſe often and move, whereby the ground becomes much more trodden at that time of the year by the ewe-fold, than it would be by a weather-fold, or an hog-fold, as may apparently be ſeen, if the folds be divided.

“ Telling Mr. Gerriſh the grazier, and farmer Iſles, how dear Mr. Eyres our miniſter ſold fat lambs to the number of fifteen, May eighteenth, viz. for ten ſhillings and ſixpence each, and that they had been folded all along to the very day he ſold them. They replied, that folding the lambs did very little hurt them with reſpect to their fat, provided they were drove pretty late to fold, and let out early in the morning.

“ Walking with Mr. Raymond into his arable common fields, October twenty-fifth (anno 1708) we met his ſhepherd pitching the fold on the new ſowed wheat. I aſked him, whether he did not find that pitching the fold on the wheat at this time of the year, and a fortnight later, turned to a much better account than folding for the barley crop for the year following. Mr. Raymond and his ſhepherd readily replied, undoubtedly it turned to the beſt account to fold after this time on wheat. I ſaid, for my part, I had obſerved the fold carried on the land deſigned for barley ſo early in the winter had little effect, its ſtrength being ſpent and waſhed away by ſpring, ſo that it will make but little ſhew in the crop of barley next ſummer, and that therefore I choſe to preſerve four, five, or ſix acres of wheat-fallow that lies warm, and will bear ſowing late, to carry my fold over to the latter end of October, rather than finiſh my wheat fold by the end of September, and then carry it on my barley; for though the latter part of October might, in our cold country, be too late to ſow wheat, yet it was better than to be ſo ſoon folding barley, which would be no better for it. To which they replied, I was much in the right. And as I have before obſerved how inſignificant the fold is in the winter, eſpecally in hard froſts, I imparted it to Mr. Raymond, who concurred with me, and ſaid, he had folded on arable land in ſnow, and found not the leaſt benefit: whereupon he reſolved in ſuch caſes to fold on meadow and paſture, in mighty expectations of graſs; but it made no return; wherefore in ſnows he now lets his ſheep ramble.

“ Whereas I have ſaid, that in cold clay ground, and in a cold hill country, a winter-fold does little good; yet I have by experience found the contrary in ſuch parts of the hill country, where the land is dry and light, and that it does great ſervice to the barley crop. This difference may be reconciled thus, i. e. where the land, though called hill country land, does not lie very high, for the height much tends to the chilling of the ground. Again, the explanatory reaſon of this difference, though hardly accountable for, yet ſeems to me chiefly to lie in the chilling quality of the ground which at firſt receives the dung and piſs, and that deadens the ferment; whereas in warmer ground its progreſſion toward that end is ſupported by a ſufficient benign warmth, ſince in both ſorts of earth, the urine does undeniably ſink into the earth, and mix with it.

"My ground being cold and feeding, I ſhould in the ſpring of the year, when I come either to pitch my fold on the barley fallows, or on the ſown barley, ſet it very wide, in order to avoid the uſual inconveniencies of penning at that time, viz. the rankneſs and lodging of the barley, and the conſequences, thinneſs and coarſeneſs.

"It was the tenth of October (anno 1720) when my fold was going to be ſet on the wheat-fallows of a field, which was heavy land, and the fallows, where the fold was to go, were to be ploughed up the next day; I was afraid the land would be too wet to fold on after the wheat was ſown, and ſpoke to the ſhepherd about it. He ſaid, he believed I might be in the right, eſpecially ſince the rams had been ſome days put to ramming the ewes, becauſe the rams would keep moving and ſtirring the ewes all night in the fold, whereby the ground would be battered and trod, and ſo ſquatted, that the wheat might not get through.

"That the Greeks did pen up their ſheep, that they might piſs through hurdles, as in Herefordſhire, you may ſee in Palladius's calendar, November, to avoid dirtying and damaging their fleeces.

"Farmer Miles, whom I have often mentioned with approbation, adviſed me, if I would turn arable into meadow, and lay it up to graſs, to fling ſtraw upon it that is leſs than half rotten, and then fold upon it the ſame night, and it will bring the ground on very faſt.

"Purſuant to what has been before ſaid, that folding in winter for barley is not profitable, becauſe, by waiting for the fold's running over the land, we loſe the principal ſeaſon of fallowing; yet however it may be proper to fold till Chriſtmas, and then go on the wheat-lay; becauſe we can loſe no fallowing ſeaſon by that; we cannot well have finiſhed our fallowing any year before Chriſtmas.

"I find by Mr. Antill and Mr. Clerk, and others, that in Leiceſterſhire they have no winter-folding for barley; they leave off by Michaelmas at fartheſt, and ſometimes cannot fold again till May; the reaſon is, their lands are ſo wet they would be always in a poach, and the coldneſs of the lands would kill the ſheep: to help which defect, they muck their barley-lands, and from thence begin their huſbandry, and ſow wheat the year after, often under furrow, on their barley-ſtubble, for they ſay, if they ſhould dung their wheat-ground it would rot their wheat, and they ſow peaſe or beans after the wheat, and then lay the ground to ſummer-fallow again, to be mucked in May for barley, or to fold for wheat; ſo that they carry out their dung before it is half rotten, or the ſeeds of the weeds killed: but in their incloſures they ſow four crops of corn all on one earth, without dung, for the moſt part beginning with oats, and laying down to graſs with wheat.

"I am told, that in Dorſetſhire the aim of the farmers is, to fold on their ſheep-leaſes in the middle of July, and ſo till Michaelmas, that in the winter there may be a good head of graſs for the milch-ewes.

"It ſeems to be inconvenient to graſp at ſo large a wheat or barley-crop, as hardly to be able to compaſs it without folding late on the wheat after it is ſowed, or on the barley-land after it is ſowed; for by being under the above neceſſity, in order to compaſs what one has engroſſed, one may often be obliged to fold unſeaſonably on each ſort of corn, nor will the fold in that caſe make good the damage done to the flock by the lateneſs of the ſeaſon: and an ewe-fold is often damaged by folding on the cold land at the latter end of October; whereas it is better to come early with your fold off of the wheat-lands on to the barley lay-grounds, and from the ſowed barley on to the wheat-fallows; for thereby you will fold the ſame quantity of ground of the reſpective grains without the reſpective inconveniencies.

"Between waſhing and ſhearing-time ſheep ought not to be folded, becauſe of dirtying their wool, nor from the cutting of the lambs till a fortnight after, nor in ſheap-leaſes or arable in wet weather, for it will tread the graſs into dung.

"A ſervant of mine, a man of very good underſtanding, tells me, he has been many years a ſhepherd, but could never obſerve that the fold ever did any good in froſty weather: particularly he remembers a very ſharp froſty winter, in which a whole flock uſed daily to gather to a hay-reek, in a ground where they were foddered, yet he could not obſerve there was any better corn there than elſewhere. I aſked him the reaſon of it; he ſaid, the froſt waſted and preyed on the dung; and I the rather approve this obſervation of his, becauſe of the great prejudice ſtrong beer and ſpirits receive by being frozen, even ſo as to become mere *caput mortuums*.

"If froſt has the ſame effect on dung, by impoveriſhing it, that it is ſaid to have on the ſheep-fold, and on ſtrong beer: quere, whether it be proper or not, to leave horſe or cow-dung ſpread on land without ploughing it in?

"Mr. Raymond is alſo of opinion, that the winter-froſts do very much deaden the folding of the ſheep, and rob it of its virtue.

"Farmer Elton ſaid, the method he beſt approved of in folding, was always to fold that land firſt that was firſt deſigned to be ploughed, ſuch as white or whitiſh land, they not being apt to bear weeds, nor will the fold be apt to cauſe weeds to come, and ſuch land he would ſow firſt, viz. at St. James's-tide. I ſaid, I ſhould think, though ſuch land ſhould be ſowed ever ſo wet, yet, if the month of Auguſt ſhould prove dry and ſcorching, it would burn, and ſuffer by ſuch early ſowing. He replied, if ſowed wet, yet ſo as it came up, he never knew the drought to hurt it.

"It was a very dry ſeaſon from the firſt of March to the ſixth of May (anno 1701) during which time I ſet my fold on my barley. Several of the farmers in my neighbourhood ſaid, it would be apt to do the barley more harm than good, for the ſheep would ſcratch up the ſeed; whereas, if rain had come, ſo that the ground had not been in a duſt, their ſcratching would have done no harm. But I rolled before I ſet my fold, and ſo I preſume the ground was ſo faſt as to receive the leſs damage, it being alſo ſtony, and therefore the ſheep could not ſearch it ſo much as otherwiſe perhaps they might have done: the event was, the fold did no harm, but good.

"Mr. Gilbert of Madington was telling me, the way of huſbandry about him, near Saliſbury, was, to fold on their wheat after it was ſowed till St. Luke's-tide, which is in the middle of October; then to draw off their flock for a month to fold their ſheep-leaſes, and then on the barley-fallows. I aſked ſome North-Wiltſhire farmers, if about them they ever folded on the wheat-land after it was ſowed; they ſaid no, they never knew it to be done in any parts thereabouts, yet folding after the corn was ſown did it more good than before; but the reaſon why they did not do it about Holt, &c. they believed was, becauſe they were forced to lay up the wheat-lands in high ridges by reaſon of the deepneſs of the earth, and its wetneſs, and the ſheep if folded on ſuch land, would do nothing but lie between the furrows, which would do the land but little ſervice: beſides, they ſaid, in the hill-country the land was rather of the lighteſt, and the treading of the ſheep, after it was ſowed, preſſed it cloſer than it was before, and ſo did it ſervice.

"Mr. Raymond aſſured me, that ſheep folded on ſandy lands would thereby be ſenſibly more impoveriſhed than thoſe folded on clay lands, and this, ſaid he, the ſhepherds agree to, who live where there are ſuch different ſorts of land. The reaſon ſeems to be, becauſe the ſandy lands draw forth and drink up the moiſture of the ſheep, to fill up which emptineſs of the outward veſſels, a freſh juice muſt ſucceed, and ſo on; or elſe that the ſandy lands being hot, make the ſheep perſpire more than clay lands do, whereas the cold clay rather repels perſpiration.

"If ſandy or light ground, as has been before hinted, draws the fat and moiſture of the ſheep-fold off, ſo as to impoveriſh a flock more than if they had been folded on cold clay lands, it muſt be allowed, on the other hand, that light ground may be better enriched by a fold than heavy land, becauſe the light ground imbibes more of the moiſture and fat of the flock; and this gives ſome account why it is ſaid, poor lands often pay better for their folding than ſtrong lands: for the ſame reaſon winter folding, when the ground is wet and cold, holds no proportion to ſummer folding.

“ Diſcourſing with farmer Biggs on huſbandry, he ſaid, he folded on the fallows all winter long, though never ſo wet; yet, ſaid he again, ſometimes the fold does harm: let it be never ſo wet, ſaid he, early in the year, folding on the fallows does no harm; for, in the firſt, there is heat enough in the ground at the firſt hand of the year to keep off the chill, and then the ground is not ſo ſettled, but that the rain ſoon runs through it, but at the latter end of the year the ground is ſettled; then treading it with the fold in wet weather makes it hold water, by which it may be chilled, and kneads the very wet into it, whereby there will be the leſs corn.

“ Before I came from Crux-Eaſton in February (anno 1698) in order to go into the Iſle of Wight, I had a diſcourſe with an old experienced ſhepherd about folding the flock on fallows: he ſaid, as to wheat, it was excellently good, but they rarely folded on barley-land after it was ſowed, for if it was a whitiſh land, and a hot ſummer came, it would be burnt up: beſides, the ſheep would be ſcraping at that time of the year on barley-land, and would take the corn out of the ground; but the wheat, ſaid he, lay too deep for them to do ſo. But when I came into the Iſle of Wight, farmer Collins was of a different opinion, and ſaid, he had always folded with good ſucceſs on hot, dry, ſandy ground after it was ſown with barley, and was earneſt with me to try it; for, ſaid he, you will quickly ſee the benefit, and though the ſheep ſhould ſcrape, you will find the barley come thickeſt there. There is land, however, about Huſborne and Stoke in Hants, that will burn by folding on in the ſpring, and get more harm than good, if hot weather come, it being a hungry ſharp gravel.

“ As it ſeems to me, the double folding on the early wheat-fallows, to be ſown on one earth, cannot occaſion the roots of the graſs ploughed-in to ſhoot up afreſh, but rather prevents it, by treading the earth down into a hard plaiſter, ſo that they cannot riſe; it is true, it may bring up a freſh new graſs, which, having weak roots, will eaſily be torn up by the draggs.

“ Columella, ſpeaking of feeding ſheep, ſays, there is no ſort of land, or food, but what (by the continual uſe of that only) ſheep will be tired of, unleſs you give them ſome ſalt now and then to lick, from whence they may procure a new appetite to their meat and water. All the ſummer time during the hot ſeaſon they muſt be let out to feed as early as may be, while the dew is on the graſs; and when the ſun is about four hours high, they muſt be led to water and under ſhade, and again to feed towards ſun-ſet. In the dog days the flock ſhould be ſo led as to feed with their heads towards the weſt in the forenoon, and towards the eaſt in the afternoon; for it is of great conſequence, ſays he, that the ſheep's heads ſhould be turned from the ſun, which would be hurtful to them. And Varro gives the ſame directions, becauſe, ſays he, the ſheeps heads are extremely ſoft. Perhaps this may be the chief reaſon of the rams and ewes in companies turning face to face, in hot ſun-ſhiny days. During the winter, and early in the ſpring, they ſhould be kept in their fold, till the ſun has melted the hoar-froſt from the graſs, which would occaſion rheums in their heads, and would alſo ſcour them: for this reaſon in the cold wet ſeaſons of the year they ſhould be watered but once a day. They let their ewes, as Varro aſſures us, go out to feed with the reſt of the flock, but kept back the lambs, which were ſuckled by the ewes at their return, and then again ſeparated from them. They alſo tethered their lambs at ten days old, leſt they ſhould diſlocate or hurt their tender limbs by playing together.” *Liſle's Huſbandry, vol.* II. *page* 178.

FOLE-FOOT, the ſame with colt's-foot. *See* COLT's-FOOT.

FOOD, a general name for whatever aliments are taken into the body to nouriſh it.

FOOD *of plants*, the particles they extract from the ſoil, air, &c. in order to their nouriſhment.

Philoſophical inquiries into the principles of vegetation, and the manner in which it is performed, are an object well worthy the attention of gentlemen whoſe ſituation allows them to purſue that truly uſeful and entertaining ſtudy. But as the induſtrious huſbandman, for whoſe benefit this work is chiefly intended, as a compendium of the beſt practice in agriculture, founded on the reſult of experience, cannot afford time for matters of ſpeculation; nor would they, in point of prudence, conſiſt with his neceſſary occupations, even if his education fitted him for ſuch reſearches; it may be ſufficient for him to form a general, but juſt, idea of the means by which plants are moſt ſucceſsfully raiſed. A proper notion of this will help to guide him in the management of his lands, and ſhew him in what ſtate the earth ſhould be, to enable the plants which he cultivates moſt eaſily and readily to find their neceſſary food. This general knowledge of the baſis of agriculture is even requiſite in every one who would be ſatisfied of the reaſonableneſs of his methods of proceeding.

Whether any one active principle does univerſally nouriſh all plants, or whether ſome particular ſalts or juices feed one plant, and others another, is a queſtion that has been warmly debated by philoſophers.

The ancients generally entitled the earth to the production of the animals, vegetables, and other bodies, upon and about it; but ſeveral of the moderns, and among them ſome of very great name, both here and abroad, have declared in favour of water, as the efficient cauſe of vegetation. Lord Bacon was of opinion, that, “ for the nouriſhment of vegetables, water is almoſt all in all; and that the earth doth but keep the plant upright, and ſave it from over-heat and over-cold.” Others carry this hypotheſis ſtill farther, aſſerting water to be the only principle or ingredient of all natural things. They ſuppoſe that, by I know not what proceſs of nature, water is tranſmuted into ſtones, into plants, and, in ſhort, all other ſubſtances whatever. Van Helmont, and his followers, to whoſe opinion even the illuſtrious Mr. Boyle has ſhewn a ſtrong propenſity, are very poſitive in this, and alledge, as proofs, the conſiderable growth of mint, and ſeveral other plants, in water, and his well-known experiment on a willow-tree. Van Helmont planted this tree, which weighed five pounds, in two hundred pounds of earth dried in an oven, and watered it with rain, or diſtilled water, after carefully covering the caſe in which it ſtood with a perforated tin cover, to prevent the admittance of any other earth. Five years after, weighing the tree, with all the leaves it had produced in that time, he found its weight amount to one hundred and ſixty-nine pounds three ounces; while the weight of the earth was only diminiſhed about two ounces.

Mr. Evelyn thought, with the learned Dr. Sharrock, whom he quotes, that water is, of its own conſtitution alone, a ſoil to vegetables, not only as the moſt genuine vehicle of the riches which it imparts to plants, through the ſeveral ſtrainers, and by means of which all change and melioration is effected; but becauſe it is, of all other ſubſtances, beſt diſpoſed for ingreſſion, to inſinuate into, and fertilize the earth; which is the reaſon why floated grounds are ſo remarkably fertile after the flood has ſubſided. “ It is, ſays he, the neareſt of kin to the whole vegetable race; for to aſſert, with any confidence, what part of the mere earth paſſes into their compoſition; or whether the earth ſerves only for ſtability, or as a womb and receptacle to their ſeeds, I ſhall not undertake to diſcuſs; though I do not yet conceive the earth to be altogether ſo dull and inactive, as to afford no other aid to the generation of what ſhe bears; the diverſity of ſoils being infinitely various, and the difference of inviſible infuſions far beyond our arithmetic. But neither do I here by any means exclude the air, nor deny its perpetual commerce and benign influencies, charged as it comes with thoſe pregnant and ſubtile particles, which pervading and inſinuating into the earth's more ſteady and leſs volatile ſalts, that inteſtine fermentation is begun and promoted, which gives life, growth, and motion, to all that ſhe produces. Dr. Mayow has proved, that the moſt exhauſted and worn-out mould, if repaired by a bare expoſure to the air alone, without which it produces nothing. Nor can plants, totally excluded from the air, live, or ſo much as erect themſelves to any thriving purpoſe, as being deprived of that breath and vital balm, which no leſs contributes to their growth and nouriſhment than does the earth itſelf, with all our aſſiſtance. Beſides, we find that the air is near of kin and affinity to water, and indeed ſeems as if it were but a thinner water; for how elſe are vines, and other trees of prodigious growth, maintained among barren rocks, and thirſty pumices, where rains but ſeldom fall, if not from the benign influences of the air?"

To this aerial food and moiſture it is that moſt of the ſedum kind owe their growth. Succulent groundſel, and the fragrant wall-flower, draw their nouriſhment from the ſame ſource. An aſh now growing out of a wall of the abbey-church at St. Alban's, affords a remarkable inſtance how much even trees are nouriſhed by the air.

As all kinds of water, as well as air, contain many other ſubſtances beſides the pure elements of water and air, it is difficult to aſcertain whether theſe extraneous ſubſtances, or ſome of them, are not the food of plants. Dr. Woodward's experiments, as related in the Philoſophical Tranſactions, ſeem to confirm the opinion that they are: for he obſerves, that a great part of what he calls terreſtrial matter, mixed with the water in his experiments, aſcended up into the plant, as well as the water; and that the plants were more or leſs nouriſhed in proportion as the water in which they ſtood contained a greater or ſmaller quantity of that matter. With regard to Van Helmont's tree, and the growth of plants in water, he very juſtly obſerves, that nothing like what the advocates for water would infer from thence, can poſſibly be concluded from any ſuch experiments, unleſs the water uſed in them be abſolutely pure, homogeneous, and not charged with any ſort of terreſtrial mixture, to which the plant may owe its growth and increaſe: for that all water, even the cleareſt and moſt tranſparent, does abound with ſuch matter, will appear to any one who ſhall put ſome of the very pureſt into a clean glaſs phial, and ſtop it with the greateſt care. Though perfectly tranſparent at firſt, it will grow cloudy, if ſuffered to ſtand ſome time without being ſtirred, and at length depoſite an opaque ſediment. Filtring and diſtilling will indeed intercept ſome of the earthy particles with which it is naturally charged; but neither of theſe operations, nor any other that we know of, though ever ſo often repeated, will free it entirely from all extraneous matter, ſome of which will always remain in it, very fine and light, fit to attend every motion of the water, whoſe extreme tenuity, and exactly ſpherical globules, enable it to pervade ſmaller ducts than even imagination can conceive. We hardly know any fluid in all nature, except fire, whoſe conſtituent parts are ſo extremely ſubtile as thoſe of water. They will paſs through pores and interſtices, impervious to air, or any other fluid. This enables them to enter the fineſt tubes and veſſels of plants, and to introduce the nutritive matter lodged in the earth, conveying it to all parts of them; whilſt each, by means of organs it is endowed with for the purpoſe, intercepts and aſſumes into itſelf ſuch particles as are ſuitable to its own nature; letting the reſt paſs on through the common ducts.

The judicious Mr. Worlidge, uninfluenced by the new and prevailing mode of thinking in his time, according to which all vegetables were ſuppoſed to be fed by water only, declares poſitively, that he cannot but explode this opinion as deſtitute of foundation; for that, although ſeveral plants ſet in water only, do emit fibrous roots, and flouriſh therein for a time; yet, at beſt, this nouriſhment is but weak, becauſe water does not contain a ſufficient quantity of the true nutritive particles, as the willow, poplar, and other aquatic plants raiſed therein, demonſtrate, and as is ſtill farther evident from their better thriving if the water be often changed. "Experiments, ſays he, have been made of gourds and cucumbers, planted in baked earth, and watered with water only; and after they have grown to ſuch a bulk as the experimenter thinks proper, they are weighed, and alſo the earth, which laſt is probably but little diminiſhed, or perhaps not at all; from whence they conclude, that the ſubſtance of thoſe vegetables proceeded from the water. Thus have men made experiments ſpeak as they would have them, to favour the new opinions they would impoſe on the credulous."

Spring and rain-water contain pretty near an equal charge of vegetable matter; river-water more than either of them. Nor can any doubt be made, but that the water which falls in rain at ſome times, is more charged with particles fit for the vegetation of plants, than that which falls at others. A more powerful degree of heat muſt draw up a larger quantity of that matter, with the humid vapours which form rain, than a more feeble warmth poſſibly can. The water of one ſpring may alſo flow with a higher charge of this matter than that of another: this depending partly upon the quickneſs of the ebullition of the water, and partly upon the quantity of that matter latent in the earth, through which the fluid paſſes, and the greater or leſs laxity of that earth. For the ſame reaſon, the water of one river may abound with it more than that of another; and the ſame river, when much agitated, may bear up more of it than when it moves with leſs rapidity.

Though water be not itſelf the food of plants, it is an abſolutely neceſſary agent, by which the matter proper for their nouriſhment, which remains inactive till it be diluted by, and incorporated with this fluid, is conveyed to them, and introduced and diſtributed into their ſeveral parts, both from the earth and the air. But ſtill it is not capable of performing even this office, without the concurrent aſſiſtance of heat, which gives it the neceſſary action, exalts and digeſts the nutritive juices, dilates the pores of the plant, and raiſes the ſap into the ſtem, branches, and fruit, where the ſun perfects the work, by ripening it.

The neceſſity of heat in vegetation is apparent from our fields and foreſts, our gardens and our orchards. We ſee, that in autumn, as the power of the ſun decreaſes, ſo its effects on plants diminiſh, and their vegetation ſlackens by degrees. Its failure is firſt diſcernible in trees, which, being raiſed high above the earth, require the moſt heat to elevate the water, charged with their nouriſhment, to their tops and extremities; ſo that for want of freſh ſupport and nutriment, they ſhed their leaves, unleſs ſecured by a very firm and hardy conſtitution, like that of our ever-greens. Next, the ſhrubs part with theirs; and then the herbs and lower tribes; the heat being, at length, not ſufficient to ſupply even theſe, though ſo near the earth, the fund of their nouriſhment. As the heat returns with the enſuing ſpring, they all recruit again, and are furniſhed with freſh ſupplies of verdure: Firſt, Thoſe which are loweſt and neareſt the earth, becauſe they require the leaſt degree of heat to raiſe into them the water with its nutritive charge; next, the ſhrubs and higher vegetables, in their turns; and, laſtly, the trees. As the heat increaſes, it grows too powerful, and hurries the ſap with too great rapidity through the finer and more tender plants. Theſe, therefore, go off and decay; and others, which are more hardy and vigorous, and require a greater degree of warmth, ſucceed in their order.

Mr. Tull is the only perſon who makes earth the food of plants. The experience of all ages contradicts this opinion; for the neceſſity of inducing ſomething into poor ſoils, to enable them to produce crops, is univerſally acknowledged; whereas, if earth alone was the food of plants, it would in all caſes produce the ſame effect.

As to the grand queſtion, whether plants of different kinds are nouriſhed by one univerſal food, or whether each particular ſpecies imbibes only its peculiar aliment; the ſupporters of this laſt opinion, among whom are the great lord Verulam and Dr. Woodward, ſay, it is not poſſible to conceive that one uniform homogeneous matter ſhould conſtitute bodies ſo unlike in all reſpects as the various tribes of vegetables; nay, even as the different parts of the ſame plant. But a moment's reflection will ſhew, that the latter part of this objection confutes the former; for if the plant has the power of altering the original juices taken in by the roots into ſo many various forms as experience proves it has, each plant may be indued with the faculty of aſſimilating to itſelf the juices it meets with in the earth; as we find the ſame food not only nouriſh different animals, but produce in each its peculiar character.

We have ocular demonſtration, that the willow and alder thrive beſt on a moiſt ſoil, and that the elm, pine, fir, and cypreſs, prefer a drier earth. Yet theſe, and many more of the wideſt difference, are ſometimes ſeen to draw their whole ſuſtenance, bulk, and ornaments, whether annual or perennial, from the juices they find in the ſame piece of ground, and from the ambient air and dews; though our ſtricteſt diligence cannot diſtinguiſh the particular aliments which approach their ſeveral roots. Changing the earth about the roots of theſe, or any other trees, whoſe bark, ſap, fruit, and ſeed, are of very different kinds and qualities, will only make each tree proſper the better. "Hence, ſays Dr. Beal, we may juſtly ſuſpect, that the very contextures of their bodies, from the firſt ſpirting of their ſeed, and as they are formed gradually from the inviſible principles or ſpirit and vigour of their ſeeds, however ſmall and imperceptible, are the natural alembics, where the common rain-water and air are digeſted into very much differing leaves, fruit, ſeed, reſins, gums, &c. perhaps as the cow's belly converts the common juices of all ſorts of graſs into milk, or as the bee collects honey and wax from all ſorts of flowers."

The ſame ſoil that has once been proper for the production of ſome ſorts of vegetables (continue thoſe who think that each particular ſpecies of plants has its particular food) does not always continue to be ſo; but in time loſes its property. If wheat, for example, be ſown upon land proper for that grain, the firſt crop will ſucceed very well, and perhaps the ſecond, or as long as the ground is in heart; but in a few years it will produce no more, if ſown with that corn. Some other it may, as barley, rye, or buck-wheat.

That this is owing to an improper culture of the land, more than to any defect in the ſoil itſelf, will evidently appear to thoſe who ſhall candidly weigh the principles of the New Huſbandry, when that ſubject comes to be treated of.

Mr. Du Hamel makes no doubt, but that the particles which plants appropriate to themſelves, take different forms in each plant, and even in the ſeveral parts of the ſame plant; but, as he juſtly obſerves, it does not at all follow from thence, that they were not originally the ſame. What would induce one to think them the ſame, is, that plants of different kinds rob one another of the nouriſhment which is in the earth: for, if a lettice, for example, drew from the earth a food different from that of endive, a lettice planted among endive would not only thrive better than if planted among other lettice, but as well as if no other plant was near it. But we know, by experience, that this lettice would grow very poorly, and conſequently that plants, though of different ſpecies, do hurt and rob one another. If each plant drew from the earth only the particular juices proper for itſelf, poppies, thiſtles, &c. which kill wheat, would not in that caſe do it any hurt, farther than by ſhading it with their ſtalks. But that the injury they do the corn is chiefly occaſioned by their roots, which conſume the neceſſary nutritive juices, is evident from this, that if dry branches were ſet in ſuch numbers as to make even a greater ſhade than thoſe weeds, they would not equally prejudice the growth of the wheat.

After ſome other arguments of equal force, Mr. Du Hamel concludes, that plants of different ſpecies feed on the ſame, or nearly the ſame ſubſtance; that there is no plant which does not rob thoſe that are within its reach of ſome part of their food; and that the ſoil which once is good for any one kind of plant, will always be able to ſupply it with food, provided it be properly cultivated.

To prove that the ſame juice takes different qualities in the veſſels of the ſame plant, he inſtances an experiment which he made, by grafting a young lemon, of the ſize of a pea, by the ſtalk, upon a branch of an orange tree. It grew there, ripened, and retained its quality of lemon, without partaking in any ſhape of that of the orange. The juices of the orange tree muſt therefore have changed their nature at once, on their paſſing into the lemon.

It is an old opinion, generally received by the ancients under the name of occult qualities, or ſympathy and antipathy, that ſome plants delight in being near each other, while others will not live together. Several of the moderns have likewiſe embraced this ſentiment, and urged in ſupport of it, the fig-tree and rhue, garlick and the roſe, which, ſay they, agree remarkably well together, becauſe the juices ſuited to the one are avoided by the other. Lavender, laurel, thyme, marjoram, and other aromatic plants, cannot, on the contrary, according to them, flouriſh together, becauſe they feed on ſimilar juices, of which they rob one another. Mr. Evelyn ſeems to be nearer the truth, when, ſpeaking of this ſubject, he aſſigns as a reaſon why ſome plants will not thrive near others, certain effluvia or ſteams emitted by the one, which may be noxious to the other. Plants will not thrive under the walnut-tree, the oak, and others of the ſame kind, becauſe their numerous and wide-extended roots exhauſt the earth around them, and the drippings from their leaves are impregnated with an acrid matter, which is an enemy to vegetation.

Though there are evident inſtances of an election of food in ſome plants of very different kinds, ſuch as the aquatic race, and thoſe which delight in a dry ſituation; yet, ſo far as relates to the farmer, they may be ſaid to be nouriſhed with one and the ſame ſubſtance; but at the ſame time it is neceſſary, that both the earth and that ſubſtance be fitted for receiving and nouriſhing them: for be the earth ever ſo good, rich, and proper for the production of vegetables, little will come of it, unleſs its parts have that juſt degree of ſtrength, or coheſion, which ſhall give ſtability to the plant, and at the ſame time afford an eaſy admittance to the fibres of its roots, to ſpread and extend themſelves in ſearch of that food.

FOOT, the part that ſupports an animal.

A horſe may have a very well made foot, and well proportioned, and yet if it chance to be thin and weak, the buyer will be diſappointed of his expectation; for ſuch a foot is liable to be ſpoiled in ſhoeing, by travelling on hard ſtony grounds, by too much drought in hot ſeaſons, or by too much moiſture in winter. A thin foot is that where the cruſt or horn is thin. This may be eaſily ſeen when the ſhoe is taken off, becauſe the verge all round the ſole will appear thin; and where it is ſo, a horſe will winch with the leaſt touch of the pincers; but as this trial will ſeldom be allowed in buying of a horſe, the beſt way to thoſe who would be acquainted with ſuch things, is to obſerve the bottom of the cruſt, which is generally ragged, and where the ſhoe-nails are clenched and rivetted: if theſe be high, it is a token the foot is thin, and that there has not been ſufficient hold for the nails, without driving them a good way upwards in the cruſt. In a thin foot, the heel and frog are alſo apt to be ſoft and tender to the touch, and by reaſon of the weakneſs natural to ſuch kind of foot, it ſometimes turns away, and one point of the heel will ſtand higher than the other, though this may be alſo owing to the crookedneſs of the paſtern joints, and will ſometimes happen where the foot is tolerably ſtrong; but is moſt common to ſuch as have weak feet; and where it is ſo, the horſe wears his ſhoes more on one ſide than the other, and often cauſes him to cut, and go lame in a journey.

As a thin weak foot is juſtly reckoned a very great defect in a horſe, ſo a very ſtrong foot is not always the moſt eligible, but is liable to ſeveral accidents. A ſtrong foot has the fibres of the hoof very diſtinct, and for the moſt part run in a ſtraight line from the coronet to the toe, like the grain of oak, lignum vitæ, or any other hard wood that eaſily ſplits; and though ſome ſuch feet will laſt very well, and keep free from accidents, where ſufficient care is taken to keep them moiſt and pliable; yet when they happen to be neglected upon a long journey, or much hard riding, eſpecially on dry ſtony grounds, or when they ſtand long in a hot dry ſtable, they will go lame and tender, at the ſame time that no defect is to be ſeen on the foot; for when the ſoft parts within are bruiſed by the hardneſs of the hoof, or by the thickneſs and hardneſs of the ſole, which in all ſuch feet is like a plate of iron; and when this happens, a horſe will be in pain, and the true cauſe ſometimes not found out for a long time, which I have known in ſeveral inſtances; nor is it eaſy to reſtore ſuch feet to a due temperament, as will be ſhown hereafter.

When a horſe that has a very ſtrong foot takes up a channel nail, or happens to be cut into the quick with a ſharp bone, a ſharp flint, or piece of glaſs, and a flow of humours follows upon ſuch a wound or puncture, the confinement theſe meet with from the ſtrength of the foot create much anguiſh, and, for want of vent below, frequently cauſes an eruption round the coronet, which proves for the moſt part troubleſome, and makes the cure tedious and uncertain, eſpecially when ſuch caſes happen to fall into bad hands.

I have known ſome inſtances where the hoof and the ſole have been quite looſened from all their attachments to the foot, the filaments and fibres that unite the horny part to the fleſh being all torn and pulled aſunder by the thickneſs and ſtrength of the horn; and where this happens in any degree, it is apt to leave a tenderneſs behind it, unleſs an uncommon care be taken to prevent it.

But the greateſt inconveniency in a very hard ſtrong foot, is its being ſubject to refts and fiſſures, which cleave the hoof quite through, ſometimes from the coronet down to the bottom; and this kind of foot is the more eaſily expoſed to ſuch accidents, that the horny fibres have a more viſible ſtraight direction than where the feet is more ſoft and pliable; theſe clefts, being for the moſt part in the quarter, ſeldom admit of any other remedy than extirpating the whole piece that lies next the heel, which defect is from thence called a falſe quarter, wherein the cure is ſeldom ſo perfect, eſpecially in the fore feet, as to leave no infirmity or blemiſh behind it. When the fiſſure or cleft does not penetrate through the horn, but makes a line on the ſurface, it is called a ſand crack, being very common in ſome ſandy countries, where the horſe's hoofs turns dry and crack with the heat of the ſand. Theſe are but little regarded where the lines are ſuperficial, and not deep in the horn, and are often cured by raſping the foot, and keeping it cool and moiſt. However, it is a defect that muſt leſſen the value of a horſe, in proportion to the degree of goodneſs or badneſs of his foot; for when the foot happens to be otherwiſe bad, theſe blemiſhes often degenerate, and are of ill conſequence.

The next defect I ſhall take notice of in the feet, is of thoſe horſes that have narrow heels. Some horſes feet are tolerably good, even where the heels are narrow; but when the foot is hot and inclined to rottenneſs, and the quarters loſe the round turn that they ought to have as they approach the heel, and look as if they were bent and pinched together, inſomuch that the heels of ſome ſuch horſes are not above two fingers in breadth, then the foot is bad; and the way that many take to mend theſe kind of feet, by hollowing on each ſide the frog, and thinning the quarters to cauſe them to ſtretch to a wider ſhoe makes them worſe; for the ſtretching out the quarters contracts the hoof on the inſtep, and almoſt always turns ſuch horſes hoof-bound, and wire-heeled.

But horſes often grow hoof-bound from other cauſes, and in ſome it proceeds from the ſhape of the coffin-bone, when it happens to be flat or hollow, where it ought to be riſing and round, when the coffin drops by thinning the ſole too much, and not taking care to ſtay it up with ſtuffing and ſplinters, and from diſeaſes in the feet that leave a weakneſs and deformity in them. But when a horſe that has a very ſtrong flinty foot happens to be hoof-bound, the caſe generally turns out bad. For the harder the hoof, the more it preſſes round the inſtep and heel. This preſſure makes the parts all round the coronet to grow fleſhy and project over the inſtep, ſo as to be conſtantly bruiſed by the upper part of the hoof, eſpecially when a horſe carries any great weight upon him, and by this means in the end ingenders a quitter, which creeps ſo under the hoof that it can ſeldom be removed without the loſs of a quarter, the ſame as when there is a fiſſure and cleft, or rather worſe, becauſe of the depreſſion and binding all round the upper part of the foot with the diſtemperature of the coronet, which often renders ſuch cures both very tedious and imperfect. Therefore this ought to be well looked into, eſpecially in chooſing a ſaddle horſe, that his feet be tolerably ſhaped, ſmooth, and cool, not narrow heeled, nor hoof-bound, neither weak-footed, nor too remarkably ſtrong; for moſt horſes of this latter kind are alſo coarſe, and chiefly fit for labour.

Another thing that ought carefully to be looked into, is that both his fore-feet be of equal ſize; for wherever this defect is the leaſt apparent, though it may proceed from a horſe's uſing one leg more than the other, as it happens to working men who uſe the right-hand and arm more than the left; yet when one foot is ſmaller than the other, it is a blemiſh, and carries ſome doubt that ſuch a foot may in time fail and periſh, even as theſe do that have been hurt by accidents, or after old lameneſſes in the ſhoulders, legs, and muſcular parts, where the foot at laſt periſhes in proportion as the muſcular and nervous parts ſhrink and diminiſh.

Another defect in horſes feet, is when they are flat and without depth. If ſuch a foot happens to be ſtrong, and the hoof ſmooth; if the ſole be alſo firm, and the frog no ways rotten or fleſhy, ſuch a horſe will endure the roads tolerably well. But when a flat foot is ſhaped like an oyſter, has many rings or wrinkles, if the ſole be ſoft, and the frog fleſhy and ſpongy, it is a very great defect. Some horſes are ſo remarkably faulty in this reſpect, that the frog bunches out beyond the bottom cruſt of the hoof, that their ſhoes muſt be made hollow, and the plates ſo broad as almoſt to cover the whole bottoms of their feet, to keep them from the ground. But indeed ſuch horſes are only fit for a draught, and not for the ſaddle.

Some horſes have tolerably good feet, only that their heels are low. Horſes that have long yielding paſterns are the moſt ſubject to this defect, and alſo thoſe that have their paſterns very ſmall, ſhort, and ſtanding almoſt quite upright; theſe have generally long heels and flat feet, and their fore-legs coming ſtraight down from the ſhoulder to the foot, without any bending of the paſterns, and for this reaſon are frequently called goat-legged. Many of the horſes bred in the fens are of this kind, have but an awkward uſe of their limbs, and make very bad travellers, and thoſe low heeled horſes which have very long yielding paſterns, are apt to have their heels wear quite to nothing upon a journey, and all the care imaginable in ſhoeing cannot prevent it.

A very high heel is another extreme, which greatly leſſens the value of a horſe; for even where ſuch a foot happens to be ſtrong and ſmooth, it is nevertheleſs the cauſe of unſteadineſs in a horſe's going, expoſes him often to trip and ſtumble, to ſprains in the coffin and paſtern-joints, &c.

There is one kind of horſe, eſpecially among the coach and cart breed, very remarkable for a large deep foot; the horn extremely thick and ſcaly, the heels broad and mouldering, and are apt to grow ſo very faſt, that the farriers when they go about to ſhoe ſuch horſes, thinking to eaſe them of their great load, and to bring their feet into a better ſize, pare and raſp them to ſuch a degree, that they leave their feet much larger about the coronet and inſtep than at the bottom; ſo that they always look as if they went upon pattens, which is not only very ugly, but ſuch horſes are ſeldom good for much.

A very large foot of any kind is to be avoided in a horſe, even ſuppoſing it to be in itſelf firm and good. But when I ſpeak of a large foot, I mean only when it is diſproportioned to his other parts, for a large horſe muſt of courſe have a larger foot than a ſmall one. But when we ſee the foot large, and the limb ſmall, in all ſuch it muſt be obſerved by thoſe who have experience, that the bones and ſinews are alſo ſlender, which not only denotes weakneſs, but heavineſs and inaptitude to any briſk and vigorous action; and therefore unfit for the coach or ſaddle, but to draw in a cart or waggon, or to carry a burden.

Some object greatly againſt white feet, as being generally worſe than thoſe of any other colour. Indeed when a horſe has too many of his feet white, they do not always prove the beſt, yet I have ſeen white-footed horſes have their feet ſuch as the ableſt judges could not find fault with. When a foot is ſmooth and tough, of a middle ſize, without wrinkles, neither too hard and brittle, nor too ſoft, and when the heel is firm, open, and no ways ſpongy or rotten, and the frog horny and dry, and the ſole ſomewhat hollow, like the inſide of a diſh or bowl, whatever be the colour, ſuch a foot will for the moſt part turn out good, though the dark or black hoof, where it reſembles that of deer, is generally the beſt; and for this reaſon thoſe who are the moſt curious about a horſe's feet, do not chooſe ſuch as have much white upon their legs and paſterns, to avoid their having too many white feet. *Gibſon's Farriery, vol.* I. *page* 19.

FORK, an inſtrument divided at the end into two or more points, or prongs.

FORKEN ROBIN, an earwig; ſo called from its forked tail.

FOSSE, a ditch or moat.

FOSTAL, a way leading from the main road to a large houſe.

FOUL FEEDING, a voracious appetite to which ſome horſes are ſubject, and, though not properly a diſeaſe, is often the cauſe of various maladies. It is generally the effect of ſome latent diſtemper, as vermin, which have a quite different effect on ſome horſes to what they have on others; for as horſes of a lax habit of body often loſe their appetites by worms, and are frequently griped and ſickly in their bowels; ſo horſes of ſtrong rigid conſtitutions, that can bear the irritation thoſe animals make in their inteſtines, are often voracious in their appetites, and continually craving after food.

Foul-feeders, however, differ in ſome things from thoſe that have voracious appetites: for as the latter crave only after their common food, and can hardly ever be ſatisfied; ſo the latter will leave their hay to eat their litter, and ſeem to like it the better when it is well ſauced with their own dung and urine; and, therefore, they may be properly ſaid to have a vitiated or depraved appetite. Though this does not always proceed from a voracious appetite, yet the firſt is often productive of the latter, and may probably be occaſioned by enlarging the capacity of the ſtomach and inteſtines to ſuch a degree, that nothing will ſatiſfy their cravings, but what has weight and ſolidity; for the ſame kind of horſes will eat mould and wet clay, or any kind of foul naſty weeds out of the ditches, and in the ſtable will eat ſtinking muſty hay, which the generality of horſes will refuſe.

There are others of depraved appetites, that are neither foul nor voracious feeders, ſuch as we often obſerve eat dry loam or mud out of the walls, which perhaps denotes ſome vitiated juices in their ſtomach; and this alſo is frequently owing to vermin, or at leaſt to a bad digeſtion, though perhaps not to any imbecility in their conſtitutions; for though thoſe horſes have a longing after thoſe extraneous things, yet their appetites at the ſame time ſeldom fail: but as this is often owing to full feeding, with the want of ſufficient exerciſe, ſo we often ſee them recover and quite loſe that vitiated taſte, when they come to ride a journey, or go upon any other conſtant exerciſe.

The beſt method in all theſe caſes of a vitiated or depraved appetite, is to begin with purging, and to diſſolve chalk in their water, and afterwards to give them good exerciſe. The ſame method may be complied with to thoſe that feed voraciouſly. To theſe the following draught may alſo be given, to blunt their appetites:

> Take a large handful of the roots of marſhmallows, cummin-ſeeds, and fenugreek-ſeeds, of each an ounce: liquorice roots ſliced, half an ounce; boil in three pints of water till the roots are ſoft and ſlimy, then pour off the decoction, and diſſolve in it an ounce of gum-arabic, and add four ounces of linſeed-oil.

Let the horſe have four handfuls of this every morning faſting, till his appetite abates. If the horſe be lean, which many voracious feeders are, he will gather more fleſh under this management, and as his fleſh increaſes his appetite will abate.

As to foul feeders, many of theſe begin with voraciouſneſs, and when they come to be ſtinted, take to eating of their litter to fill their ſtomachs, and in time take a great liking to it; and it is obſervable, that many of the horſes that go broken winded, have this evil faculty; and therefore I ſhould adviſe any one who has a foul-feeding horſe, to keep his ſtall as clean as poſſible, to let no wet, dirty litter, lie under him, nor to put his litter under the manger, but to beſtow it on ſome other horſe, otherwiſe they will paw it out, and feed upon it greedily; but clean ſtraw that has not been ſoaked with horſe-piſs and filth, will never hurt any horſe; for though there is no harm in the urine, yet when the ſtraw has been ſoaked in it with the dung, it often turns into a wad, or like a ſponge in their bowels, and cauſes great diſorders. But when their wet litter is taken away every morning, it may be the means to make them leave off that ill habit. *Gibſon's Farriery, vol.* II. *page* 96.

FOWL, a general name for all ſorts of birds; but uſed in a particular ſenſe to ſignify ſuch as are bred in the farmer's yard for profit.

The countryman's farm or habitation cannot be ſaid to be completely ſtored or ſtocked without fowl as well as beaſt, which yield a conſiderable advantage by their eggs, brood, bodies, and feathers. Any poor cottager that lives by the highway-ſide may keep them, they being able to ſhift for themſelves the greateſt part of the year, by their feeding on inſects, corn, or any thing almoſt that is eatable by any other ſort of animal: and therefore they are kept to great advantage at barn-doors, and other places, where corn or ſtraw is ſcattered.

As for cocks and hens, we ſhall not enter into a deſcription of the ſeveral ſorts of them, only obſerve that thoſe that are the beſt breeders, and the beſt layers, are to be choſen, the oldeſt being always the beſt ſitters, and the youngeſt the beſt layers; but no ſort will be good for either, if they are kept too fat. The beſt age to ſet a hen for chickens, is from two years old to five; and the beſt month to ſet them in, is February, though any month between that and Michaelmas is good. A hen ſits twenty days; wheras geeſe, ducks, and turkeys, ſit thirty. Obſerve to let them have conſtantly meat and drink near them while they ſit, that they may not ſtraggle from their eggs, and chill them. One cock will ſerve ten hens.

If fowls are fed with buck or French wheat, or with hemp, canary, or millet-ſeed, which is commonly ſown in March, it is ſaid they will lay more eggs than ordinary; and buck-wheat, either whole or ground, and made into paſte, which is the beſt way, is a grain that will fat fowls or hogs very ſpeedily; but the common food to fat them with is barley-meal wet with milk or water; but wheat-flour is better: but if you deſign to bring up chickens, give a barley-corn or two to each of them, as you take them out of the neſt, and ſo continue to feed them till they are fit for fatting.

For the beſt methods of breeding ducks, geeſe, turkeys, pigeons, ſwans, peacocks, &c. *ſee each under its proper article* DUCKS, GEESE, TURKEYS, &c.

FOWL'*s Dung. See the article* DUNG.

FOX, a well known animal of the canine kind, with ſharp ears, and a buſhy tail.

The fox is very prejudicial to the huſbandman, by taking away, and deſtroying of his lambs, poultry, geeſe, &c. eſpecially in places that are near foreſt-woods, and covert places. The beſt way of deſtroying them is with guns or traps, after this manner: if you deſign to ſhoot them, procure a ſheep's paunch, and tying of it to a long ſtick, rub your ſhoes well upon it, that the fox may have no ſcent of your feet, and draw the paunch after you, with which make a trail a mile or two in length; and order it ſo as to bring it near ſome thick-headed tree. At which place, when you have made your trail, leave your paunch, and with your gun get up into the tree; and as ſoon as it begins to be dark, you will ſee him come by you upon the ſcent of the trail, where you may ſhoot him. Obſerve that you draw the trail to windward of the tree, if you can.

But if you have a mind to catch them with a ſteel-trap, which is the ſureſt way, chooſe a place to ſet it in a plain part of a large field; let it be out of the way of all paths, but not near either a hedge or any ſhelter. Open your trap, and lay it upon the ground, and cut out in the turf juſt the form thereof, and take out ſo much earth as may make room to lay it, covering of it again very neatly with the turf you cut out; and becauſe the joints of the turf will not cloſe exactly, get ſome of the fine mould that is to be found in a new caſt up mole-hill, and fill the joints with it, taking ſome graſs, and ſticking of it in the mould, as if it grew there. Make all ſo fine and plain, as that it may deceive your own eye to look upon it. About eight or ten yards from the trap, three ſeveral ways, ſcatter ſome of the fine mould that you had out of the mole-hill, very thin, upon a place about fourteen or fifteen inches ſquare; and upon theſe places, and where the trap is, lay two or three ſmall bits of cheeſe, and with a ſheep's paunch, as is before directed, draw a trail of about a mile long to each of the three places, that are at a diſtance from the trap, and from thence to the trap, that ſo the fox may come upon one of thoſe places firſt, which will make him approach the trap with more boldneſs, where you will ſeldom fail of him; only you muſt obſerve not to faſten your trap, but to leave it looſe, that he may draw it to the hedge-ſide, or to ſome cover, or elſe he will bite off his leg, and be gone.

Some bend down a ſtick in the wood, and ſet a trap for them in their paths, like that which is ſet for woodcocks, which hangs them up, or any other ſort of vermin. *Mortimer's Huſbandry, vol.* I. *page* 312.

FOX-TAIL GRASS, the ſame with cow-wheat. *See the article* Cow-Wheat.

FRAGRANT, odorous, ſweet of ſmell.

FREE-MARTIN, a barren heifer.

FRENCH BARLEY, a ſpecies of barley called by botaniſts *tritico ſpeltum.* Some call it wheat-barley. It is naked, and the grain like wheat, but the ear ſhaped like that of the common barley. This ſpecies is often ſown about Rowley, Hamſtal, and Redmore, in Staffordſhire. It yields a large increaſe, and makes good bread and good malt. *See the article* Barley.

FRENCH-BEANS. *See the article* Beans.

FRITH, an arm of the ſea running into the land.

FROST, the laſt effect of cold; the power or act of congelation.

Froſt is a great fertilizer of land, and therefore when the ſoil be a harſh, churliſh, or obſtinate clay, it ſhould be turned up in ridges at the beginnning of winter, which will greatly tend to remove its bad qualities, and ſeparate its particles.

Hard winters are generally of ſervice to corn in many reſpects; eſpecially if the land has been thoroughly drained, and is well covered with ſnow. This laſt mellows the ground, and keeps it warm; while froſt, neither the rigour nor duration of which need be feared if it comes on gradually, and the land is dry, not only kills great numbers of vermin and inſects, but, by leaving the earth in a looſe ſtate, fits it for roots to extend themſelves therein as the warmth of the ſpring approaches, and thereby enables them to produce ſtrong plants; whereas frequent rains in winter, without froſt, ſodden the earth, which afterwards produces nothing but blades, ſoon to be deſtroyed by the hoar froſts of the ſpring, by inſects, and by weeds; or which would yield at moſt only ſtraw without grain. The winter's froſts may indeed nip off the blades; but then the roots being unhurt, new ones will ſhoot up in the ſpring. This was the caſe in the remarkably ſevere winter of 1608, of which Mezeray ſpeaks, and which, notwithſtanding its extreme ſeverity, was followed by a plentiful harveſt; and ſuch alſo, or nearly ſuch, was the long winter of 1729.

The great danger from froſts is, when the earth is wet, and not covered with ſnow. For example, if a ſtrong froſt returns after a ſudden thaw, the fibres of the roots are broken by the expanſion of the ſurrounding water when frozen, and the too great abundance of moiſture in the plants themſelves, when frozen, tears their fibres to pieces by the ſame expanſion. This was what happened in 1684.

Early in the ſpring of 1710, the parliament of Paris, hoping that the corn cut off by the preceding winter would ſhoot out again, as it did after the winter of 1608, mentioned by Mezeray, forbid ſowing anew the lands which had been ſown the autumn before: but the expectation now proved groundleſs, the plants having been totally deſtroyed by repeated froſts, intermixed with frequent thaws; ſo that had it not been for the barley that was ſowed afterwards, which yielded ſuch prodigious crops, that the French ſtill call that year the year of barley, the dearth muſt have been much more dreadful than it was. In that very ſpring, after the hard winter, ſeveral people in the dutchy of Berry, and elſewhere, ſowed wheat, which ſpouted well, and grew, but did not ſpindle; whereupon ſome mowed their crops, and others turned in cattle to feed as in a meadow; but after another winter had paſſed over them, theſe very fields yielded the next year as plentifully, as if they had been ſown anew. In incloſed grounds, the corn near hedges, which ſecured it from the north wind, reſiſted all the rigour of that exceſſive cold; and in other places, where the poor peaſants raked up all the ſnow they could collect, and ſpread it with their hands upon the uncovered ſpots of their ſmall fields, their corn was preſerved, and yielded a good crop.

A gentleman, now living in England, had a field of wheat ſo greatly damaged by alternate froſt and thaw, that the neighbouring farmers thought he could not do better than plough it up for ſpring corn; but obſerving that many of the plants were yet alive, and in a condition to be recovered, though thinly ſcattered, he hand-hoed the whole, and reaped three quarters of corn from each acre of this land.

FROWAR, the name of an edge tool, uſed in cleaving laths.

FRUIT, the produce of a tree or plant, in which the ſeeds are contained.

Thouſands of objects teach us, that moiſture and warmth are the great cauſes of putrefaction. From the decay of many otherwiſe laſting bodies, we learn, that the alternate changes of heat and cold, of dryneſs and moiſture, moulder to pieces even the ſolid oak. Theſe general cauſes of putrefaction and decay ſhould therefore be avoided, or prevented, as much as poſſible; and to this end an equal ſtate of the air, with regard to heat and dryneſs, becomes neceſſary in a repoſitory for the preſervation of fruit. The want of dryneſs renders cellars in general unfit for this purpoſe; though ſome of them may, perhaps, be dry enough; and if they are, the other requiſite, of an equal ſtate of heat, is uſually found in them: but as this is not often the caſe, it is ſurely worth the gentleman's while to provide a receptacle on purpoſe for his fruit. A cloſet, ſurrounded every way with good walls, and furniſhed with double doors, promiſes the beſt ſucceſs. In this cloſet, different compartments, or bins, may be made of brick, which continues much drier than ſtone or wood. Large jars, or caſks, will alſo anſwer the ſame end, when they are cloſely ſtopped; and ſo do boxes, as it is well known to the London fruiterers. Either of theſe may be proportioned to the quantity which it is adviſable to keep in each, that is, to the quantity that is to be conſumed within a few days; for even in ſuch a place the fruit ſhould be expoſed to the air as little as can be, before it is eaten. Experience will ſoon ſhew to the good manager the importance of this caution.

When the fruit, we mean chiefly apples and pears, for they are fitteſt for keeping, has been carefully gathered by hand, in perfectly dry weather, and ſweated for ſome days, in heaps on a clean floor, till it has diſcharged its watery and crude juices, each apple or pear muſt be rubbed ſingly with a coarſe cloath, to clean and dry them, and if the leaſt hurt or ſpeck tending to putrefaction appears at this wiping, all the fruit ſo marked muſt be laid aſide, as unfit for keeping. A layer of very dry ſtraw ſhould be laid at the bottom of the veſſel, whatever it be, in which they are to be preſerved, and upon this a layer of perfectly ſound apples or pears; then another layer of ſtraw over them, a layer of fruit upon this, and ſo alternately till the whole intended quantity is put in. We have named ſtraw, becauſe it is eaſieſt to come at; but any other ſubſtance, which is perfectly dry, and leaſt liable to corruption, will do. If, therefore, each layer of fruit is ſheltered above and below with a covering of paper, to preſerve it from the taſte which ſaw duſt might give it, this bids fair to anſwer the deſired purpoſe. On this principle it is that roots are preſerved in ſand: the only objection to which, for the uſe here intended is, that its weight may hurt the fruit, otherwiſe it promiſes well, when perfectly dry.

FRUIT-TREES, a general name for trees that produce eatable fruit, as apples, pears, plums, peaches, apricots, figs, &c. See each under its proper article.

FRUNDELE, two pecks, or half a buſhel.

FRUSHES. *See* Running-thrush.

FUDDER, a load. It properly relates to lead, and ſignifies a certain weight, viz. eight pigs, or ſixteen hundred weight.

FULLERS EARTH, a native earth found in many parts of England, and much uſed by fullers in cleaning and ſcouring their cloth. It is of a very fat nature, and very full of that vegetative ſalt that helps the growth of plants; and therefore may be uſed with advantage, where it is found in plenty, on ſome ſorts of land.

FURLONG, the eighth part of a mile.

FURROW, a trench made by the plough.

FURZE, *whins* or *gorſe*, to which C. Baukin and Mr. Ray, give the name of *geniſta ſpinoſa,* and which Linnæus and Miller call *ulex*, propagate themſelves ſo rapidly, by ſowing their ſeeds, that, where they are once eſtabliſhed in a ſpot of ground, they ſoon over-ſpread the whole place; for, as the ſeeds ripen, their pods are opened by the warmth of the ſun, and they are thrown out with an elaſtic jirk to a conſiderable diſtance all around. There they vegetate, and the ground is ſoon filled with young plants, which are not eaſily deſtroyed after they have taken good root. The only way of extirpating them, is by paring off and burning the ſurface of the ground. *See the article* BURN-BAKING.

This is by ſo much the more adviſable, as theſe ſeeds will otherwiſe remain a long while ſound in the earth, and grow whenever they are brought up by ploughing; and alſo becauſe the ſmalleſt fragments of this plant will ſtrike out freſh roots, and ſhoot up anew: but when a good thickneſs of the ſurface is pared off, and burnt, the ſeeds are ſo effectually deſtroyed, and the roots are killed to ſo conſiderable a depth, that neither can again give riſe to new plants; and if a few of theſe do appear, a ſummer fallow will put an entire end to their growth. Their increaſe may likewiſe be prevented by good manuring with marl, chalk, or lime, eſpecially in ſandy ſoils, which are the moſt apt to produce this plant, and which are at the ſame time the moſt benefited by thoſe helps.

However, this very plant, formerly deemed a great nuiſance, is now cultivated to advantage on light, ſandy, dry ſoils, which would otherwiſe turn to little account. The tops of the common Engliſh furze, bruiſed a little, to take off, or to blunt their prickly tips, have been found to be excellent fodder, even for lean ſickly beaſts, and particularly horſes, which they have frequently recovered, and plumped up in a ſhort time. This cuſtom is much practiſed in ſeveral foreign countries, where furze are cultivated purpoſely for fodder; and the peaſant thinks it a happineſs, that his breaking their ſpikes with a mallet enables him to give this wholeſome green food to his cattle in the winter, when often no other ſucculent plant can be had fit for that uſe. The mills which Sir Capel Hanbury has lately erected for this end in Wales, with a patriotic ſpirit, well ſuited to his diſtinguiſhed zeal for the public welfare, will ſave the countryman that laborious taſk, and prove highly beneficial to thoſe who follow his judicious example.

When furze are raiſed on purpoſe for the food of cattle, and eſpecially on ſoils like the above mentioned, their ſeeds ſhould be ſown in February, March, or April, and the ground ſhould be prepared as for barley. Six pounds of them will be ſufficient for an acre of land; and they ſhould be but barely covered over. The young plants muſt be preſerved from cattle during the firſt year, and they will be fit to mow or cut in the next. October is the proper time to begin cutting them. They will continue to ſhoot till Chriſtmas, and be fit for uſe till March. Horſes eat them as readily as they do hay, after they have been bruiſed, or pounded, ſo as to take off their ſharp points; and it is ſaid, that an acre of ground will produce fifteen tons of this fodder, and that it will go as far as an equal quantity of hay. Some mix the bruiſed furze with chopped ſtraw; an hundred of ſtraw to a ton of furze; but only the growth of the year ſhould be cut for cattle.

Poor hungry gravelly ſoils, which would not have let for five ſhillings an acre, have been rendered worth twenty ſhillings an acre, by ſowing them with furze ſeed, in places where fuel has been ſcarce; this being frequently uſed for heating ovens, burning lime and bricks, and alſo for drying malt; but it is not worth cultivating in countries where fuel of any kind is cheap, or upon ſuch lands as will produce good graſs or corn.

Some years ago, the common furze uſed to be much ſown for hedges about fields; and where the ſoil was light, the plants ſoon became ſtrong enough for a fence againſt cattle: but as theſe hedges grow naked at the bottom in a ſhort time, and the plants frequently failed, ſo as to leave conſiderable gaps, this practice has of late been greatly diſuſed. The ſpecies commonly called French furze is the beſt for this purpoſe, becauſe it thickens more near the ground, and grows to a greater height: but its ſhoots are not tender enough for cattle to eat them. This is alſo conſidered as the moſt difficult to extirpate: though Mr. Bradley, who tells us he had ſeen fields of one hundred and fifty acres planted with it in Devonſhire, ſays, that it may be killed by cutting the woody ſtalks within a foot of the root in ſummer time; for that it will not then ſpring up again like the ſmall wild furze or whins, by which name Mr. Markham diſtinguiſhes the ſmaller from the larger ſort. This begins to blow in the middle of January, and continues in bloſſom all the ſummer; while the Engliſh furze does not bloom till towards the end of the ſpring, and finiſhes its bloſſoming at the ſame time as the other.

The marquis of Tourbilly obſerves, that cows, oxen, and moſt other cattle, as well as horſes, feed heartily upon, and are well fed by, the bruiſed tops of furze; and that we may be ſure corn will do well where-ever this plant is met with: for be the ſurface of ground what it will, the ſpontaneous growth of the furze always indicates a depth of good mould underneath; and the continual dropping and rotting of the leaves, will infallibly improve and enrich the ſurface. The flowers of the furze are excellent for bees.

FUZZEN, *or* FUZEN, the natural juice or nouriſhment of any thing; the ſtrength of it.

G.

GALLERY, a kind of covered walk in a garden, formed into porticoes or arches, with horn-beams, lime-trees, or the like.

GALLING *of a horſe's back*, a diſorder occaſioned by heat, and the chafing or pinching of the ſaddle.

In order to prevent it, ſome take a hind's ſkin well garniſhed with hair, and fit it neatly under the pannel of the ſaddle, ſo that the hairy ſide be next the horſe.

When a horſe's back is galled upon a journey, take out a little of the ſtuffing of the pannel over the ſwelling, and ſew a piece of ſoft white leather on the inſide of the pannel; anoint the part with ſalt butter, and every evening wipe it clean, rubbing it till it grow ſoft, anointing it again with butter, or, for want of that, with greaſe: waſh the ſwelling, or hurt, every evening with cold water and ſope, and ſtrew it with ſalt, which ſhould be left on till the horſe be ſaddled in the morning.

GALLON, a meaſure of capacity both for dry and liquid things, containing four quarts; but theſe quarts, and conſequently the gallon itſelf, are different, according to the quality of the thing meaſured: for inſtance, the wine gallon contains 231 cubic inches, and holds eight pounds avoirdupoiſe of pure water: the beer and ale gallon contains 282 ſolid inches, and holds ten pounds three ounces and a quarter avoirdupoiſe, of water; and the gallon for corn, meal, &c. 272¼ cubic inches, and holds nine pounds thirteen ounce of pure water.

GALLOWS *of a plough*, a part of the plough-head, ſo called by farmers, from its reſemblance to the common gallows, as conſiſting of three pieces of timber, of which one is placed tranſverſely over the heads of the other two. *See* PLOUGH.

GAP, a breach, or opening made in a hedge.

GARDEN, a plot of ground cultivated and properly ornamented with a variety of plants, flowers, fruits, &c.

The generality of writers upon this ſubject, and indeed moſt gardeners, in their practice, have, at leaſt till of late years, treated the pleaſure garden, the fruit garden, and the kitchen garden, as three quite diſtinct and ſeparate objects, not only in point of culture, but even of ſituation, ſoil, and incloſure. They are undoubtedly right as to the firſt: but we ſee no reaſon for disjoining the two laſt, unleſs it be in written accounts, where, for the ſake of greater order and perſpicuity, and for the conveniency of the reader, their ſeveral products, and the different ways of managing them, may with propriety be given ſingly, as will be the method here.

The pleaſure or flower garden, being intended ſolely for ornament and recreation, does not belong to this work, the main deſign of which is utility. We ſhall therefore only obſerve, in relation thereto, that the gentleman who can afford to be at the expence of ſuch a garden, for the laying out, planting, and managing of which he will find ample and excellent directions in Mr. Miller's Dictionary, will, of courſe, place it in a properly conſpicuous part, where it may afford the greateſt entertainment to the eye. Conſequently he will order it to be made next to, or juſt againſt, the back front of his houſe, from whence a deſcent of at leaſt three, but rather of ſix or ſeven, ſteps will ſingularly embelliſh the whole. He will allow room for a ſufficiently extenſive lawn, which, if it be the firſt thing that ſtrikes the ſight, will have an elegant effect; for ſpacious walks, one of which, ſo contrived as to be perfectly dry, and every now and then to lead to a ſhady place, or into plantations of ſhrubs, where a perſon may walk in private, ſhould ſurround the whole garden, were it only for the benefit of exerciſe. He will have wilderneſſes, groves, green-houſes, &c. and he will be particularly careful to provide plenty of water, for caſcades, fountains, and winding ſtreams, which laſt, if ſo conducted as to imitate nature, will give life and beauty to the whole, beſides being of neceſſary uſe for watering the ground. Statues and vaſes, judiciouſly diſpoſed, are alſo, here, pleaſing and proper objects: but neither theſe, nor any of the buildings in the garden, whether temples, grottos, alcoves, or other, ſhould by any means be too much multiplied, or crowded.

Mr. Miller obſerves very rightly, ſpeaking of pleaſure gardens in particular, that the great art of laying them out, is to adapt their ſeveral parts to the natural poſition of the ground, ſo as to have as little earth to remove as poſſible; for this is often one of the greateſt expences in making of gardens: though it may with truth be affirmed, that, wherever it has been practiſed, nine times in ten it has proved the worſe: ſo that if, inſtead of levelling hills to form large terraces, ſtiff ſlopes, and even parterres, or ſinking of hollows and raiſing of hills, the ſurface of the ground had been only ſmoothed and well turfed, this would have produced a much better effect; and have been more generally approved, than the greateſt number of thoſe gardens which have been made with an infinite expence both of time and of money.

The boundaries of theſe gardens, whatever they are fenced with, ſhould be carefully hid by plantations of flowering ſhrubs, intermixed with laurels and other evergreens, to conceal the fences, which have a diſagreeable look when they are left naked and expoſed. All the boundaries ſhould not be ſeen from any one point of view: and if the country around affords a variety of pleaſant proſpects, it will be right to bound the pleaſure garden by an ha-ha ditch and wall, to lay open thoſe views.

Neither the huſbandman, nor the country gentleman of moderate fortune, who prefers utility to oſtentatious ſhow, can ſet about an eaſier or more profitable branch of culture, than that of the kitchen and fruit garden, which may very properly be intermixed, and occupy one and the ſame ſpot of ground, ſince they both require a good, deep ſoil, and nearly the ſame expoſure. The walls which incloſe the kitchen garden, in order to ſecure its product, will be extremely ſerviceable for fruit: and, if elegance ſhould be ſtudied, this united garden may ſtill be placed out of view from the dwelling-houſe.

The chief things to be conſidered in the choice of a ſpot of ground for a kitchen and fruit garden are, the ſituation, the ſoil, the conveniency of water, the extent moſt proper to be incloſed, and the manner of incloſing it, and laying it out.

If the huſbandman can chooſe his ſoil and ſituation for a garden, the former ſhould be rich, rather ſtiff than light, and conſiderably deep. Nor is a moderate degree of moiſture here by any means an objection. The ſituation ſhould be nearly level: becauſe heavy rains would waſh away the richeſt part of the mould, if the declivity were conſiderable. If he has not a level ſpot near his houſe, the ground intended for the garden may be made into flats with terraces ſupported by ſtrong walls, which will become uſeful for fruit-trees. A gentle inclination may be preſerved, to anſwer Mr. Miller's idea of having one part of dry ground for early crops, and the low part for late crops, in order that the kitchen may be the better ſupplied throughout the ſeaſon with the various ſorts of herbs, roots, &c.

He ſhould not be diſcouraged at ſome ſeeming diſadvantages to which his ſoil and ſituation may expoſe him; for no difficulty is ſo great, but that it may be overcome by care, induſtry, and perſeverance. Of this we have a ſtriking inſtance in the following part of a paper which D. J. Beale read to the Royal Society, ſome years ago, with a view to the improvement of gardening in Scotland.

“ I had, ſays he, ſeveral conferences with Sir Robert Murray (who was an honour to his country, and a bleſſing to the place where he abode) concerning eſculent and olitory gardens, and (under one) nurſeries of fruit-trees, and other uſeful vegetables in Scotland. I repreſented, that, almoſt within my memory, they are become the chief relief of England; that auſtere fruit has been found to yield the ſtrong and ſprightly liquor which reſembles the wine of the grape; that the return of gain from gardens is great and ſpeedy; and that nurſeries are neither a chargeable nor a burthenſome addition, but a motive of encouragement to perſevere in the nobleſt kind of agriculture. Sir Robert granted all I ſaid: and I am ſure he executed all that he could for the benefit of his own country, and of this. But, ſaid he, there are ſo many rocks, and ſuch bleak winds, in Scotland, that it can hardly draw in the ſame yoke with England, for gardens and orchards. I replied, that, in Devonſhire and Cornwall they fence their gardens and orchards with Flanders furze and tall holly, from the ſea winds; that they have lofty firs and goodly pines in Scotland; and that New England, where the winds are as keen, and the ſnow and froſts as deep, and as long laſting as in many parts of Scotland, is nevertheleſs full of fruitful orchards. And if Scotland be farther in the north, yet Norway is rich in boſcage; and the ſeeds of the hemlock, fir, ſpruce, and cedar, from New England, Newfoundland, and Virginia, may perhaps rejoice in the exchange of Northern America, for the north of this iſland.

“ This, I told Sir Robert, I durſt undertake; that when Edinburgh and their chief towns and univerſities ſhall plant kitchen gardens, as we do now in England, they ſhall receive their grateful reward the firſt year, and bear the charges of their nurſeries abundantly, and ſo hold on, and within ſeven years ſecure their poſterity of the benefit, and delight themſelves with the fruit of their pleaſing labour.

“ Now for fertilizing rocks, I made bold to repeat it often, that, within a day's journey of the heart of England, I could ſhew three gardens, the beſt that I have ſeen for flowery beauties, Engliſh ever-greens, and ſallads all the winter long; all theſe on a hard rock, in moſt places but one foot deep under earth, in ſome two, and in very few three, with very lofty hills cloſe to the ſouth ſide, the declivity of the gardens due north, and the rock perfectly bare next to the walls on the north ſide. I likewiſe ſaw rich hop yards in the ſame caſe, but in deeper ground, next to the garden on the ſouth ſide: and theſe northern hop yards eſcaped many blaſts, which ſeized on the hop yards on the ſouth ſide of the hill. On the ſteep aſcent on the north ſide of one of theſe rocky hills, where no plough could come, I ſaw a gentleman ploughing up the ſhallow tuf with a hand-plough, for flax; and I ſaw good flax grow there, to the largeneſs of a village-field. His hand-plough had a ſtem of aſh, or ſally, about ſeven feet long, and a plate at one ſide near the end, to turn the turf; a coulter to be let out ſhorter or longer, to cut the turf four, five, or more inches deep, as the land permitted, and a ſmall iron wheel. This hand-plough the maſter and the man, by turns, drove before them with a walking ſpeed; having leathern aprons before them, to ſave their cloaths. For the cauſes of this hardy fertility, let philoſophers account. I am ſure of the truth of what I write.

“ It is no hard taſk to ſhovel down the ſhallow and moſſy turf, from the deepeſt declivities of rocks, into places where it may have a receptable or ſtay, and there, with the ſpade to mix and impregnate it with compoſt for gardens or vineyards. There too the tenth part of an acre in gardening may yield more profit, than ten acres of ordinary tillage in a corn field.” *Philoſophical Tranſactions, number* 116.

On the other hand, we have many proofs that wet, and even very marſhy, grounds have been converted into excellent kitchen gardens, after they have been drained. Such was, formerly, all that large part of Paris which ſtill retains the name of *le marais* (the marſh;) and ſuch were, evidently, ſeveral of our moſt profitable gardens around London. The marquis of Turbilly has given us farther inſtances of this truth in ſeveral of his noble improvements; and the Memoirs of the truly patriotic Society of Berne remark very juſtly, that all legumes and pot-herbs thrive perfectly well in the black, rich, moiſt, and ſomewhat riſing, grounds, which moſt commonly ſkirt the borders of marſhes.

As warmth is eſſentially neceſſary to a garden, it is adviſable that the expoſure of the ground intended for this purpoſe be to the ſouth-eaſt, or ſouth; and that it be protected from the north and north-eaſt, either by high grounds, or plantations of lofty trees at a ſmall diſtance. Fruit-trees require to be likewiſe protected from the ſouth-weſt and weſt, which are apt, in the autumn, to ſhake the fruit.

The huſbandman ſhould here ſpare no trouble or expence to render his ſoil of a proper quality and depth: and if it be not naturally ſo, he muſt have recourſe to one or other of the methods practiſed for the improvement of ſoils, according to the nature of his ground.

Whatever the ſoil be, the mould in which the plants are to live and thrive ſhould be deep enough to afford their roots full room to extend themſelves. It appears by ſeveral experiments, that the roots of many plants, not excepting even annuals, pierce to the depth of eighteen inches, and more. To allow therefore a ſufficiency of room, though perhaps more than may be really wanted, a depth of three feet of good mould ſhould be allotted them here: and if the ſoil underneath is clay, or retentive of water, which would be apt to chill the roots of plants, it will be right to exceed even this depth.

Trenching is the moſt effectual way to obtain a conſiderable depth of well looſened mould. The common method of doing this, when the ſoil underneath is clay, is to begin with digging a trench four or five feet wide, either along or acroſs the whole ground; then to lay in the bottom of it, about half a foot thick, long dung, fern, leaves of trees, rotten ſticks, weeds, or any other ſuch like traſh, to rot and keep the ſoil from binding; then to fill this up with the earth dug out of the next adjoining trench, laying uppermoſt the ſpits that were loweſt, and ſo to continue till the work is finiſhed, without ever going deeper than juſt to the clay, though the ſurface be never ſo ſhallow. But if the clay be dug into, and part of it be turned up and mixed with the other earth, its bad qualities will ſoon be corrected by the influencies of the air, rain, and one winter's froſts; it will become good and fertile mould, and the depth of the ſtaple will be increaſed thereby, eſpecially with the addition of a little drift ſand, coal, or other aſhes. The beſt time for trenching of land, that it may receive the benefit of being well mellowed, is the beginning of winter; when alſo, being moiſt, it is eaſy to dig.

When the mould on the ſurface is but ſhallow, and lies on a bed of ſand, gravel, or looſe earth, it will be adviſable to lay a layer of ſtiff earth, inclining to clay, at the bottom of the trench. This will be more eſpecially neceſſary for the growth of trees, or plants whoſe roots naturally pierce deep: for by means of this earth, thoſe roots will ſpread horizontally in the mould, inſtead of ſtriking down, as they would otherwiſe do, into barren earth, which would immediately make the trees decay and become ſtinted. And another advantage attending this method will be, that as water cannot ſo eaſily deſcend through this ſtiffer ſoil, the earth will be thereby preſerved in a ſo much moiſter ſtate; yet even here the clay ſhould not be ſuch as is impervious to water; for this, unleſs it lie very deep, would be attended with as bad conſequences as the other extreme.

The general practice of gardeners is regularly to trench their ground, and lay it rough in the winter, without ſufficiently conſidering the quality of the ſoil, or the nature of the earth which lies underneath. But a little reflection would convince them of their error. Let us, in this light, ſee what is the effect of trench in various ſoils. If the ground is naturally light, and lies on a bed of ſand or gravel, it is to be feared that every ſubſtance brought to improve the ſoil, together with its fineſt and richeſt particles, will be carried down into that ſand or gravel. Does not too frequent trenching contribute to this loſs? as does likewiſe laying the ſurface rough in the winter: for the rains waſh the finer mould into the hollow places, from whence, the depth of the ſoil being leaſt there, it is moſt readily carried down into the looſe earth underneath. If the ſoil underneath is ſtiff, frequent trenching is proper in order to bring back to the ſurface the rich mould that has been waſhed down: and if it be naturally ſtrong, the laying of it rough in the winter is an advantage, becauſe the winter's froſts will moulder its tough ſtrong particles.

This method of preparing the ground is, undoubtedly, expenſive: but its fertility afterwards will yield an ample reward.

Plenty of water is abſolutely neceſſary in this garden, and therefore great care ſhould be taken to provide it, in ſuch manner that it may become at as eaſily as poſſible. If a ſufficient ſupply of it can be obtained from the neighbouring grounds, two or three baſons ſhould be made in different parts of the garden, if it be a large one; for when the water is to be carried to a conſiderable diſtance, the expence attending this neceſſary buſineſs will be great, and there will be danger of the plants ſuffering for want of it; labourers being very ſparing of their work, eſpecially when it is toilſome, unleſs they are well looked after. The ſize of theſe baſons ſhould be proportioned to the quantity of water that will be wanted, or with which they can be ſupplied: but their depth ſhould not exceed four feet, for fear of accidents, if people ſhould chance to fall into them: beſides which, deep water is not ſo well warmed and tempered by the ſun and air, as when it is ſhallow.

The methods uſed for collecting and preſerving of water in ponds or reſervoirs in the field, are equally applicable to the making and repleniſhing of theſe baſons in the garden. But it will be proper here to add the following more particular cautions and inſtructions of Mr. Miller, who, after obſerving, that the beſt time of the year for lining theſe baſons with clay, particularly in looſe or ſandy land, and for afterwards covering that clay with a thick layer of coarſe gravel, is in autumn, when the ſun is declining, and the weather temperate, adviſes, "as a farther means of ſecuring this clay from being cracked by the heat of the ſun, or by froſt, to lay upon the rim or top of it, around the ſides of the baſon, a ſtratum of ſand, then a ſtratum of good earth, and upon this a layer of thick turf. The graſs thus laid will root in the mould underneath, and bind the whole firmly together: and it ſhould be laid as far down the inſide of the baſon, as the water is apt to ſhrink to, that no part of the clay may be wholly expoſed to the weather.

"No trees or ſhrubs ſhould be ſuffered to grow near theſe baſons, leſt their roots ſhould penetrate into them, and thereby occaſion holes through which the water would find an eaſy paſſage. Neither ſhould theſe reſervoirs be made near to tall trees, becauſe the ſhaking of them, by violent winds, would be apt to looſen and crack the clay.

"In countries where clay proper for this purpoſe cannot be eaſily had, theſe baſons are frequently lined with chalk beaten into fine powder, and made into a ſort of mortar, which is rammed down and worked very hard and firm all over their inſide. This cement holds water very well, if the pond be not ſuffered to remain too long dry: for when this happens, the ſun and wind are apt to crack the chalk, and theſe cracks generally extend through its whole thickneſs, ſo as to let out the water.

"Some line theſe ponds with bricks laid in terras, which is a good method where the ground is very looſe and ſandy; becauſe when theſe walls are well built, the ſurrounding earth may be rammed down cloſe to them, ſo as to prevent its falling away, or ſettling from them. But, as heat is apt to crack the terras, no part of this lining ſhould be left long dry and expoſed.

"Others again uſe for this purpoſe a cement of powdered tile and lime, two thirds of the former to one third of the latter, beaten well together, and worked up with but little water: for the ſtiffer it is, and the more it has been beaten, the better it will be. With this cement they cover the ſurface of the walls of baſons about two inches thick, laying it very ſmooth, and taking great care that no ſticks, ſtraws, or ſtones be mixed with it. This is generally done in dry weather; and as ſoon as the whole inſide of the baſon has been plaiſtered in this manner, it is rubbed over with oil or bullock's blood, and the water is let in immediately after. This cement has the property of hardening under water, ſo as to be equal to ſtone; and it will continue as long ſound."

Where a ſupply of water for baſons and ponds cannot be obtained, wells muſt be dug, and it is generally adviſed, that the water taken out of them be expoſed to the ſun and air for ſome time, before it is uſed, becauſe, ſays Mr. Miller, the rawneſs of this water, when freſh drawn, is not agreeable to the growth of vegetables.

The ſize of this garden ſhould be in proportion to the wants of the family; but with a much larger allowance of ground than is uſually allotted, in order that the plants may be benefited by ſtirring the earth between them whilſt they grow. The great and manifeſt advantages of this practice, eſpecially in the culture of pulſe and garden plants, have been ſo evidently ſhewn by numbers of experiments related in the former parts of this work, that I cannot but again recommend it here as an object of high importance.

It ſhould be incloſed with a wall, either of brick or ſtone; but brick is beſt, for the greater conveniency of nailing up the fruit-trees which are to be planted againſt it. The thickneſs of theſe walls ſhould be proportioned to their height, which ſome run up to twelve or fourteen feet, or more: but nine or ten will be enough for almoſt any kind of fruit; and in this caſe thirteen inches, that is to ſay, a brick and an half, will be a ſufficient thickneſs; though two bricks will be better, for duration. Their inſide ſhould be built as ſmooth as poſſible, and, to ſtrengthen them againſt high winds, piers ſhould be run up with them, at the diſtance of about twelve or fourteen feet from each other, according to the uſual extent of the fruit-trees for which they are intended. As to pears, which ſpread very wide, and frequently grow much above the height here mentioned, they do not require the aſſiſtance of a wall; unleſs it be ſome of the lateſt winter ſorts, and theſe the curious, who will be at the expence, may plant againſt walls built on purpoſe for them. Theſe piers may project ſix or eight inches on the outſide of the wall, for the ſake of greater ſolidity; and they ſhould advance about four inches on the inſide, for the convenience of fixing to them trelliſes, by building the wall on arches; and planting the trees at thoſe arched places, as Mr. Hitt adviſes, the trees will be thereby enabled to extend their roots underneath the wall; which will prove very advantageous to their growth.

If the quantity of walling which ſurrounds the kitchen garden be too little to furniſh the deſired ſupply of fruit, a croſs wall may be built through the middle of this ground; or, where the ſize of the garden will admit of it, there may be two croſs walls: but theſe walls muſt not, by any means, be leſs than eighty or an hundred feet aſunder. More will be yet better.

Mr. Miller is clearly of opinion that the beſt aſpect for walls in England, is to have one point to the eaſtward of the ſouth; becauſe theſe will enjoy the benefit of the morning ſun, and be leſs expoſed to the weſt and ſouth-weſt winds (which are very injurious to fruits in this country) than thoſe which are built due ſouth. "I know, ſays he, that many perſons object to the turning of walls the leaſt point to the eaſt, on account of the blights which they think come from that quarter in the ſpring: but from many years experience and obſervation, I can affirm, that blights as often attack thoſe walls which are open to the ſouth-weſt, as thoſe which are built to any other aſpect; and I believe thoſe who will be at the trouble of obſerving for ſeven years, which aſpected walls ſuffer moſt from blights, will find thoſe which are built with a point to the eaſtward of the ſouth, as ſeldom blighted as thoſe which are turned to any other aſpect; therefore in the contrivance of a kitchen garden, there ſhould be as great a length of theſe walls built as the ſituation of the ground will admit.

" The next beſt aſpect is due ſouth; and the next to that ſouth-eaſt, which is preferable to the ſouth-weſt, for the reaſons before aſſigned: but as there will, for the moſt part, be ſouth-weſt and weſt walls in every garden, theſe may be planted with fruits which do not require ſo much heat to ripen them, as thoſe deſigned for the beſt walls; but wherever there are north walls, thoſe will only be proper for baking-pears, plums, and morello cherries for preſerving; or ſome duke cherries may be planted againſt theſe walls, to ſupply the table till peaches, nectarines, and plums are ripe."

In whatever manner the wall are made, this garden ſhould be well ſheltered from the north and north-eaſt, by a diſtant plantation of high timber-trees, if nature has not otherwiſe provided a ſufficient defence from thoſe quarters.

In the diſtribution of this garden, particular care ſhould be taken to lay the walks out ſo as to obtain the greateſt convenience that can be for ſupplying each part of it with manure and water, and as eaſy acceſs as poſſible to its different quarters, which may be ſurrounded by a border planted with eſpaliers. The manner of forming eſpaliers will be directed when we come to ſpeak of the training of fruit-trees.

Theſe walks ſhould be firm enough to bear at leaſt the weight of a loaded wheel-barrow, and wide enough for the convenient carriage of whatever there may be occaſion to bring into this garden, or to carry out of it. Mr. Miller is againſt making them of gravel; becauſe, as it will very often be neceſſary to wheel manure, water, &c. upon them, they would ſoon be torn up and rendered unſightly; unleſs care be taken that the wheel be broad; or rather that it be a roller as wide as the diſtance between the ſides of the wheel-barrow.

For the ſame reaſon he rightly condemns turf-walks here, and adviſes, as the beſt for a kitchen garden, thoſe which are laid with a binding ſand. In effect, theſe are the eaſieſt kept of any: for when either weeds or moſs begin to grow, ſcuffling of them over with a Dutch hoe in dry weather, and raking them over a day or two after, will render them as clean as when they were firſt laid: or if they are covered with duſt taken from great roads, this will bind and become very firm.

If the ſoil is ſtiff and apt to retain water, narrow under-ground drains ſhould be made by the ſides of the walks, to carry off that wet: and where the ground is naturally moiſt, lime rubbiſh, flints, chalk, or any other ſuch material as can be procured with the leaſt expence, ſhould be laid at the bottom of theſe walks; or if neither of theſe can be had, the ſand ſhould be laid thick upon a bed of heath or furze, and the water will drain through this, ſo that the walks will be firm and good in all ſeaſons.

The ſame means will alſo help greatly to drain away the ſuperfluous moiſture of the whole ground, if the ſoil ſhould be naturally too wet; for if they are not ſufficient, more under-ground drains may be made acroſs different parts of the garden, according to its declivity: for moſt kitchen plants are hurt by too much moiſture in winter; and trees never produce good fruit when their roots lie in water.

If each quarter of the kitchen garden is to be encompaſſed by eſpaliers, the walks which divide thoſe quarters ſhould be wide enough to afford admittance to the warmth of the ſun, and to a free current of air. In this caſe they may be, as Mr. Miller directs, ſix feet wide in ſmall gardens, and ten or twelve in extenſive grounds. On each ſide of theſe walks, the eſpalier ſhould be planted in a border four or five feet wide; by which means the two eſpaliers will be far enough aſunder for their roots never to injure one another. Theſe borders may be ſown with ſmall ſallading, or any other herbs that do not continue long or root deep; ſo that no ground need be loſt, and the continual ſtirring and manuring of it for theſe productions will be of great ſervice to the roots of the trees.

The borders along the ſouth and other walls that have a good expoſure ſhould, in the opinion of this experienced gardener, be at leaſt eight or ten feet wide, in order to allow the roots of the fruit-trees that are planted againſt them full room to extend themſelves. Such of theſe as face the ſouth may be ſown for early crops of plants which do not root deep, and thoſe that are expoſed to the north will do for late crops: but no deep rooting plant, eſpecially peaſe and beans, ſhould ever be placed too near the trees; though moſt gardeners are apt to tranſgreſs greatly in this reſpect, as well to preſerve their crops in winter, as to bring them forward in the ſpring: both which ends might be anſwered equally well, and without prejudice to their fruit-trees, by making reed hedges in ſome of the warmeſt quarters, and ſowing cloſe to them their early peaſe, beans, &c. if ſuch fences are found to anſwer the purpoſe of forwarding their growth.

It is a general opinion, that plants which are ſheltered by walls, ſo as to be defended from nipping winds, and to have the additional warmth of the reflected heat of the wall, are leaſt liable to be deſtroyed by the winter's froſts; for which reaſon it is that early crops are moſt commonly in borders ſo ſituated. The ſun will undoubtedly give greater motion to the ſap of plants there, and they may, for this reaſon, ſeem to be the ſtronger. But if we conſider, that the walls yield no protection againſt the ſeverity of the night's froſt, and that the effect of this froſt muſt be moſt ſeverely felt by plants whoſe ſap is in the greateſt motion; we may rather fear that this ſituation, inſtead of being beneficial, may, in fact, counter-act the very end propoſed. To be ſatisfied of this fact, a gentleman ſowed ſome early peaſe in a border at the foot of a ſouth wall, and at the ſame time ſome others, of the ſame ſort, in an open field adjacent to to the garden; and he found, that the latter were by much the leaſt damaged by the winter's froſts; nor did he perceive any great difference in the ſeaſon of their blooming.

A ſquare, or an oblong form, will be moſt agreeable to the eye: but it matters not, in other reſpects, what ſhape this garden is of; eſpecially as all groſs irregularities may eaſily be hid in the laying of it out. Thus, when this is done, any of the ſlips cut off by the garden-wall, may, if large enough, and well expoſed to the ſun, be ſet apart for a place to make hot-beds for early cucumbers, melons, &c. One would wiſh this ſpot to be as near as poſſible to the ſtables, for the convenience of ſupplying it with dung; and to have it without the wall is certainly moſt eligible, becauſe that will ſave a great deal of filth and litter in the garden, and remove from the noſe and eye an object which is not of the moſt pleaſing kind. If this ſlip is long enough to admit of an annual ſucceſſion of new beds during two or three years, they will be much better than when they are continued more than one year on the ſame ſpot: and as it will be abſolutely neceſſary to fence this melon ground, as it is called, round with a reed hedge, this may be ſo contrived as to be moved away in pannels, in ſuch manner that there will be no occaſion to ſhift any thing more than one of the croſs partitions, or fences, each year.

The importance of the precept particularly here, will juſtify our mentioning again, that the dunghill, ſet apart for this, or for any other purpoſe of gardening, or agriculture, ſhould be carefully kept clear from weeds: for if weeds are ſuffered to ſcatter their ſeeds upon the dung, they will be brought into the garden, or other cultivated ground, ſhoot up, damage every crop of uſeful plants, and occaſion a perpetual labour to extirpate them.

Another caution which Mr. Miller gives, as abſolutely neceſſary to be obſerved, is, to carry off all the refuſe leaves and ſtumps of cabbages, the ſtalks of beans, and haulm of peaſe, as ſoon as they have done bearing; becauſe the ill ſcent which moſt people complain of in kitchen gardens is wholly occaſioned by theſe things being ſuffered to rot upon the ground. The leaves of cabbages may be given to hogs, or other animals, while they are freſh, and the reſt of this traſh may be thrown upon the dunghill, which it will help to enrich; or ſuch as will keep may be preſerved, to be thrown in the bottom of the trenches, in that part of the garden which is to be trenched the following autumn.

I muſt here point out a too common neglect of moſt gardeners, which is, the letting of their plants remain on the ground till they have ripened their ſeeds, and wither; not conſidering that whilſt a plant is full of ſap, it preſerves the earth in a looſe ſtate, probably by means of the moiſture perſpired from its roots; but that, when permitted to ſtand till its ſeed is ripe, or the plant withers, it then leaves the impoveriſhed earth dry and hard; being itſelf become entirely void of ſap.

The moſt important points of general culture here conſiſt in good digging, keeping the ground clean, manuring the ſoil, and allowing proper diſtances between the plants, according to their ſeveral kinds and growths. But as the various productions of the kitchen, and thoſe of the fruit, garden require very different treatment, though in the ſame incloſure, it will be right to conſider them ſeparately.

The kitchen garden, if it be rightly managed, is the moſt uſeful and moſt profitable ſpot of ground that either the country gentleman, or the huſbandman, can cultivate. It is indiſpenſably neceſſary to every family in the country, where, the neareſt market town being frequently far off, but poorly furniſhed with plants and roots, and that only on certain ſtated days, perhaps not oftener than once a week, there is no other way to have a variety, or even a ſufficiency, of this exceedingly healthful food, one of whoſe great excellencies conſiſts in its being freſh gathered.

Two eſſential rules to be obſerved in the general management of a kitchen garden are, never to crowd the ground with more plants than it is able to nouriſh properly; and never to let any part of it remain unoccupied, for want of a due ſucceſſion of crops. By this means the maſter, whom I would adviſe always to be his own gardener, at leaſt ſo far as perſonally to direct and ſuperintend whatever is done, may have his table conſtantly ſupplied with ſuch vegetables as he likes beſt, no part of his ground will lie uſeleſs, and each of its products will be brought to perfection.

GARGET, or *Gargol*, a diſtemper incident to hogs; and is known by the creature's hanging down of his head, and carrying it on one ſide, moiſt eyes, ſtaggering, and loſs of appetite.

It is occaſioned by a corruption of the blood, engendered by the eating of rotten fruits, garbidge, carrion, or rank graſs, wherein is much hemlock, &c.

In order to cure this diſeaſe, let the creatures be firſt blooded both under the tail and under the ears, and then the following drink given them:

> Take of chamber-lye one pint; rue and ſouthernwood, cut ſmall, of each a handful; wood-ſoot from an oven, and common ſalt, of each a ſpoonful; hen's dung, near two ſpoonfuls; flowers of brimſtone one ounce: ſtir the whole together, and give two or three horns to each, proportional to their ſize. It is alſo good for a cow to cure the gargal or murrain.

Or you may uſe the following drink in the room of the above;

> Take angelica, rue, ſtavewort, or hog's madder, and May-weed, of each one handful; ſhred them very ſmall, and boil them very well in a pint of milk; and when it is cold enough, add to it a pennyworth of ſallad-oil, and the ſame quantity of treacle. *Mortimer's Huſbandry, vol.* I. *pag.* 250.

GARLICK, a well known plant, cultivated in gardens, and eaſily propagated by parting the cloves, or ſmall bulbs of its root, and planting them in the ſpring, about four or five inches aſunder. They will thrive in almoſt any ſoil or ſituation; but in rich ground their increaſe will be ſurprizing. About the beginning of June their leaves ſhould be tied in knots, to prevent their ſpindling or running to ſeed; and this will alſo tend to enlarge their bulks. As ſoon as their leaves begin to wither and decay, which will be about the middle of July, the roots ſhould be taken up, and kept dry for uſe.

There is a wild ſort of garlick, called crow-garlick, or cow-garlick, that often does great damage to corn in dry ſandy grounds, but will not, according to Mr. Liſle, grow in clays. That gentleman tells us, that he knew a farmer in ſome of whoſe fields it grew in ſuch abundance, that his wheat taſted ſtrong of it, and was thereby damaged from ſixpence to a ſhilling in the buſhel. *Liſle's Huſbandry, vol.* II. *pag.* 313.

GARTH, a yard, a backſide, a croft.

GARNER, a granary, or repoſitory for corn.

GARZIL, hedging wood.

GATE, a frame of timber upon hinges to give a paſſage into incloſed grounds.

GATEWAY, the paſſage through gates of incloſed grounds.

GATTERIDGE-TREE, prickwood.

GAVEL, a row, or ſwarth of corn cut down with the ſcythe.

GAVEL, is alſo a provincial word, ſignifying ground.

GAVEL-KIND, a cuſtom whereby the lands of the father are equally divided at his death among all his ſons.

GAVELOCK, a pitch, or iron-bar for entering ſtakes into the ground.

GEESE, birds too well known to need any deſcription here. They are very profitable to the farmer many ways, for their fleſh, their feathers, and their greaſe. They will live upon commons or any ſort of paſtures, and need very little care or attendance; only they ſhould have plenty of water. The largeſt geeſe are reckoned the beſt: but there is a ſort of Spaniſh gooſe, that is a much better layer and breeder than the Engliſh, eſpecially if the eggs are hatched under an Engliſh gooſe.

Geeſe lay in the ſpring, the earlier the better; becauſe of their price, and their having a ſecond brood. They commonly lay twelve or ſixteen eggs apiece. You may know when they will lay by their carrying ſtraw in their mouth; and when they will ſit, by their continuing on their neſts after they have laid. A gooſe ſits thirty days; but if the weather be fair and warm, they will hatch three or four days ſooner. After the goſlins are hatched, ſome keep them in the houſe ten or twelves days, and feed them with curds, barley-meal, bran, &c. and after they have acquired ſome ſtrength let them out four or five hours a day, taking them in again till they are big enough to defend themſelves from vermin. Others put them out at firſt, and perhaps ſucceed as well as the former. One gander will be ſufficient for five geeſe.

If you would fat green geeſe, you muſt ſhut them up when they are about a month old, and they will be fat in about a month more. Be ſure to let them have always by them, in a ſmall rack, ſome fine hay, which will much haſten their fatting. But for fatting of older geeſe, it is commonly done when they are about ſix months old, in or ſoon after harveſt, when they have been in ſtubble fields, from which food ſome kill them, which is a good way. But thoſe who are deſirous of having them very fat, ſhut them up for a fortnight or three weeks, and feed them with oats, ſplit-beans, barley-meal, or ground malt mixed with milk; but the beſt thing to fatten them with is malt mixed with beer. You muſt however obſerve in fattening all ſorts of water-fowl, that they uſually ſit with their bills upon their rumps, where they ſuck out the greater part of their moiſture and fatneſs, at a ſmall bunch of feathers, which you will find ſtanding upright on on their rumps, and always moiſt, with which they trim their feathers, which renders them more oily and ſlippery than the feathers of other fowls, and cauſes the water to ſlip off them. If therefore theſe upright feathers are cut away cloſe, they will become fat in leſs time, and with leſs meat than otherwiſe. Geeſe will likewiſe feed on, and fatten well with carrots cut ſmall and given them; or if you give them rye before, or about Midſummer, it will ſtrengthen them, and keep them in health, that being commonly their ſickly time.

In ſome countries they ſhear their geeſe for feathers; and ſome pull them twice a year; but the latter is more injurious to them, and therefore it is better ſtaying till their moulting time, and till their death, for the feathers. *Mortimer's Huſbandry, vol.* I. *pag.* 255.

GELDING, a caſtrated animal. For the method of gelding horſes, *ſee the article* HORSE.

GELT-GIMMER, a barren ewe.

GEOFF, or *Goffe*, a mow of hay or corn.

GERMINATION, the act of ſprouting or ſhooting; growth.

GERMINS, buds, tender ſhoots.

GIGGS, ſmall ſwellings, or bladders on the inſide of the lips and palate of a horſe.

They are cured by ſlitting them open with a knife or lancet, and waſhing them afterwards with ſalt and vinegar.

GILL, a rivulet, a beck. It is alſo a name for ground-ivy, or ale-hoof.

GIMMER-LAMB, or *Gammer-Lamb*, an ewe-lamb.

GLANDERS, a very obſtinate and loathſome diſeaſe incident to horſes.

The cauſe and ſeat of the glanders has till lately been ſo imperfectly handled, and ſo little underſtood by the writers on this diſtemper, that it is no wonder it ſhould be ranked among the incurables: but a new light having been thrown on this whole affair by the ſtudy of M. La Foſſe, the king of France's farrier, who has been at the pains to trace out, and diſcover, by diſſections, the ſource and cauſe of this diſorder, we hope the method he has propoſed, with ſome further experiments and improvements, will ſoon bring to a certainty of cure (in moſt caſes at leaſt) a diſtemper ſo dangerous to our horſes, and that hitherto has eluded the force of art.

Before we make mention of this work, which has the approbation of the Royal Academy of Sciences, it will not be unacceptable to our readers, we apprehend, to have a more particular account of the ſymptoms of this diſorder from M. La Foſſe, that we may the better judge of the merit of our author and his diſcoveries.

This gentleman then has diſtinguiſhed ſeven different kinds of glanders, four of which are incurable:

The firſt proceeds from ulcerated lungs, the purulent matter of which comes up the trachea, and is diſcharged through the noſtrils, like a whitiſh liquor, ſometimes appearing in lumps and grumes. In this diſorder, though the matter is diſcharged from the noſtrils, yet the malady is ſolely in the lungs.

The ſecond is a waſting humour, which uſually ſeizes horſes at the decline of a diſeaſe, cauſed by too hard labour; this defluxion alſo proceeds from the lungs.

The third is a malignant diſcharge, which attends the ſtrangles ſometimes, and falls upon the lungs, which runs off by the noſtrils.

The fourth is, when an acrimonious humour in the farcy ſeizes theſe parts, where it ſoon makes terrible havock.

The fifth kind we ſhall deſcribe by and by, as ariſing from taking cold.

The ſixth kind is a diſcharge from the ſtrangles, which ſometimes vents itſelf at the noſtrils.

Theſe are the various diſorders which have been obſerved ſometimes to throw matter out from the noſtrils; let us now deſcribe the real glanders:

The matter then diſcarged from the noſtrils of a glandered horſe, is either white, yellow, or greeniſh, ſometimes ſtreaked, or tinged with blood; when the diſeaſe is of long ſtanding, and the bones are fouled, the matter turns blackiſh, and becomes very fœtid; and is always attended with a ſwelling of the kernels or glands under the jaws; in every other reſpect the horſe is generally healthy and ſound, till the diſtemper has been of ſome continuance.

It is always a bad ſign, when the matter ſticks to the inſide of the noſtrils, like glue or ſtiff paſte; when the inſide of the noſe is raw and looks of a livid, or lead colour, when the matter becomes bloody, and ſtinks, and when it looks of an aſh colour. But when only a limpid fluid is firſt diſcharged, and afterwards a whitiſh matter, the gland under the jaw not increaſing, and the diſorder of no long continuance, we may expect a ſpeedy cure; for in this caſe, which ariſes from taking cold, after a horſe has been over-heated, the pituitary membrane is but ſlightly inflamed, the lymph in the ſmall veſſels condenſed, and the gland overloaded, but not yet ulcerated.

From theſe ſymptoms and ſome obſervations made both by Bracken and Gibſon, it is plain they were not abſolute ſtrangers to the ſeat of this diſorder, though they neglected puſhing their inquiries to the fountain-head, and conſequently were at a loſs to know how to apply the remedy to the parts affected.

But our author, after examining by diſſection the carcaſes of glandered horſes, and making a ſtrict ſcrutiny into the ſtate of the viſcera, aſſiſted for that purpoſe by ingenious and expert anatomiſts for ten years together, affirms this diſeaſe to be altogether local; and that the true ſeat of it is in the pituitary membrane, which lines the partition along the inſide of the noſe, the maxillary ſinuſſes or cavities of the cheek-bones on each ſide the noſe, and the frontal ſinuſſes or cavities above the orbits of the eyes; that the viſcera, as liver, lungs, &c. of glandered horſes are in general exceeding ſound; and conſequently that the ſeat of this diſorder is not in thoſe parts, as has been aſſerted by moſt authors; nor indeed is it probable it ſhould: for how could ſuch horſes preſerve their appetite, their good appearance, ſleek and ſhining coats; in a word, all the ſigns of health for many years together (which many glandered horſes are known to enjoy) with ſuch diſtempered bowels?

But on nicely examining the heads of ſuch horſes, he found the cavities above-mentioned, more or leſs, filled with a viſcous ſlimy matter, the membrane which lines both them and the noſtrils inflamed, thickened, and corroded with ſordid ulcers, which in ſome caſes had eat into the bones. Theſe ſinuſſes or cavities will be better underſtood by referring to the annexed plate.

He obſerves, that when glandered horſes diſcharge matter from both noſtrils, both ſides of the membrane and cavities were affected; but when they ran at one noſtril only, that ſide only was found diſtempered.

It is a curious remark of our author, that the ſublingual glands, or the kernels ſituated under the jaw-bone, which are always ſwelled in this diſtemper, do not diſcharge their lymph into the mouth, as in man, but into the noſtrils; and that he conſtantly found their obſtruction agreed with the diſcharge; if one gland only was affected, then the horſe diſcharged from one noſtril only; but if both were, then the diſcharge was from both.

He ſometimes, though rarely, found the boney partition of the noſe carious or rotten; but that the ſpongy bones about this part muſt ſuffer from the acrimony of matter long pent, is not at all to be doubted, though the more ſolid ones may eſcape.

The ſeat of this diſorder thus diſcovered, our author, with great ingenuity, has paved the way for cure, by trepanning theſe cavities, and taking out a piece of bone, by which means the parts affected may be waſhed with a proper injection; and, in fine, the ulcers deterged, healed, and dried up.

But as from the obſervations ſince made by this gentleman, there are different ſpecies of the glanders; ſo the cure of the milder kinds may firſt be attempted by injections and fumigations. Thus, after taking cold, ſhould a horſe for fifteen or twenty days diſcharge a limpid fluid, or whitiſh matter from one or both noſtrils, the glands under the jaw rather growing harder than diminiſhing, we may expect it will degenerate into a true glanders: to prevent which, after firſt bleeding, and treating him as we have directed for a cold, let an emollient injection, prepared with a decoction of linſeed, marſhmallows, elder, chamomile flowers, and honey of roſes, or ſuch like, be thrown up as far as poſſible with a ſtrong ſyringe, and repeated three times a day: ſhould the running not leſſen, or be removed in a fortnight by the uſe of this injection, a reſtringent one may now be prepared with tincture of roſes, lime-water, &c. and the noſtrils fumigated with the powders of frankincenſe, maſtich, amber, and cinnabar, burnt on an iron heated for that purpoſe, the fume of which may eaſily be conveyed through a tube into the noſtrils.

This method has been found ſucceſsful when uſed in time; but the methods of cure depend on the ſtubbornneſs of the diſorder; and, when inveterate, recourſe muſt be had to the operation above deſcribed.

This operation he has performed on three horſes, two of whom diſcharged from one noſtril only, and the third from both; the two firſt he trepanned on that ſide of the head which was affected, and to the other he performed it on both, and found that the wound and perforation filled up with good fleſh in twenty-ſix days, and the horſes ſuffered no inconvenience from the operation; though after this experiment they were put to death.

The directions and orders of the civil government of France, which hinder people from keeping glandered horſes, long prevented M. La Foſſe repeating his attempts, and puſhing his experiments further; but it is to be hoped that ſo uſeful a project will be purſued to its utmoſt extent, as it ſeems ſo promiſing in the execution, and is ſo important in its conſequences: to which end we ſhall beg leave to animadvert on what has been ſaid, and offer our opinion both in relation to the diſeaſe, the operation, and the manner of conducting the cure.

In order to prove that a great inflammation of the pituitary membrane is always the cauſe of the glanders, M. La Foſſe has attempted to bring on an inflammation upon the ſame membrane, by a corroſive injection; and when the injection was only thrown into one ſide, the maxillary lymphatic glands were ſwelled on the ſame ſide, and that noſtril only produced the diſcharge; but when both noſtrils were injected, theſe ſymptoms appeared on both ſides. This gentleman has alſo obſerved, that the bone of the maxillary ſinus being broke by the kick of another horſe, the uſual ſymptoms of the glanders ſoon appeared, from the inflammation the petuitary membrane ſuffered on the occaſion.

The original ſource and cauſe then of this diſorder ſeems to be an inflammation in the glands, and membrane that lines the noſtrils and theſe cavities, which, if not diſperſed in time, will form matter, and ulcerate and erode the bones, for want of a free diſcharge to unload the cavities, and of proper applications to cleanſe and deterge the ulcers: violent colds, or a feveriſh tranſlation ſettling here, may alſo occaſion the ſame complaint, and are probably the general cauſes.

There is a diſorder in men called *Ozœna*, that has great ſimilitude to this in horſes, and ariſes from an inflammation in the maxillary ſinuſſes, or cavities in the cheek-bones, from whence enſues a collection of matter, which, when the cavity is full, or the head properly inclined, runs over into the noſe, and would conſtantly diſcharge thence like a glandered horſe, was the head continued in the ſame poſition. The ſurgical cure is the taking out one or more teeth from the upper jaw, and perforating the cavity with a proper inſtrument, in order to make a depending orifice for the matter to flow through; and to make way for ſyringing the parts affected with proper injections, which in this caſe are thrown through the cavity into the noſe.

The ſimilarity of theſe two caſes, with the method of cure, and the ſucceſs attending the ſurgical treatment (which was firſt invented and perfected by our countrymen Drake and Cowper) undoubtedly gave the firſt hint for trepanning, and ſyringing theſe cavities in horſes; and it is moſt probable, that when the operation is attempted in time, before the bones become rotten, it will be attended with equal ſucceſs; but after opening the cavities, ſhould it by probing be diſcovered, that the bones are in that ſtate, the beſt way then would be to diſpatch the horſe, to prevent unneceſſary trouble and expence.

The parts fixed on for applying the trepan are pointed out in the plate, and the manner of ſawing out the bone will eaſily be underſtood by a view of the inſtrument, and the explanation annexed.

The perforations being made, our next buſineſs is to prevent their filling up too faſt, as it may be neceſſary to keep them open for ſome weeks before a cure can be affected; for which purpoſe, after the uſe of the injection, let the upper one be filled up with a piece of cork, waxed over, and adapted exactly to its ſize, the lower one may be kept open with a hollow leaden tent, through which there will be a conſtant drain of matter from the ſinus's, which will be greatly favoured by this depending orifice, and both be detained by a proper bondage.

If this method ſhould not prevent the granulations, or ſhoots of the fleſh, from filling up ſo faſt as to choak up the perforation, and by that means hinder the injections paſſing freely, they muſt be ſuppreſſed by rubbing with cauſtic medicines, or touching with the actual cautery; as may alſo the bony edges, which, by obliging them to exfoliate or ſcale off, will retard the healing.

The injection firſt made uſe of, ſhould be of a deterſive nature; as a decoction of birth-wort, gentian, and centaury; to a quarter of which, if two ounces of Ægyptiacum and tincture of myrrh are added, it may be as proper as any; and when the diſcharge is obſerved to abate, and the colour alter to a thick white matter, the injection may be changed for barley-water, honey of roſes, and tincture of myrrh; and, finally, to dry up the humidities, and recover the tone of the relaxed glands, Bates's allum-water, or a ſolution of colcothar, vitriol, lapis medicamentoſus, or ſuch like, in lime-water, will moſt probably complete the cure. Dr. Bracken recommends the following:

> Take of allum and white vitriol powdered, of each four ounces, calcine them in a crucible when cold, powder the calx, and mix it with a gallon of lime-water, and a quart of vinegar, decant the clear for uſe.

But whoever is at all acquainted with practical ſurgery, well knows, that without the aſſiſtance of internals, eſpecially in glandular diſorders, the cure is not ſo eaſily effected, nor rendered compleat or laſting: we therefore adviſe a ſtrong decoction of guaicum chips to be given every day, to a quart or three pints, throughout the cure, and when the matter leſſens, to purge at proper intervals, and put a rowel into the horſe's cheſt, in order to divert the fluids from their old channel; if theſe ſhould not ſucceed, mercurials may be given with the phyſic, and the alterative powders with lime-water may be taken for a time, if the horſe is worth the expence.

An Explanation of the Heads and Trepan. See Plate XVII. *Fig.* 2.

B. B. two lines repreſenting the bounds of the cerebellum, or back part of the brain, which is very ſmall in a horſe, in proportion to that of a man, as well as the brain itſelf, which commences from the line D.

C. C. a line where the ſuperior part of the ſinus frontalis commences, together with a view of the bottom of the ſinus, which terminates between the lines D and E, where there appears a ſubſtance in the form of a pear, which is the os ethmoides, or ſieve-like bone, through which the olfactory nerves paſs, by which the pituitary membrane receives its ſenſibility, and the ſenſe of ſmelling is performed.

E. repreſents the beginning of the maxillary ſinus, which terminates at M.

The ſhaded ſpace, which may be obſerved between theſe two lines, repreſents the great cavities. The oblique ray marked F, is a bony partition, which ſeparates this ſinus into two parts, that have no communication; and ſometimes it happens (though but rarely) that there are two bony partitions; and for this reaſon they are repreſented by the lines marked F and G. It alſo ſometimes happens (but ſtill more ſeldom) that there are horſes, in whoſe heads we do not find any of theſe bony partitions.

N. points out the place of the cornets or horns. O the redoublings. P their middle part. Q the inferior part of them. M the bony canal or pipe which guards the maxillary nerve.

A. A. the ſeptum narium, or partition, which divides the noſe from top to bottom, and conſtitutes the two noſtrils.

L, in the head that is intire, points out where the trepan ſhould be applied on the frontal ſinus, when we have reaſon to believe the glanders is ſpread into this ſinus. However, I think it ſafeſt to apply it firſt on E, for the reaſons mentioned in the next explanation, and becauſe the brain may be endangered, ſhould the ſinus be miſtook.

E, the place where the trepan may be applied, in order to cleanſe the maxillary ſinus. The round mark between D and E (which is the impreſſion of the trepan) is, however, on experience, preferred by the author, as the propereſt place, as one orifice would then be ſufficient to waſh all the parts, both above and below, with the injection.

But in general, when the maxillary ſinus only is affected, penetrate but the upper part, where the ſyringe points, or thereabouts, and your expectations will be anſwered; ſhould they not, there ſeems ſo little danger in the operation, that you may again perforate at the places above mentioned, higher up. But a proper number of experiments will ſoon ſettle this point with certainty.

H, in the head that is intire, points out the place where another hole, or perforation ſhould be made, as a drain to give iſſue to the glanderous matter waſhed away by the injection which could not be diſcharged without ſuch a depending orifice; and perhaps this perforation alone, in many recent caſes, would be ſufficient, provided the injection paſſed freely upwards, and the hole was kept open by means of a hallow leaden pipe conſtantly retained in it for that purpoſe, and to procure a free paſſage for the matter.

I, repreſents the injection puſhed in by the ſyringe, which flows out by the orifice and the noſtril K; during the uſe of the ſyringe, it is neceſſary to hold the noſtrils cloſe.

If, in the maxillary ſinus, inſtead of one there happens to be two bony partitions, it is abſolutely neceſſary to pierce through them both, by means of a ſtiletto, or ſharp-pointed tuck, as in the manner repreſented in the cut of a horſe's head opened, though this conformation ſeldom occurs.

As theſe bony partitions may in ſome particulars vary, ſhould the ſtiletto not have the deſired effect, and the injection thrown in by the ſyringe not come out at H; in ſuch caſe the liquor ſhould be injected upwards, through the orifice made by the ſtiletto or trepan at H.

As in young horſes the frontal and maxillary ſinuſſes are very ſmall, it will be proper to direct the trepan towards the interior part of the noſe, otherwiſe the inſtrument might work upon the roots of the teeth, which incline towards the ſinus, and would in ſuch caſe be an inſurmountable obſtacle to the operation.

R, the inſtrument or trepan. S, the handle which turns it. T, the ſaw-part to be applied to the bone.

From a view of this inſtrument, the manner of working it will appear ſimple and eaſy; the cooper's managing his wimble being a proper directory.

The inſtrument called the trephine, which is chiefly uſed by our Engliſh ſurgeons in perforating the ſkull, will equally anſwer this purpoſe; and if any difficulties ſhould ariſe, notwithſtanding this deſcription, the gentlemen of the faculty will ſoon make it familiar and intelligible.

Before the application of the trepan, or trephine, it is quite neceſſary to obſerve, that a circular piece of the ſkin ſhould firſt be cut off, with the membrane which covers the bone, about the ſize of a half crown piece, in order to make the inſtrument work the eaſier, and to prevent the inconveniencies which might ariſe from the external wounds healing up too faſt.

The ſyringe ſhould be large enough to contain half a pint of injection.

GLANDIFEROUS, an epithet applied to ſuch trees as bear maſt or acorns. Thus the oak, beech, &c. are called glandiferous trees.

GLEANING, the action of picking up the ears of corn left behind by the gatherers.

GLEBE, properly ſignifies the ſoil or ground in general; but is particularly applied to the land poſſeſſed as part of the revenue of an eccleſiaſtical benefice.

GLEBOUS, or *gleby*, turfy.

GLEDE, a kite.

GLEN, a valley, a dale.

GLYSTER, or *Clyſter*, a medicine injected into the anus of an animal.

Glyſters are often neceſſary for horſes in various diſorders, and may be reduced to theſe different kinds, viz. laxative and emollient, purgative and reſtringent.

But it ſhould be obſerved, that before the adminiſtration of emollient glyſters in coſtive diſorders, a ſmall hand well oiled ſhould be paſſed up the horſe's fundament, in order to bring away any hardened dung, which otherwiſe would be an obſtacle to the clyſter's paſſage.

A bag and a pipe of a proper form, is to be preferred to a ſyringe, which throws up the clyſter with ſo much force, that it often ſurprizes a horſe, and makes him reject it as faſt as it goes in: whereas the liquor, when preſſed gently from the bag, gives him no ſurprize or uneaſineſs, but paſſes eaſily up into the bowels, where it ſometimes remains a long time, and is extremely uſeful, by cooling and relaxing them; and will ſometimes incorporate ſo with the dung, as not eaſily to be diſtinguiſhed from the other contents of the guts. Theſe emollient clyſters are extremely ſerviceable in moſt fevers, and greatly preferable to purging ones; which in general are too pungent, and ſtimulate too much, eſpecially if aloes are a part of the compoſition.

Nutritive clyſters are very neceſſary, and often ſave a horſe from ſtarving, when his jaws are ſo locked by convulſions, that nothing can be conveyed by the mouth.

They ſhould not exceed a quart or three pints at a time, but be often repeated: nor ſhould they be too fat; but made of ſheeps heads, trotters, or any other meat broths, milk-pottage, rice-milk ſtrained, and many other ſuch nouriſhing things. For an emollient clyſter take the following:

> Take marſhmallows and chamomile flowers, each a large handful; bay-berries and ſweet fennel-ſeeds bruiſed, each an ounce, boil in a gallon of water to three quarts, pour off into a pan, and diſſolve in it half a pound of treacle, and a pint of linſeed oil, or any common oil.

To make it more laxative, add four ounces of lenitive electuary, or the ſame quantity of cream of tartar, or common purging ſalts.

> Take two or three handfuls of marſhmallows, ſenna one ounce, bitter apple half an ounce, bay-berries and anniſeed bruiſed, each an ounce, ſalt of tartar half an ounce; boil a quarter of an hour in three quarts of water, pour off, and add four ounces of ſyrup of buckthorn, and half a pint of oil.

This clyſter will purge a horſe pretty briſkly; and may be given ſucceſsfully, when an immediate diſcharge is wanting; eſpecially in ſome fevers with inflamed lungs, or other diſorders, which require ſpeedy relief.

But it is neceſſary to caution againſt a ſolution of coarſe aloes for this purpoſe, as it has been found to gripe horſes violently, and excite feveriſh, and ſometimes convulſive ſymptoms; and indeed all pungent and ſtimulating medicines, as the ſtronger purgatives generally are, ſhould be given in this form with great caution.

But the generality of emollient clyſters may be prepared with much leſs trouble; as two quarts of water gruel, with half a pound of treacle, a pint of oil, and a handful of common ſalt, will as effectually anſwer every purpoſe. The following is a reſtringent clyſter.

> Take pomegranate-bark, or oak bark, two ounces; red roſe-leaves, freſh or dry, a handful; bauſtines, an ounce: boil theſe in two quarts of water, till one is nearly conſumed; then pour it off, and diſſolve in it four ounces of diaſcordium; to which may be added a pint of Port-wine.

This will anſwer all common caſes, where reſtringents are neceſſary, but ſhould never be given in larger quantities; for the longer clyſters of this kind lie in the bowels, the more efficacious they are. *Bartlet's Farriery, page* 22.

GOAD, a pointed inſtrument with which oxen are driven forward.

GOAR-VETCHES, the ſame with ſummer-vetches. *See the article* VETCHES.

GOAT, a genus of animals, the characters of which, according to Mr. Ray, are theſe: that it is covered with hairs, not with wool; that its horns are leſs crooked than thoſe of the ſheep, and that it has a beard hanging down from its chin, and is of a ſtrong ſmell.

It is very ſingular, that this genus of animals are all able to run and climb about the rugged parts of mountains without falling, though their feet ſeem by no means contrived by nature for any ſuch purpoſes.

Goats may be of great advantage to the farmers in ſome parts of the kingdom, as they will live in rocky barren countries, where nothing elſe can get a ſupport for life. They will climb the ſteepeſt rocks, and there browſe upon briars, heath, and ſhrubs of various kinds, which other creatures will not taſte of. They will feed on graſs in paſtures; but, as they love browſing on trees much better, great care muſt be taken to keep them from valuable plantations.

The greateſt advantage of theſe creatures is their milk, which they yield in large quantities; and which is accounted the beſt milk of all animals. They mix this and cows milk together in many parts of the kingdom, and a very valuable kind of cheeſe is made of it. Beſide this, the kids or young goats are very fine food, and the beſt kinds bring forth theſe two or three at a time, and that twice a year.

Goats hair alſo is valuable; it may be ſheared as the wool from ſheep, and is excellent for making ropes that are to be uſed in the water, as they will laſt a great while longer than thoſe made the common way. A ſort of ſtuff is alſo made of it in ſome places. The beſt kind of goats for keeping to advantage ſhould be choſen in this manner: the male ſhould have a large body, his hair ſhould be long, and his legs ſtraight and ſtiff; the neck ſhould be plain and ſhort, the head ſmall and ſlender, the horns large, the eyes prominent, and the beard long. The female ſhould have a large udder, with large teats, and no horns, or very ſmall ones. They ſhould be kept in flocks, that they may not ſtraggle; and they ſhould have good ſhelter both in ſummer and in winter, the heat and cold being both prejudicial to them. They ſhould be coupled in December. They ſhould have no litter in winter, but only a paved floor kept clean. The kids are to be brought up for the table in the ſame manner as our lambs are. They are recommended to lie among horſes, their ſmell, as ſuppoſed, preventing many diſtempers in thoſe cattle. *Mortimer's Husbandry, vol.* I. *pag.* 244.

GOD's-GOOD, yeaſt, or barm.

GOFFE, the ſame with geoff. *See* GEOFF.

GOOL, a ditch.

GOOSBERRIES, the name of a well known fruit cultivated in kitchen gardens.

They are propagated either by ſuckers taken from the old plants, or by cuttings. Theſe laſt are by far preferable, becauſe they generally root the beſt, and are leaſt apt to produce ſuckers, which always weaken the ſtock from whence they proceed. The cuttings ſhould be taken from the handſomeſt ſhoots of the beſt bearing branches of the moſt fruitful ſhrubs: they ſhould be about ſix or eight inches long, and ſhould be taken off, and planted, in autumn, juſt before their leaves begin to fall, about three inches deep, in light earth, expoſed to the morning ſun. Their growth will be promoted by watering of them gently in dry weather, and they will be trained up regularly to a ſtrait ſtem, if all their under ſhoots are rubbed off in the ſummer, as ſoon as they appear, ſo as to leave only the uppermoſt or ſtrongeſt. In the next October, theſe plants will be fit to remove into a nurſery, where, after trimming their roots, and cutting off all ſide branches, they ſhould be ſet a foot aſunder in rows three feet diſtant from each other, in an open ſpot of freſh earth, which has been well dug, and cleanſed from all noxious weeds and roots. They ſhould here be faſtened to ſhort ſticks, or ſtakes, the more effectually to render their ſtems ſtrait and upright; they ſhould be cleared from all lateral ſhoots to the height of about a foot above the ſurface of the earth; and after one year's training in this manner (keeping them clear from weeds, and cutting out all croſs branches, ſo that their heads may not become too thick,) they will be fit to tranſplant to the places where they are to remain. The ſoil, for them to thrive to the greateſt advantage, ſhould then be a rich light ſandy earth; though they will do very well in middling ſoils which are not too ſtrong or moiſt, and in all ſituations. However, their fruit is beſt when they grow in an open expoſure, and not within the ſhade of other trees. The beſt ſeaſon for this tranſplanting is likewiſe in October, when their leaves begin to decay; and will alſo be right then to trim their roots again, to diveſt them of all lateral and all croſs ſhoots, and to ſhorten all their long branches, ſo as to make the head regular. The diſtance at which they ſhould be planted now, if there be a large number of them, is eight feet row from row, and ſix feet aſunder in the rows.

The gardeners around London, who raiſe great quantities of theſe buſhes in order to ſupply the markets with their fruit, prune them ſoon after Michaelmas, and then dig up the ground in the above-mentioned intermediate ſpaces, and plant it with coleworts for ſpring uſe. Their ground is by this means employed all the winter, without hurting the gooſberries; and the coleworts ſo planted often eſcape in hard froſts, when others which are leſs ſheltered are often deſtroyed. This huſbandry is well worth practiſing where land is dear, or where perſons are confined for room.

The common practice of clipping the heads of theſe ſhrubs with ſhears, in order to give them a roundiſh form, is very wrong: becauſe they become thereby ſo crowded with wood, that the fruit which they produce never grows then to half the ſize that it would if the branches were properly thinned with a pruning knife, all the miſplaced ones cut away, and the ſtrong bearing ſhoots ſhortened to about ten inches, with care always to prune them off behind a leaf bud. With this management, with keeping the ground clear from weeds, with digging it at leaſt once a year, and with beſtowing a little rotten dung upon it every other year, the fruit will be near twice as large as that which is raiſed in the common way, and the ſhrubs will continue in vigour much longer.

The large white Dutch, the large amber, the early red, and the early green, both of which laſt are hairy, are generally reckoned the beſt ſorts of gooſberries: but many others, known by the names of the perſons who firſt raiſed them from ſeeds, are alſo much eſteemed.

Gooſberries yield in plenty an agreeable and cooling liquor, the firſt luſciouſneſs of which is ſoon carried off by proper fermentation. Some make gooſberry wine without boiling it all, becauſe the boiling gives it a browniſh colour: but the truth is, that it will ſoon become ſour, if it be not depurated from the groſs lee, with which it abounds, by a proper fermentation.

GOOSE. *See the article* GEESE.

GOOSE-GRASS, or wild tanſy, the name of a troubleſome weed very frequent in clay grounds. The beſt method of deſtroying it is to mow it in ſummer, well dung the land, and never plough it out of heart.

GOSS, or *Gorſe*, the furze.

GOULANS, corn-marigolds.

GRAFT, or *Graft*, a cion or ſhoot of a tree inſerted into another, ſo as to make it yield fruit of the ſame nature with that of the trees from whence the graft was taken.

In the choice of grafts, the following directions ſhould be carefully obſerved: Firſt, That they are ſhoots of the former year. Secondly, That they are taken from healthy fruitful trees. And, thirdly, That you prefer thoſe grafts which are taken from the lateral or horizontal branches, to thoſe taken from the perpendicular ſhoots. Theſe grafts ſhould be cut off from the trees before the buds begin to ſwell, which is generally three weeks or a month before the ſeaſon for grafting; therefore when they are cut off, they ſhould be laid in the ground with the cut downwards, burying them half their length, and covering their tops with dry litter, to prevent their drying: if a ſmall joint of the former year's wood be cut off with the cion, it will preſerve it the better: and when it is grafted, this may be cut off; for the grafts never muſt be cut to a proper length before they are inſerted into the ſtocks; but till then, the ſhoots ſhould remain their full length, as they were taken from the tree, which will preſerve them better from ſtriking. If theſe grafts are to be carried to a conſiderable diſtance, it will be proper to put their cut ends into a lump of clay, and to wrap them up in moſs, which will preſerve them freſh for a month or longer: but theſe ſhould be cut off earlier from the trees than thoſe which are to be grafted near the place where the trees are growing. For the choice of ſtocks for grafting, *ſee the article* Stock.

GRAFTING, or *Engrafting*, is the taking a ſhoot from one tree, and inſerting it into another, in ſuch a manner that both may unite and form one tree.

The reaſon for grafting is, that as all good fruits have been accidentally obtained from ſeeds, ſo theſe when ſown will often degenerate, and produce ſuch fruit as are not worth cultivating; but when the ſhoots, cions, or grafts, are taken from ſuch trees as yield good fruit, theſe will never vary from their kind, whatever be the ſtock, or tree, on which they are grafted.

The moſt proper ſeaſon for grafting is in the ſpring, juſt before the riſing of the ſap, or at leaſt before it riſes in any great quantity: but the weather muſt be neither froſty nor wet; nor ſhould the wind blow very bleak or ſtrong when this operation is performed: for on theſe circumſtances, and upon the exact joining of the inner bark of the cion with the inner bark of the ſtock, ſo that the ſap which flows between the bark and the wood may be communicated from the one to the other, the ſucceſs of grafting chiefly depends.

The implements neceſſary for grafting are, a fine ſmall hand-ſaw to cut off the heads of large ſtocks; a good ſtrong knife with a thick back to make clefts in the ſtocks; a ſharp penknife to cut the grafts; a grafting chiſſel, and a ſmall mallet to pare away the wood; baſs, or woollen yarn, to tie the grafts with; and a quantity of clay, or cement, properly prepared, to lay over the inciſions, in order to prevent their bleeding, and keep out the air.

The method of preparing the clay intended for this purpoſe, is to mix thoroughly together a quantity of ſtrong, fat loom, ſome new ſtone-horſe dung broken into ſmall bits, a little tanners hair, or ſtraw, cut very ſmall, with a little ſalt, and as much water as will make the whole of the conſiſtence of pretty ſtiff mortar.

The cement or compoſition which ſome have of late uſed, and which has been found to anſwer the deſign of keeping out the air better than the above clay, is made of turpentine, bees-wax, and roſin, melted together. This compoſition, when of a proper conſiſtence, is laid about a quarter of an inch thick, upon the cut part of the ſtock round the graft; and has this farther advantage over the clay, that there is no danger of its being hurt by froſt; for cold hardens it; and when the heat of ſummer comes on, by which time it is no longer wanted on the tree, it will melt and fall off without any trouble.

Among the ſeveral methods of grafting hitherto known, the following are moſt approved, and generally practiſed.

Cleft-Grafting, called alſo Stock, or Slit-Grafting. This is uſed chiefly for middle ſized ſtocks, from one to two inches in diameter. The ſeaſon for it is in the months of February and March; and the method, as now practiſed, is thus:

The head of the ſtalk being ſawn, or cut off, with a ſlope, ſmooth and clean, a perpendicular cleft is made therein, about two inches deep, with a ſtrong knife, or chiſſel, from the top of the ſlope, as near to the pith as may be without touching it. In this cleft, the grafting chiſſel, or a wedge, is put to keep it open. The graft or cion is prepared by cutting it aſlope, in form of a wedge, to ſuit the cleft, only leaving a ſmall ſhoulder on each ſide; and when cut, it is to be placed exactly in the cleft, ſo as that the inner bark of the cion may aptly, and cloſely, join to the inner part of the bark, or rind of the ſtock; in the dextrous performance of which, the chief part of the art of grafting conſiſts. That ſide of the cion, which is to be placed outward, at the part where it is cut wedge-wiſe and inſerted into the cleft of the ſtock, ſhould be much thicker than the other ſide, the better to facilitate the exact joining of its rind to that of the ſtock; for if theſe two do not unite, the graft will not ſucceed. The rind of the ſtock choſen for this way of grafting ſhould therefore not be too thick; becauſe it will then be the leſs manageable. If the cleft pinch too tight, a ſmall wedge may be left in it to bear the ſtreſs. As ſoon as the graft is properly fixed, the cleft ſhould be cloſely covered over with clay, or, which ſome think better, with moſs, or the freſh bark of a tree bound on with ozier.

When this method, which is the moſt ancient, and moſt common, manner of grafting, is uſed to ſtocks that are not ſtrong, a ligature of baſs ſhould be made around the ſtock, to prevent the opening of its ſlit; and the whole ſhould then be clayed over, or covered with the cement before deſcribed, to hinder the air from penetrating into the ſlit, ſo as to deſtroy the graft, only two eyes of which ſhould here be left above the clay, for ſhooting.

The ſtraighteſt and ſmootheſt part of the ſtock ſhould always be preferred for grafting, in whatever way this operation is performed.

Grafting *in the Rind*, or *Shoulder*-Grafting, likewiſe called ſlicing and packing, to diſtinguiſh it from grafting in the bark, which will next be ſpoken of, is performed in the following manner, about the latter end of March, or the beginning of April, on more ſlender ſtocks than thoſe which are commonly uſed for cleft-grafting.

The top of the ſtock is cut off in a ſmooth, ſtraight place: then the cion, or graft, is prepared by cutting it on one ſide from the joint, or ſeam, down ſlope-wiſe, making the ſlope about an inch, or an inch and an half long; and obſerving it is bent, ſo that the cion may ſtand nearly upright when it is fixed to the ſtock. At the top of the ſlope, a ſhoulder is made, whereby it is to reſt on the crown of the ſtock. The whole ſlope muſt be plain and ſmooth, that it may lie even to the ſide of the ſtock. The length of the cion uſed here may be about four inches from the ſhoulder, for a ſtandard tree; but for a dwarf, or wall-tree, it may be ſix inches. When the cion is prepared, the outſide of its ſloped end, from the ſhoulder downward, is applied to the weſt, or ſouth-weſt ſide of the ſtock, and its length and breadth meaſured thereon; which done, the bark of the ſtock (but not any of its wood) is cut away to thoſe dimenſions, that the cut part of the cion may be fitted in as exactly as poſſible. In doing this, regard muſt be had to the bigneſs of the ſtock, and the thickneſs of its bark, in order to proportion thereto the length and breadth of the cut part of the cion; otherwiſe the paſſages of the ſap in the ſtock and cion will not meet, and the cion will then of courſe periſh. When the cut part of the cion is exactly fitted to, and laid on that of the ſtock, they are bound together with woollen yarn, and covered with clay an inch above, and as far below, the head of the ſtock; working it round the cion, till it become ſharp at top, that the rain may run down it.

This method has ſeveral advantages over the former. Among theſe are, that the wound heals up ſooner, and that, in the mean time, it is in leſs danger from the weather: that it does leſs injury to the ſtocks and grafts, by avoiding all ſevere ſplittings and pinchings; that the bark is more eaſily placed in the paſſage of the ſap here, than in the cleft; that the graft thrives and ſhoots with greater vigour, and bears ſooner in this way than in that; and that it is practicable on ſmaller ſtocks than the other, which muſt have a good body, and conſiſtence, before they can bear cleaving.

Grafting *in the Bark* is performed thus. Prepare the ſtock and cion as for grafting in the rind, both as to time and manner; but, inſtead of cutting out the bark of the ſtock, ſlit it down, on the ſouth-weſt ſide, from the top, almoſt as long as the ſloped part of the cion, and at the top of the ſlit looſen the bark with the point of your knife. Then thruſt an inſtrument, made of very hard wood, ivory, ſilver, or the like, and formed at the end like the ſlope-end of the cion, but much leſs, down, between the bark and wood, to make room for the cion; which being put in, the bark is to be ſo managed, as that it may cloſe exactly to the ſtock and edges of the cion, and the whole is then to be bound up, and covered as before.

Whip-Grafting, or *Tongue*-Grafting, is proper for ſmall ſtocks, from an inch diameter to a quarter of an inch, or even leſs. Mr. Worlidge, Mr. London, Mr. Miller, and others, ſpeak of it as the moſt effectual way of any, and that which is moſt in uſe, becauſe the cion covers the ſtock much ſooner in this method than in any other; for here the cion and the ſtock muſt always be of the ſame thickneſs. There are three ways of performing it, and all of them may be practiſed ſomewhat later than either of the foregoing.

The firſt is, to ſlope the cion off a full inch, or more; then to do the ſame to the ſtock; and afterwards to tie the one to the other, with baſs or yarn, ſo as to join them cloſely at every part, but particularly at the rind; and then to cover the joint carefully with well tempered clay. The baſs uſed for this, or for any other binding, ſhould be taken from a ſound mat, and be ſoaked in water for ſome hours, to increaſe its ſtrength, and render it the more pliable.

The ſecond way is, to make a ſhoulder in the graft, and, the head of the ſtock being cut off and ſmoothed, to join it as in grafting in the rind.

The third method, which is an improvement of the laſt, is properly named tipping or tonguing. This is done by cutting the ſtock off ſlanting, as before, and leaving at its upper ſide a thin piece, or tongue, as it is called, of the wood, pared away like the lower end of a cion. The cion is then ſloped, and tongued, in the ſame manner as the ſtock, and a ſlit is made in each of them, downward in the ſtock, and upward in the graft, on the ſide oppoſite to the tongue, ſo that each may receive the tongue of the other. The cion is then joined to the ſtock, as cloſely as can be, particularly at the bark; a ligature is made round them with baſs or woollen yarn, and the engrafted part is well covered with clay or cement.

Side-GRAFTING. In this, the cion is prepared as in whip-grafting; but the head of the ſtock is not cut off at the time of performing the operation. Inſtead of that, ſo much of the bark as the cion will cover is pared off from the weſt-ſide of the ſtock; then both the cion and the ſtock are ſlit in the laſt mentioned manner of whip-grafting, and they are bound together, and cloſed up with clay. At the year's end, the top of the ſtock is cut off at the grafted place, ſlopewiſe; and the wound is covered with clay or cement.

Scutcheon-GRAFTING is another method of grafting in the rind, by ſlitting the bark of the ſtock in form of the capital letter T, looſening it with the point of a knife, and inſerting a cion prepared as above. This is practiſed in June, July, and Auguſt; eſpecially if the bark does not part eaſily from the ſtock; and in caſe of failure, it is properly ſupplied by cleft grafting, in the enſuing month of February or March.

Crown-GRAFTING is only practiſed in the larger trees, which are capable of receiving a number of grafts, and are too big to be cloven; for theſe, the head or main branches, being cut off horizontally, four or more grafts are placed round the ſtock, between the bark and the rind, ſomewhat in the manner of a crown. The moſt proper time for performing this is about the latter end of March, or the beginning of April. After the intended number of cions are inſerted, which is done exactly in the ſame manner as that already delivered for grafting in the rind, the whole crown of the ſtock is well clayed over, and only two eyes of each cion are left uncovered; that being ſufficient for their ſhooting.

This method of grafting was more practiſed formerly than it is at preſent; many people having been diſcouraged by the ill ſucceſs that has frequently attended their cions, which have been blown out of the ſtock, by ſtrong winds, after they had made large ſhoots, and even after they had grown there five or ſix years. But this accident may be prevented, by tying the cions to ſtakes faſtened to the tree, till they are ſo firmly fixed, as to have almoſt covered the ſtock.

Root-GRAFTING is a modern invention, the deſign of which is ſomewhat different from that of any of the former methods; this being for the propagation, or multiplication, of plants already fitted to produce their fruit.

To perform this, take a graft, or ſprig, of a young tree, which you intend to propagate, and a ſmall piece of the root of another tree of the ſame kind, or of a like genus, and whip-graft them together; obſerving that the but-ends of the graft and root be well united, and that the rind of the root join cloſely to that of the graft. Theſe may, afterwards, be planted out at pleaſure, and the piece of root will collect the nutritive juices, and feed the graft, as the ſtock does the other way.

This method of propagation is very eaſy and expeditious; roots being more plentiful than ſtocks: by this means the pieces of roots of one crab-ſtock, for example, or of one apple-ſtock, will ſerve for twenty or thirty apple grafts; and the like of other trees. It is alſo an excellent way for raiſing of tender trees, which will hardly bear being grafted in the ſtock. Add, that trees thus grafted bear ſooner, and are more eaſily dwarfed than thoſe done any other way.

The only objection againſt this method is, that the young tree grows but ſlowly at firſt, which is occaſioned by the ſmallneſs of the root that feeds the graft; for in all trees the head muſt follow the increaſe of the roots, from whence it hath its nouriſhment.

Reiterated GRAFTING, *or* GRAFTING *by a double or triple inciſion*, is another method mentioned by Agricola, whoſe work, though chimerical enough in many reſpects, contains, notwithſtanding, ſeveral good things. To perform this, firſt graft a good cion on a ſtock, and cut it away to one half, or a third part; then fix to that remaining part of the cion another graft, of a better kind; and to that a third; for the oftener the tree is grafted, the finer fruit it produces.

By this method the author above mentioned aſſures us, that he produced muſcat pears, which were admirable, making at firſt uſe of a ſtock grafted with a pound-pear, on which he grafted a ſummer bon-chretien; and when the branch of this laſt had ſhot, he grafted on it a cion of a bergamo, which he alſo cut, and grafted on it a cion of a muſcat pear.

GRAFTING *of branches* is alſo commended by Agricola, as a very certain and profitable operation; beſt practiſed on large, full-grown, and even old trees.

To do this, half or more of the branches muſt be lopped off, and grafts of three or four years old be applied to them, taking care to have ſtakes, or other things, to ſupport them againſt the wind, &c.

He adds, that by this method you will have, perhaps, the ſame year, or at leaſt the ſecond or third, ſuch a quantity of fruit, as the youngeſt and ſoundeſt tree would hardly produce.

GRAFTING *by approach*, called alſo *inarching*, and *ablactation*, is uſed only when the tree intended to be grafted, and that from which the graft is to be taken, ſtand ſo near, or can be brought ſo near to each other, that they may be joined together. The method of performing it is thus: the branch to be inarched is fitted to that part of the ſtock where it is to be joined, the rind, and part of the wood, of one ſide of that branch, is then pared away, very ſmooth and even for the length of three inches, and afterwards the other branch, which is to ſerve for the ſtock to which the graft is to be united, is ſerved in the ſame manner, ſo that the two may join cloſely and equally together, that the ſap veſſels may meet. A little tongue is then cut upwards in the graft, and a ſlit is made in the ſtock to receive it; ſo that when they are joined, the tongue prevents their ſlipping, and the graft is the more cloſely united to the ſtock. When they are thus placed exactly together, they muſt be tied with baſs, worſted, or ſome other ſoft thing; and the place of junction muſt be well covered over with grafting clay, to prevent the air from drying the wound, and the wet from rotting the ſtock. A ſtake muſt alſo be fixed in the ground, and both the ſtock and the graft muſt be tied thereto, to prevent their being diſplaced by the wind. When they have remained in this ſtate four months, they will be ſufficiently united, and the graft may then be cut off from the mother tree, obſerving to ſlope it cloſe to the ſtock. It is of great ſervice to the graft then to lay a freſh coat of clay all round the grafted or joined part. This operation ſhould be performed in April or May, that the graft may be perfectly united to the ſtock, before the enſuing winter. It is chiefly practiſed upon oranges, mirtles, jaſmines, firs, pines, and ſome other trees, which do not ſucceed well in the common way of grafting or budding. But though orange trees are here mentioned among the reſt, this practice is not to be adviſed for them, or for any other trees, if they are intended to grow large; for that they hardly ever do in this method; and accordingly it is ſeldom uſed but for the curioſity of having a young plant with fruit upon it, in a year or two from its having been raiſed from the ſeed. This is, indeed, effected by inarching a bearing branch into a young ſtock: but the plant ſo treated ſeldom lives long.

The walnut, fig, and mulberry, will alſo take by this method of grafting, though neither of them will ſucceed in any other way; but ſtill they, like all other trees that are thus managed, will remain weak, and ſtinted in their growth, beſides the ſhortening of their otherwiſe uſual time of duration.

All grafts, particularly of young cions, are ſubject to be injured by birds; but that may be prevented by binding ſome ſmall buſhes about the tops of the ſtocks.

The binding of the grafts, whether it be of baſs or yarn, ſhould be looſened at leaſt, if it be not entirely taken off at Midſummer, or thereabouts, leſt its then too great tightneſs (as the ſtock will have increaſed in bulk, and the binding, perhaps, have been ſwelled, and conſequently ſhrunk by the weather) ſhould injure the plant.

Eſcutcheon GRAFTING. *See* INOCULATION.

GRAIN, a general name for all ſorts of corn, as wheat, barley, &c.

GRANARY, a building to lay or ſtore corn in, eſpecially that deſigned to be kept a conſiderable time.

Experimental philoſophy has proved, that the air is the great ſource of corruption; keep out that, and all is kept out; and the moſt corruptible ſubſtances, ſuch as meal, butter, milk, and the like, have been preſerved freſh four months in the exhauſted receiver of an air-pump.

They have, near Grand Cairo, a magazine or granary, defended with good walls, and called Joſeph's granaries. It is not probable that they are quite ſo old as the days of that patriarch; but they abundantly prove the utility of ſuch ſtore-houſes, by the vaſt quantities of grain annually preſerved in them.

Many parts of Africa abound with granaries of this kind.

They are ſo many deep pits made in the ſolid rock; the deſcent into them is but juſt large enough for a man to go down into them; but they grow larger as ſoon as the perſon is in by, and are uſually ſquare, from thirty to forty feet in diameter. In theſe the great men of the country preſerve their corn; they firſt ſtrew over the floor with ſtraw, then they lay on the corn, ſtill as the heap riſes, placing a thin bed of ſtraw between the corn and the ſides, as they did at the bottom. In this manner they proceed till the whole cavity is filled: when this is done, they cover the mouth of the entrance with a ſort of hurdle of green boughs of trees, interwoven one with another. This they cover with about two feet thickneſs of ſand, and over this raiſe a ridge of earth, well beat together, in order to throw off the rain both ways, that none may ſettle on the place and ſoak into the magazine.

The corn thus ſtored up always keeps three, four, or more years very good; and, not unfrequently, the proprietor being taken off by the ſeverity of the eaſtern governments, under which they live, the magazine is forgotten, and ſome accident diſcovering it many years afterwards, the corn is almoſt always found perfectly good in it. All the care they take, in regard to the corn, is to expoſe it two or three days to the ſun's heat, to dry it thoroughly, before they carry it into the magazine.

In the dutchy of Lithuania, and in the Ukraine, the people always preſerve their corn in the ſame manner in wells or pits made in dry places; but in theſe countries great care is to be taken in the opening theſe ſtore-rooms; for if people deſcend into them before they have had ſufficient communication with the freſh air, they are often killed by the damps; this, however, is eaſily guarded againſt. By theſe, and numerous other inſtances of the practice of other countries, it appears evident, that the advantage of theſe ſubterranean granaries over all others is very great.

Though theſe are to be recommended before all others, yet the common granaries may, with proper care, be rendered greatly more uſeful than they are at preſent. The grand caution neceſſary to this purpoſe, is, to guard againſt the too great humidity, which there always is in places where there is a great number of doors and windows. A too free acceſs of the external air is alſo to be carefully guarded againſt; for this brings in with it the eggs of a vaſt number of different inſects, which prey upon, and deſtroy the corn. A third caution is, when the corn is the produce of the country where it is preſerved, not to fill the place with the crop of one place only, but to mix the harveſts of two as different provinces as may be, the one dry, the other moiſt, or otherwiſe differing as much as may be; thus the contrary qualities of the one will prevent the deſtruction of the other. Theſe are the three great rules to prevent the corrupting of corn; but when the miſchief is once begun, it will prove very difficult to ſtop it: all the care that can be employed, ſhould therefore be taken in regard to theſe.

The two great cautions to be obſerved in the erecting of granaries, are to make them ſufficiently ſtrong, and to expoſe them to the moſt drying winds. The ordering of the corn in many parts of England is thus: to ſeparate it from duſt and other impurities after it is threſhed, they toſs it with ſhovels from one end to the other of a long and large room; the lighter ſubſtances fall down in the middle of the room, and the corn only is carried from ſide to ſide, or end to end of it. After this they ſcreen the corn, and then, bringing it into the granaries, it is ſpread about half a foot thick, and turned from time to time about twice in a week; once a week they alſo repeat the ſcreening it. This ſort of management they continue about two months, and after that they lay it a foot thick for two months more, and in this time they turn it once a week, or twice, if the ſeaſon be damp, and now and then ſcreen it again. After about five or ſix months, they raiſe it to five or ſix feet thickneſs in the heaps, and then they turn it once or twice in a month, and ſcreen it now and then. When it has lain two years, or more, they turn it once in two months, and ſcreen it once a quarter, and, how long ſoever it is kept, the oftener the turning and ſcreening is repeated, the better the grain will be found to keep.

It is proper to leave an area of a yard wide on every ſide the heap of corn, and other empty ſpaces, into which they turn and toſs the corn, as often as they find occaſion. In Kent they make two ſquare holes at each end of the floor, and one round in the middle, by means of which they throw the corn out of the upper into the lower rooms, and ſo up again, to turn and air it the better. Their ſcreens are made with two partitions, to ſeparate the duſt from the corn which falls into a bag; and when ſufficiently full, this is thrown away, the pure and good corn remaining behind.

Corn has, by theſe means, been kept in our granaries thirty years; and it is obſerved, that the longer it is kept, the more flour it yields in proportion to the corn, and the purer and whiter the bread is, the ſuperfluous humidity only evaporating in the keeping. At Zurich, in Swiſſerland, they keep corn eighty years or longer, by the ſame ſorts of methods.

The public granaries at Dantzick are ſeven, eight, or nine ſtories high, having a funnel in the midſt of every floor, to let down the corn from one to another. They are built ſo ſecurely, that though every way ſurrounded with water, the corn contracts no damp, and the veſſels have the convenience of coming up to the walls for their lading. The Ruſſians preſerve their corn in ſubterranean granaries, of the figure of a ſugar-loaf, wide below, and narrow at top: the ſides are well plaiſtered, and the top covered with ſtones. They are very careful to have the corn well dried before it is laid into theſe ſtore-houſes, and often dry it by means of ovens, the ſummer dry weather being too ſhort to effect it ſufficiently.

GRANGE, a houſe or farm furniſhed with granaries and barns for holding corn, ſtables for horſes, ſtalls for cattle, &c.

GRANIFEROUS *Pods*, are ſuch as contain ſmall ſeeds reſembling grain.

GRANIVOROUS, an epithet given to animals that feed on corn or ſeed.

GRAPE, the fruit of the vine. *See the article* VINE.

The beſt and moſt general ſorts of grapes, either for the garden, for wine, or for verjuice, are 1, the morillons; 2, the chaſſelas; 3, the muſcats; 4, the corinths; 5, the malmſies; 6, the bourguignons; 7, the bourdelais; 8, the ſans-moireau, or grapes without ſtones; 9, the melier; 10, the gamet; and 11, the gouais.

1. The morillons are of ſeveral ſorts, almoſt all of which are well known in moſt places, and of which ſome are very good, both for the table and for making wine.

The early morillon, which we call the July grape, has ſmall, round, black berries, growing looſe on the bunches. It ripens in England about the beginning of Auguſt, has a ſugary juice, with but little flavour, and is very apt to be eaten by birds and flies. It may be allowed a corner in the garden, well expoſed to the ſouth, and ſheltered from the wind; but its only merit is its ripening early.

The morillon taconné, or black cluſter, likewiſe called the meunier, or miller, from the hoary down of its leaves, ripens ſomewhat later than the former, yields plentifully, and makes good wine. The bunches of this are ſhort, the berries oval, and ſo cloſe together, that many of thoſe on the inſide continue green, when the outer ones are perfectly ripe. It delights in a ſandy light ſoil, ripens here in September, and is by ſome called the Burgundy grape; but this name belongs more properly to the common black morillon, which the people of Burgundy diſtinguiſh by the appellation of pineau, and which thoſe of Orleans term the auvernat, becauſe it came originally from Avergne. Its berries are oval, and hang looſer on the bunches than thoſe of the black cluſter grape; by which means they are ripened more equally. This ſort is very ſweet, ſugary, black, good to eat, grows well in almoſt any ſoil, and yields an excellent wine. Its leaf is rounder than that of any other ſort of grapes, and its wood, when cut, is redder. The beſt ſort is that whoſe joints are not above three fingers breadth aſunder. Another ſpecies of this morillon, to which the French give the name of pineau aigret, or tartiſh taſted pineau, has longer, thicker, more pithy, and leſs compact, wood than the former; its joints are at leaſt the breadth of four fingers aſunder; the outſide of its bark is very red, and its leaf is divided into three parts, like that of the fig-tree. The berries of this are ſmaller, and hang in looſer cluſters, than thoſe of the foregoing ſort; nor does it yield much fruit: but the wine that is made of this fruit is ſtrong, and even better than that of the preceding ſpecies. A third ſort of morillon, which the French diſtinguiſhed by the appellation of franc morillon, lampereau, and beaune, bloſſoms earlier than the others, and yields equally good wine. The wood of this is black, as is alſo its fruit, which promiſes greatly whilſt green, but above half of it is generally loſt before it attains to a proper maturity. This vine runs into wood more than either of the former ſorts, and its joints are farther diſtant from each other.

There is alſo a white morillon, which is excellent to eat, but its ſkin is harder than that of the common black morillon; and there is likewiſe, of this ſpecies, the Orleans gray auvernat.

2. The chaſſelas, otherwiſe called muſcadet, or white bar-ſur-aube, is a large, white, and excellent grape, either for eating, for keeping long, for drying, or for making good wine. Its berries do not grow cloſe together; and it is peculiarly fit for ſtony vineyards, becauſe it ripens there the moſt eaſily. There is another ſort of white bar-ſur-aube, a ſpecies of the large corinth, which will be ſpoken of hereafter.

The black chaſſelas, known in Provence and Languedoc by the name of the Greek grape, is ſcarcer than the white: and ſo is alſo the red, the berries of which are likewiſe bigger. Both of theſe are excellent.

3. Almoſt all the muſcat grapes are exquiſite.

The white muſcat, or Frontignan, has long, thick, and very cloſely cluſtered bunches. It is excellent for eating, for preſerving, for making wine, or for drying in an oven, or by the heat of the ſun. As the berries of theſe grapes are very ſmall, and grow extremely cloſe together, they ſhould, eſpecially where it can be done with moſt eaſe, be carefully thinned early in the ſeaſon, that the ſun and air may not be hindered from entering them, and that they may not be rotted by the moiſture which would otherwiſe be detained.

The early white Piémont muſcat, which deſerves ſingular eſteem, has longer bunches, leſs cloſely cluſtered, and more unctuous.

The red or coral muſcat, ſo called from the livelineſs of it colour, has the ſame qualities, its berry is yet firmer, and requires a pretty deal of ſun to ripen it well.

The black muſcat is larger, and grows extremely cloſe. It has not ſo high a flavour; but it is very ſugary, and is much eſteemed, becauſe it is a great bearer, and its fruit ripens pretty early.

The purple muſcat is of a leſs deep colour, and bears very large bunches, which are well garniſhed with large high flavoured berries. This, and the red, yield the moſt vinous juices of all the ſorts of muſcats.

The malmſy muſcat will be ſpoken of under the head of malmſy grapes.

The ribeezatte muſcat has a pretty ſtrong flavour of muſk: its berry is ſmaller than that of the other ſorts, and its juice is ſo ſweet and agreeable, that it would be accounted one of the firſt of grapes, if it was leſs apt to ſhed its bloſſoms, and alſo, if it was leſs apt to degenerate.

The long muſcat, or paſſe-muſqué of Italy, has very long and big bunches of large oval berries, hanging ſomewhat looſe. This is ſcarce, and does not ripen without a great deal of heat: though, if it be but half ripe, it is the beſt of all grapes to preſerve for a ſweetmeat; the fire exalting that fine flavour in it, which the ſun had not time, or power to perfect.

The long purple muſcat, which ſome call the Madeira grape, is rare; but uncommonly beautiful and good.

There is likewiſe the Jeſus muſcat, the berries of which are very large and round. This has a very high perfumed flavour, and is extremely ſcarce.

The gennetin, otherwiſe called the Orleans muſcat, belongs alſo to this ſpecies of grapes. It is very ſugary, apt to ſhed its bloſſoms, and reſembles the melié, or rather the malmſy; for which reaſon ſome call it likewiſe the white malmſy. The dealers in wine at Paris often ſell the gennetin wine for the true muſcat of Frontignan.

4. The black corinth, or, as it is vulgarly called, the currant grape, is ſugary and delicious. Its berries are round, very ſmall, and cloſely cluſtered on the bunch, which, for its thickneſs, is rather long, and they have not any ſtone.

The purple corinth is a little bigger than the black, like which it is an excellent fruit, and has no ſtone; but it is very apt to ſhed its bloſſoms; for which reaſon it ſhould be pruned longer than other vines.

The grape without ſtones is a ſort of white barſur aube, but its berries are ſmaller, and ſomewhat tarter. It is very fit for drying, becauſe it has not any ſtones; for which reaſon it is often called the large corinth, or currant.

It is to be obſerved, that all the muſcats and corinths, being apt to ſhed their bloſſoms, ſhould be pruned long, or grafted upon the bourdelais, when it is not deſired they ſhould have a ſtrong muſky flavour.

5. The malmſy grape is of a greyiſh colour, and the vines which produce it are great bearers. Its berries are ſmall, but very ſugary, high flavoured, early ripe, and ſo full of juice, that, like the Orleans gray auvernat, it is reckoned one of the moſt melting grapes. The red malmſy is of a flame colour, and has the ſame qualities as the ſort before mentioned. The white malmſy is ſcarcer, and ripens leſs early. The gray malmſy is the moſt uſed, and generally thought to be the beſt of the three.

There is likewiſe the muſked malmſy, otherwiſe muſcat de malvoiſie. It comes from Mont-ferrat: the country round about Turin is full of it; and its flavour of muſk is higher than that of any other grape.

6. The bourguignon, or treſſeau, is a pretty large black grape, better to make wine of than to eat. The vines of this ſpecies bear moſt plentifully, and their branches are of a good ſize.

The white bourgignon, called in ſome places mourlon, and in others the clozier, has joints at the diſtance of two fingers and an half broad from each other, its fruit grows on a ſhort ſtalk, its branches are cloſely cluſtered, its leaf is very round, like that of the guoais, and it endures froſty weather.

The noirat, or black grape, otherwiſe called the dyer, or Spaniſh plant, is another ſort of black bourguignon.

Its wood, like that of the former, is hard and very black; the pith of this wood is ſmall and compact; its joints are ſhort; its leaf has a red ſtalk, is of the middle ſize, and quite round. It reſiſts the froſt better than any other vine; but its juice is very flat, and ſerves only to give a deep colour to the wine it is mixed with; for which reaſon a few, and but a few, of theſe vines are planted in each vineyard that is to produce red wine. It is alſo good for wounds. The dyers give a great price for the wine that is made of this grape, to dye their cloths with.

7. The bourdelais is of three ſorts, viz. white, red, and black. Its bunches, and their berries, are very large. It is uſed chiefly to make verjuice, and for ſweet-meats. It is likewiſe an excellent ſtock for grafting all ſorts of grapes, eſpecially thoſe that are apt to ſhed their bloſſoms, ſuch as the Damaſcus, the corinths, and particularly the purple kind of this laſt ſpecies. The muſcats may alſo be engrafted on it, and ſo, in ſhort, may all other vines.

The apricot grape, the Greek vine, and the farineau, are three ſpecies of the bourdelais.

The apricot grape is ſo called, becauſe its fruit is of a golden yellow, like the apricot: its bunches are beautiful, and very large.

The Greek vine, likewiſe called the marvellous grape, and the St. James of Galicia, becauſe that part of Spain is full of it, is red, bears large, round, and ſweet berries, which ripen early, and make good wine. It produces very large, and beautiful bunches; and when the fruit is ripe, its leaves become ſtreaked and bordered with red, as is frequently the caſe of all vines whoſe fruit is variegated with black, purple, and red.

The farineau, or rognon-de-coq, as ſome call it, is white, has ſmall long berries, and is fitter to make verjuice than wine.

8. The ſans-moireau, which the people about Auxerre call quille-de-coq, is, a black grape, excellent for eating and for making wine. Its berries are ſomewhat long, firm, and cloſely cluſtered. There are three ſorts of this vine: the wood of the firſt and beſt is hard, and has ſhort joints; the ſecond is very like the firſt; and the third, called the ſans-moireau chiquetê, or white prunelas, becauſe it has whiter wood than the others. It yields but a flat wine, bears only in ſome years, and its berries are apt to drop off entirely before they are fit to be gathered.

The red prunelas, or negrier, has a red rind, long jointed wood, thick pith, a jagged leaf, and bears large bunches of tranſparent and very red grapes. It is one of the lateſt ripeners, and yields a laſting, but rough wine; for which reaſon a few only of theſe plants are ſet in vineyards of black grapes; but juſt enough to deepen the colour of the wine, and to give it a body. It reſiſts froſt, becauſe its ſtem is tall and ſtrong.

9. The white melié is one of the beſt of grapes for making wine, aud for eating. It yields greatly, and has a good juice, which keeps pretty well. It is an excellent fruit for drying.

The black melié is neither ſo well taſted, nor ſo vinous as the white.

The green melié, which ſome call only the green plant, is the moſt eſteemed of this ſpecies of grapes, becauſe it yields greatly, does not ſhed its bloſſoms, and the wine made of it never turns yellow.

The ſurin is a ſpecies of the melié. Its berries are ſomewhat oblong, and a little pointed. The fruit of this vine has an excellent flavour, and is greatly liked in Auvergne.

10. The gamet is a very common grape, yields plentifully, and grows more eaſily than any other: but it affords only a very weak wine, which has but little flavour; nor does this ſort of vine laſt many years. There is a white gamet, and a black gamet.

11. The gouais is likewiſe very common. One ſort of it is white, and another purple, with a bloom, like that on plums. Its vine will laſt an hundred years in the ground. It bears larger and longer bunches than the gamet; but, like it, has too poor a juice to make good wine. It is even inferior to the gamet in this reſpect: but it makes excellent verjuice, and fine ſweet-meats. Very few, if any, of this ſpecies, ſhould be left in a vineyard.

12. Beſides theſe eleven moſt general ſorts of grapes, there are many others, which though leſs uſually ſpoken of, ought to be known.

The beaunier, ſo called becauſe it is very common and much eſteemed at Beaune, is a grape which yields greatly, and has ſome reſemblance to the white gouas. At Auxerre, it is called the ſervinien.

The fromenteau is an exquiſite grape, and well known in Champagne. It is of a gray red, grows in pretty large bunches, which are very cloſely cluſtered, has a tough ſkin, an excellent juice, and makes the beſt of wine. It is to this grape that the famous wine of Sillery owes its merit and renown.

The ſauvignon is a black grape, pretty big and long, very high flavoured, and exceedingly good. There is alſo a white ſauvignon, which has the ſame qualities as the black: but both of them are ſcarce, and not much known.

The pinquant-paul is a very ſweet white grape. It is likewiſe called the bec-d'oiſeau, or bird's bill, and in Italy, pizutelli, pointed, becauſe its berry, which is large and very long, is pointed at each end.

There is alſo the purple pizutelli, otherwiſe called dent-de-loup, or wolf's tooth, which has likewiſe a long berry, but leſs pointed. It is one of the plumpeſt and moſt beautiful of grapes, and yields a pretty good juice, which will keep for a long time.

The grape which the French call the gland, becauſe it is ſhaped like an acorn, is of a deep yellow colour, very ſweet, and keeps well.

The blanquette de limons, is a white grape, tranſparent as glaſs. Its bunch is long and pretty big: it yields greatly, and its juice is very ſweet and delicious.

The white robe, and the black robe, yield alſo plentifully. Their bunches are thick and long, their berries ſmall, and very cloſe together; but, being a ſpecies of the ſmall Bourdelais, they do not ripen eaſily.

The Alicant vine, commonly called the great black Spaniſh, bears bunches of very large berries, which are good to eat, and ſtill better to make the wine ſo vaunted in Spain; uſually called tent, in this country.

The berries of the African grape are as big as plums, and the bunches of them are proportionably large. Theſe berries are rather long than round, and ſomewhat flat towards the point. The wood of this vine is very thick, and its leaf very large. The aſſiſtance of a wall, and a great deal of ſun, are neceſſary to ripen this fruit thoroughly.

The morocco, or barbarou, is a large purple grape, the bunches of which are alſo of an extraordinary ſize. The berries are big, round, and hard, the wood reddiſh, and the leaf ſtreaked with red. Some vines of this ſpecies yield amazingly, and bloſſom three times a year.

The Damaſcus grape is likewiſe excellent to eat; its bunches are very big and long, its berry very large, long, and of an amber colour. It has but one ſtone, and is very apt to ſhed its bloſſoms; for which reaſon it ſhould be pruned long. There is a white ſort, and a red ſort, of this grape.

The Italian grape, otherwiſe called pergoleze, is of two ſorts, viz. the white and the purple. Its bunches are large, and the berries long and looſe ſet; but they require a conſiderable degree of heat to ripen them.

The Mantuan vine yields a very early fruit; for it ripens in the beginning of Auguſt. Its bunch is pretty large, and it does not ſhed its bloſſoms: the berries too are pretty big, rather long than round: they are of a fine rich amber colour, and contain a very vinous juice.

The Auſtrian vine, or cioutat, has a leaf divided like that of parſley: its fruit is white, ſweet, yields well, and reſembles the chaſſelas; but its juice is not vinous.

The Swiſs grape is rather curious than good. Its bunches are thick and long, and their berries are variegated with black and white, ſometimes in ſuch manner that one half of a berry is of one of theſe colours, and the other half of the other.

A ſhort recapitulation of the above-mentioned different ſorts of grapes, will at once ſhew what each of them is fitteſt to be planted for.

Grapes *proper for the Garden.*

The cioutat; the black and the white chaſſelas; the white, the black, the red, the long, and the muſky muſcat, with the early Orleans muſcat, commonly called the gennetin; the corinth, ſmall or large, red or purple; the malmſy, gray or red; the Italian, the African, the Damaſcus, the Morocco, the apricot, the white robe, the melié, eſpecially the white; and the Bourdelais.

GRAPES *proper for the Vineyard.*

The pineau, or Auvernat, the gray Auvernat; the white morillon, and the morillon taconné; the gennetin; the pinquant-paul, the beaumier, the treſſeau, and all the bourquignons; the Bourdelais, the Swiſs, the Spaniſh black, or Alicant; the ploqué, the ſans-moireau, or grape without ſtones, the negrier, the fromenteau, the blanquette de limons, and moſt of the garden grapes, eſpecially the melié, the white robe, the black and the red muſcat, and the chaſſelas. A few plants of the gouais may alſo be intermixed with them.

GRAPES *proper for making Verjuice.*

The farineau, the white and the purple gouais, and the white and the black gamet.

GRASS, a general name for moſt of the herbaceous plants uſed in feeding cattle.

The beſt ſeaſon for ſowing graſs-ſeed is the latter end of Auguſt, and the beginning of September, that the graſs may be well rooted before the froſt ſet in, which is apt to turn the plants out of the ground, when they are not well rooted. This ſeed ſhould be ſown in moiſt weather, or when there is a proſpect of ſhowers, which will ſoon bring the graſs up; for, the earth being at that ſeaſon warm, the moiſture will cauſe the ſeed to vegetate in a few days: but, where this cannot be performed in autumn, the ſeeds may be ſown in the ſpring; towards the middle of March will be a good time, if the ſeaſon proves favourable.

The land on which graſs-ſeed is intended to be ſown, ſhould be well ploughed, and cleared from the roots of noxious weeds, ſuch as couch-graſs, fern, ruſhes, heath, gorſe, broom, reſt-harrow, &c. which, if left in the ground, will ſoon get the better of the graſs, and overrun the land. Therefore, in ſuch places where either of theſe weeds abound, it will be a good method to plough up the ſurface in April, and let it lie ſome time to dry; then lay it in ſmall heaps, and burn it. The aſhes ſo produced, when ſpread on the land, will be a good manure for it. The method of burning the land is particularly uſeful; eſpecially, if it is a cold ſtiff ſoil; but where couch-graſs, fern, or reſt-harrow, is in plenty, whoſe roots run far under ground, the land muſt be ploughed two or three times pretty deep in dry weather, and the roots carefully harrowed off each ploughing; which is the moſt ſure method to deſtroy them. Where the land is very low, and of a ſtiff clayey nature, which holds water in winter, it will be of ſingular ſervice to make ſome under-ground drains to carry off the wet; which if detained too long on the ground, will render the graſs ſour. The method of making theſe drains is preſcribed under the article DRAINING.

Before the ſeed is ſown, the ſurface of the ground ſhould be made level and fine, otherwiſe the ſeed will be buried unequal. The quantity of graſs-ſeed for an acre of land is uſually three buſhels, if the ſeed is clean, otherwiſe there muſt be a much greater quantity allowed; when the ſeed is ſown, it muſt be gently harrowed in, and the ground rolled with a wooden roller; which will make the ſurface even, and prevent the ſeeds being blown in patches. When the graſs comes up, if there ſhould be any bare ſpots, where the ſeed has not grown, they may be ſown again, and the ground rolled, which will fix the ſeeds; and the firſt kindly ſhowers will bring up the graſs, and make it very thick.

Some people mix clover and rye-graſs together, allowing ten pounds of clover, and one buſhel of rye-graſs, to an acre: but this is only to be done where the land is deſigned to remain but three or four years in paſture, becauſe neither of theſe kinds are of long duration; ſo that, where the land is deſigned to be laid down for many years, it will be proper to ſow with the graſs-ſeed ſome white trefoil, or Dutch clover; which is an abiding plant, and ſpreads cloſe on the ſurface of the ground, ſending forth roots at every joint; and makes the cloſeſt ſward of any, and is the ſweeteſt feed for cattle: ſo that, whenever land is laid down to paſture, there ſhould always be ſix or eight pounds of this ſeed ſown upon each acre.

The following ſpring, if there ſhould be any thiſtles, ragwort, or ſuch other troubleſome weeds, come up among the graſs, they ſhould carefully be cut up with a ſpaddle before they grow large; and this ſhould be repeated two or three times in the ſummer, which will effectually deſtroy them; for, if theſe plants are ſuffered to ripen their ſeeds, they will be blown all over the ground; their ſeeds having down adhering to them, which aſſiſts their tranſportation; ſo that they are often carried by the wind to a great diſtance, and thereby become very troubleſome weeds to the graſs. For want of this care, how many paſtures may be ſeen almoſt over-run with theſe weeds, eſpecially the ragwort; when a ſmall expence, if applied in time, would have intirely extirpated them! for a man may go over ſeveral acres of land in one day with a ſpaddle, and cut up the weeds juſt below the ſurface of the ground, turning their roots upwards; which if done in dry weather, they will ſoon decay; but this muſt always be performed before the plants come to have their ſeeds formed; becauſe after that many ſorts will live long enough to nouriſh their ſeeds after they are cut, ſo as to ripen them: and there will be a ſupply of weeds for ſome years after, which cannot be extirpated without a much greater expence.

The proper management of paſture land is the leaſt underſtood of any part of agriculture: the farmers never have attended to this, being more inclined to the plough; though the profit attending that has not of late years been ſo great as to encourage them in that part of huſbandry: but theſe people never think of laying down land for paſture, to continue longer than three years; at the end of which time they plough it up again, to ſow it with grain.

Their uſual method is to ſow rye-graſs and trefoil with barley, when they intend to lay down the ground; or ſometimes ſow only clover with the barley; nor is it poſſible to convince theſe people of their error in ſowing corn with this graſs; which they affirm to be uſeful in ſhading the graſs; not conſidering how much the corn draws away the nouriſhment from the graſs: but it is in vain to write to theſe people, who are not to be convinced, either by argument or experiment; ſo much are they led by cuſtom, as not to be led or driven out of their own methods; but, as their practice of huſbandry has greatly leſſened the circumſtances of the farmers, ſo that the lands are daily falling into the hands of the owners, therefore this part of huſbandry ſhould by them be principally attended to, as it may be carried on with much leſs expence: for paſture land requires but few hands to manage; whereas the ſowing of corn is attended with great expence, and the profit is very precarious: but, when this is attended with ſucceſs, and the grain at a moderate price, if the whole labour is to be paid for, there will be little coming to the owner for rent, when the balance is fairly ſtated; but in this moſt gentlemen deceive themſelves, and often ſuppoſe they gain by farming, when, perhaps, the whole rent of the land is loſt: therefore, to avoid the trouble which attends this ſort of huſbandry, it will be the beſt method to turn as much of their land into paſture, as they can; which, by grazing and feeding of ſheep, will be attended with little expence, and a ſure profit.

It is not uncommon for the huſbandman, for want of diſtinguiſhing graſſes for ſeed, to fill his ground with either weeds or bad and imperfect graſſes. Whereas by making a proper choice, he would always have the beſt graſs, and in the greateſt abundance his land will admit of.

In the common way of proceeding, if a farmer wants to lay down his land to graſs, he either takes his ſeeds indiſcriminately from his own foul hay-rick, or ſends to his neighbour for a ſupply. By this means, beſides a certain mixture of rubbiſh, which muſt neceſſarily happen; it is not unlikely, but that what he intends for dry land may have come from moiſt, where it grew naturally, and ſo on the contrary: and the conſequence of this ſlovenly method frequently is, that the ground, inſtead of being covered in one year with a good ſward, is filled with weeds not natural to it, which would never have ſprung up, if they had not been brought thither.

"Arguments, ſays Mr. Stillingfleet, are never wanting in ſupport of ancient cuſtoms, and I am no ſtranger to thoſe, ſuch as they are, which prejudice and indolence have made uſe of on this occaſion.

"1. Some ſay then, that if you manure your ground properly, good graſſes will come of themſelves. I own they will. But the queſtion is, how long it will be before that happens: and why be at the expence of ſowing what you muſt afterwards try to kill? which muſt be the caſe, as long as people ſow all kinds of rubbiſh under the name of hay-ſeeds. Again, if the beſt way is to let the ground take its chance, why is the farmer at the expence of procuring the ſeeds of the white and broad clover, which come up in almoſt all parts of England ſpontaneouſly? But if this is allowed not to be the beſt way in relation to clover of any kind, what reaſon can be in nature, why graſs-ſeeds only ought not to be ſown pure?

"2. Others ſay, that it is better to have a mixture of different ſeeds. I will ſuppoſe this to be true. But cannot a mixture be had though the ſeeds be gathered, and ſeparated? and is not a mixture by choice more likely to be proper, than one by chance? eſpecially after a ſufficient experience has been had of the particular virtues of each ſort, of the different kinds of cattle which each graſs is moſt adapted to, of the different grounds where they will thrive beſt, &c. all which circumſtances are now, in general, wholly unknown, though of the utmoſt conſequence.

"3. It is ſaid by ſome, that weeds will come up along with the graſs. No doubt of it. Can any one imagine that graſs-ſeeds ſhould be exempted from what happens to every other kind of ſeeds? But I will venture to ſay, that not near the quantity of weeds will ſpring up which they imagine, if the graſs be ſown very thick. Men muſt be very much put to it, when they make ſuch objections as this laſt, or indeed any of the others. I am almoſt inclined to ſay with a great writer, It is a ſimple thing to take much pains to anſwer ſimple objections.

"One would hardly think it poſſible, that the ſlovenly method of proceeding, here complained of, could prevail univerſally: yet this is the caſe as to all graſſes, except the darnel (or rye) graſs, and what is known in ſome few countries by the name of the Suffolk graſs; and this latter inſtance is owing, I believe, more to the ſoil than to any care of the huſbandman. Now, would the farmer be at the pains of ſeparating, once in his life, half a pint, or a pint, of the different kinds of graſs ſeeds, and take care to ſow them ſeparately, in a very little time he would have wherewithal to ſtock his farm properly, according to the nature of each ſoil, and might at the ſame time ſpread theſe ſeeds properly over the nation, by ſupplying the ſeed ſhops.

"I have had frequent experience how eaſy it is to gather the ſeeds of graſſes, having ſeveral times employed children of ten or eleven years old, who have gathered many ſorts for me without making any miſtakes, after I had once ſhewn them the ſorts I wanted.

"I have procured thus the creeping bent, the fine bent, the ſheep's feſcue, the creſted dog-tail, &c. in ſufficient quantities to begin a ſtock; but, for want of a proper opportunity of cultivating them myſelf, or meeting with any one who had zeal enough to beſtow a proper care on them, my collections of this kind hitherto have only proved, that the ſcheme is in itſelf feaſible.

"In the year 1761, a little boy gathered, by my directions, as much of the creſted dog-tail, in three hours, by the ſide of a road, as, when ſhed, yielded, upon weighing, above a quarter of a pound averdupois, perfectly free from huſks. As this ſeed is ſmall, the ſkilful will eaſily judge how far ſuch a quantity would go if properly employed.

"My very eſtimable and ingenious friend Mr. Aldworth, who was witneſs of the fact which I laſt mentioned, at my deſire, ordered a ſmall part of a meadow, near his ſeat at Stanlake, which had better graſſes, and leſs mixed, than the reſt, to be left unmowed till the ſeeds were fit for gathering. This piece yielded, upon threſhing and ſifting, a full buſhel by meaſure, of almoſt pure ſeed of the creſted dog-tail.

"In caſe any one ſhould be inclined to follow this example, I think it highly neceſſary to obſerve, that care muſt be taken to mow the graſs before it ſheds; that it be mowed very early in the morning, before the dew is off the ground, and that it ought not to be ſpread as in making hay, but left as it falls from the ſcythe during a ſufficient time, and then be gently turned over.

"The number of graſſes fit for the farmer is, I believe, very ſmall; perhaps half a dozen, or half a ſcore, are all he need to cultivate; and how ſmall the trouble would be of collecting the ſeeds of theſe, and how great the benefit, muſt be obvious to every one at firſt ſight. Would not any one be looked upon as wild, who ſhould ſow wheat, barley, oats, rye, peas, beans, vetches, buck-wheat, turneps, and weeds of all ſorts together? Yet how is it much leſs abſurd to do what is equivalent in relation to graſſes? does it not import the farmer to have good hay and graſs in plenty? and will cattle thrive equally on all ſorts of food? We know the contrary. Horſes will ſcarcely eat hay that will do well enough for oxen and cows. Sheep are particularly fond of one ſort of graſs, and fatten upon it faſter than any other in Sweden, if we believe Linnæus. And may they not do the ſame in England? How ſhall we know till we have tried? Nor can we ſay, that what is valuable in Sweden, may be inferior to many other graſſes in England, ſince it appears by the Flora Suecica, that they have all the good ones that we have. But however this may be, I ſhould rather chooſe to make experiments than conjectures."

The Society for promoting Agriculture, &c. in the province of Britany, has laid down the moſt rational plan yet formed by any body of men, nobly aſſociated for the welfare of their country, and which promiſes the greateſt advantages to mankind. A part of this plan is the cultivating ſeparately moſt of the plants which grow naturally in the fields there, in order to know which of them will afford the moſt and the beſt food for cattle.

As the huſbandman would not be benefited by knowing the particular claſſes, genera, &c. under which Ray, Linnæus, and other botaniſts have ranged the ſeveral ſpecies of graſſes, we ſhall here give the names of ſuch of them as may be cultivated to moſt advantage in this country, with the beſt drawings (for which we are indebted to Mr. Stillingfleet) of ſome of the moſt profitable ſorts, which it will be of ſervice to the farmer to be able to diſtinguiſh rightly.

The common dogs graſs, quich graſs, or couch graſs (*Gramen ſpicâ triticeâ repens vulgare, caninum dictum*) common creeping graſs, with a ſpike like wheat, called dogs graſs, will thrive in almoſt any ſoil, and can ſcarcely be got out again after it has once taken poſſeſſion: ſo greatly does it multiply by its roots and trailing branches, which put forth roots and ſhoots at every joint. It grows to the height of four or five feet, with blades ſo rough and coarſe, that few horſes will eat them, eſpecially while they are green: but it yields abundant crops of hay, which does well enough for oxen, and therefore deſerves, perhaps, more attention than our farmers have yet beſtowed upon it. M. Duhamel indicates the beſt way of making the moſt of it, when he directs the farmer always to mow it before its ſeeds ripen, or its ſtalks grow hard; for after that cattle refuſe it; adding, that it ſoon ſhoots up again, and will bear frequent cutting.

This plant is well known to all huſbandmen, to whom it is a ſad plague, when it gets into their arable land. It is the chiendent of the French, who, I muſt obſerve here for the benefit of their huſbandry, do not diſtinguiſh it ſufficiently from our

Rye graſs, which is C. Bauhin's *Gramen loliaceum anguſtiore folio, et ſpica*, Darnel graſs, with a narrower leaf and ſpike; and Linnæus's *Lolium ſpicâ muticâ*, Darnel with a chaffy ſpike: for darnel graſs, rye graſs, and ray graſs, are only different names of one and the ſame plant: though M. Duhamel, miſlead by the erroneous ſpelling of ſome writers, who have called rye graſs ray graſs, has been miſtakenly induced to think, that theſe are two different plants with us. We diſtinguiſh, indeed, two conſiderably different ſpecies of the rye graſs, viz. the foregoing, which, according to Mr. Ray, is the *Lolium rubrum*, or red darnel; and the *Lolium album*, which, according to the ſame author, is C. Bauhin's *Gramen loliaceum ſpicâ longiore*, darnel graſs, with a longer ſpike, and the yvraie of the French, by us commonly called darnel only. But both of them are equally rye graſs. It is the laſt of theſe ſpecies, viz. the *lolium album*, which is chiefly cultivated in England, eſpecially in ſtrong cold land, upon which it will ſucceed better than any other ſpecies, and is an earlier ſeed in the ſpring: but it is very coarſe; and unleſs it be cut quite early for hay, it becomes ſo hard and wirey in the ſtalks, that few cattle care to eat it: for this ſort of graſs has but few leaves, and runs all to ſtalks. When cattle have been turned in to feed upon it, the remaining ſtalks or bents, as they are ſometimes called, ſhould be mowed off in June; for otherwiſe they will dry upon the ground, give the paſture the diſagreeable appearance of a ſtubble field during all the latter part of ſummer, and be ſo very troubleſome to the cattle which feed on it, by tickling their noſtrils, that nothing but the want of better grazing will compel them to eat of the young graſs which ſhoots up between theſe withered ſtems; for they will not eat them. Thoſe who think that they do, when ſtreightened for food, are greatly miſtaken, according to Mr. Miller, who ſays, that he has cloſely attended to this many years, and has always found theſe bents remaining on the ground untouched, till the froſts, rain, and winds, have deſtroyed them in the winter. Beſides this, by permitting them to ſtand, the after growth of the graſs is greatly retarded, and the beautiful verdure of the fields is loſt for three or four months. It therefore is good huſbandry to mow them cloſe to the ground, before they become too dry: and if this cutting is then made into hay, it will ſerve to feed cart horſes in the winter, ſo as to repay the expence of mowing.

The red darnel is a conſiderably inferior ſpecies of rye graſs; for it has yet narrower leaves, and its ſtalks grow hard much ſooner. It is very common in moſt paſture grounds, becauſe it flowers early, and its ſeeds ripen and ſow themſelves before the hay is cut. They, therefore, who would keep their paſtures as clear as poſſible from this graſs, ſhould always mow them before its ſeeds are ripe.

Rye graſs is uſually ſown with clover, upon ſuch lands as are deſigned to be plowed again in a few years; and a common method is to ſow it with ſpring corn. But Mr. Miller, from many repeated trials, has always found, that when this graſs has been ſown in Auguſt, and a few ſhowers have fallen ſhortly after, the crop has been by much the beſt: for it then has often been ſo high as to afford a good feed the ſame autumn; and a ton and a half of hay has been mowed early the next ſpring off each acre of land, though it has been a cold and ſour ſoil. "I am, therefore, ſays he, convinced of that being the beſt ſeaſon for ſowing theſe graſſes; though it will be very difficult to perſuade theſe perſons to alter their practice, who have been long wedded to old cuſtoms. The quantity of ſeeds which I allow to an acre is about two buſhels, and eight pounds of the common clover, which, together, will make as good a covering upon the ground as can be deſired. But this is not to be practiſed upon lands where the beauty of the verdure is principally regarded. It is fitteſt for thoſe who have only profit in view." However, we muſt reckon as an abatement of this profit, that, as M. Duhamel rightly obſerves, the ground that has been under rye graſs, which is not ſo profitable a crop as either lucerne, ſainfoin, or even clover, is not able to bear wheat the next year, as it is after thoſe other plants, or after a crop of roots."

According to Mr. Liſle's information, the farmers in the Iſle of Wight prefer rye graſs to hop clover, becauſe, ſay they, the rye graſs will bear the winter, and keep to a good head, which the clover will not do. One of his tenants there had an acre and a half of rye graſs upon tolerably good ground, which he ſhut up from Michaelmas till within a month of Candlemas, and from thence to the middle of April it kept fifteen ewes and fifteen lambs.

Rye graſs ſeldom laſts more than three years, as it is commonly managed: but Mr. Liſle is ſtrongly of opinion, that, conſidering the nature of its roots, and its manner of propagating itſelf, by ſending forth fibres from its joints, it may be kept alive many years longer, by dunging it, or by refreſhing it with ſoil, when it begins to decay, after the ſecond or third year: beſides which, this will make its roots tiller, and mat on the ground, to the utter ſuppreſſion and deſtruction of all weeds, not excepting even the couch graſs.

An acquaintance of his near Upcern, in Dorſetſhire, told him, that he had as much rye graſs ſeed on eighteen acres of land, as was worth twenty pounds; and that, after the ſeed was threſhed out, that hay was better than oat-ſtraw fodder. Mr. Liſle himſelf ſaw a rick of this coarſe ſtubbed hay, and a rick of oat ſtraw, both of which had been laid open to the cattle, in the ſame place; and they would not touch the ſtraw, but had made ſuch a hole in the rye graſs hay rick, that it was ready to fall. The ſame perſon aſſured Mr. Liſle, that he found the rye graſs to be excellent food for his cattle, if it was mowed green, and not kept for the lucre of the feed. His uſual allowance was three buſhels of this ſeed to an acre of land, and he uſed to ſell it for twenty-two pence, or two ſhillings a buſhel.

Another farmer ſhewed Mr. Liſle ſome of his rye graſs, ſaying, that he looked upon it as his choiceſt fodder for ſheep. He mowed it when in the flower; and Mr. Liſle declares, that he thought it very fine hay. Others again, and thoſe men of experience, have affirmed, that the very ſtubble of the rye graſs, mowed the ſame year it was ſowed, is, when ploughed in, as good as dunging, and will pay for the ſeed.

Mr. Liſle agrees with all other experienced huſbandmen, that, though rye graſs will maintain as many cattle on an acre as hop clover will do; yet it does not, like it, improve the land for a ſubſequent crop of corn; the reaſon of which he takes to be, that the roots of the rye graſs, conſiſting of a multitude of matty fibres, which run on the ſurface of the ground, gird and hold the earth ſo ſtrongly together, that they cannot eaſily be diſintangled from it by ploughing.

"If I may judge of this graſs, ſays Mr. Stillingfleet, by the veniſon I have eaten out of a paddock that was chiefly filled with this ſpecies, I would by no means recommend it for parks. I know it will be ſaid, that veniſon is never good out of paddock, that the deer muſt have room to range, trees to browſe on, &c. I grant there is ſome reaſon for ſaying this, but I believe in general it is more owing to the want of proper food, viz. good graſs, than merely to confinement; for paddocks are generally made out of a rich ſpot of ground near the houſe, that has conſtantly been manured, and of courſe is full of graſs fitter for the dairy or the ſtable, than for deer; which hardly ever is the caſe in large parks. No man, will, I ſuppoſe, pretend to make good pork from a hog fed with grains inſtead of peas, tho' he has the liberty of chooſing as much ground as he pleaſes, and where he pleaſes."

In a ſubſequent editition of his Obſervations on Graſſes, he adds, "I have ſince eaten veniſon out of a large park, where there was much of this graſs, and it was no better than that out of the paddock. I ſhould be apt to think from hence, that this graſs would not be proper for ſheep, as I have always obſerved that the ſame kind of ground which yields good veniſon, yields alſo good mutton. For what particular uſes it is good, wants to be tried; whether for the dairy, for fattening cattle, or for horſes. Many are tempted, by the facility of procuring the ſeed of this graſs, to lay down with it grounds near their houſes, where they want to have a fine turf: but unleſs the ſoil be very rich, a worſe graſs cannot be choſen for this purpoſe, as it will certainly die off entirely in a very few years."

The wall barley, or way bennet, as ſome people improperly term it, is evidently from the ſhape of its ear, and from every other characteriſing circumſtance, a rye graſs, or wild rye, as Mr. Ray obſerves, though very different from the preceding. It is the *gramen ſecalinum et ſecale ſylveſtre*, called tall meadow rye graſs by Mr. Miller, who reckons it an excellent graſs for ſowing, becauſe it is very leafy, its ſtalks do not become ſtiff and hard like many other ſpecies, and its roots are perennial. He ſeems not to doubt, but that it may be rendered very fine by proper care; and as its roots are perennial, rolling will make them mat, ſo as to form a very cloſe ſward. There are three ſorts of it, viz. the greater, the leſſer, and the marſh rye graſs. Mr. Stillingfleet wiſhes, that this genus only were to be called rye graſs, and that the old name of darnel were continued to the *gramcn loliacoum*, or rye graſs, before ſpoken of.

The two beſt ſpecies of graſs for paſtures are, in Mr. Miller's opinion, C. Bauhin's *gramen pratenſe, paniculatum majus, anguſtiore folio*, meadow graſs, with large panicles, and a narrower leaf, which is the *poa paniculâ diffuſâ, ſpiculis, quadrifloribus pubeſcentibus culmo erecto teretri*, Flor. Suec. 77. Poa with a diffuſed panicle, the ſmaller ſpikes having four hairy flowers; and a taper erect ſtraw; and C. Bauhin's *gramen pratenſe, paniculatum majus, latiore folio*, meadow graſs, with a larger panicle, and broader leaf, which is the *poa paniculâ diffuſâ, ſpiculis trifloribus glabris, culmo erecto teretri*, Flor. Suec. 76. Poa with a diffuſed panicle, ſmall ſpikes with three flowers, and an upright ſtraw.

Theſe ſeem to be the great meadow graſſes Mr. Stillingfleet obſerves are common in our beſt meadow grounds. He has alſo met with them frequently on banks by the road ſide, and near ditches, even where they were not to be found in the adjoining meadows and paſtures. But as he has not favoured us with a botanical deſcription of them, we can only form conjectures.

If the ſeeds of theſe two ſorts were carefully collected and ſown ſeparately, without any mixture of the ſeed of other graſs, they would not only afford a greater quantity of fodder on the ſame ſpace of land, but the graſs would alſo be better, the hay ſweeter, and the verdure more laſting, than that of any other ſpecies. Mr. Miller recommends this particularly to every gentleman who would improve the verdure near his habitation.

The annual meadow graſs makes the fineſt of turfs. It grows every where by way ſides, and on rich ſound commons. It is called in ſome parts the Suffolk graſs, as we mentioned before. Mr. Stillingfleet ſays, he has ſeen whole fields of it in High Suffolk, without any mixture of other graſſes, and as ſome of the beſt ſalt butter we have in London comes from that country, it is moſt likely to be the beſt graſs for the dairy. *See* ANNUAL MEADOW GRASS.

As the next beſt to meadow graſs, Mr. Miller recommends Ray's *gramen avenaceum pratenſe elatius, paniculâ flaveſcente, locuſtis parvis*, taller meadow oat-graſs, with a yellowiſh panicle, and ſmall huſks, which is the *avena paniculâ laxâ, calycibus trifloris brevibus, floſculis omnibus ariſtatis*, Prod. Leyd. 66. Oat-graſs with a looſe panicle, three flowers in each empalement, which is ſhort, and all the flowers having awns. Mr. Ray likewiſe recommends the ſmooth mountain oat-graſs, which he calls *gramen avenaceum montanum ſpicâ ſimplici, ariſtis recurvis*, found by Mr. Dale, upon Bartlow hills in Eſſex, on the edge of Cambridgeſhire, in the borders of the corn fields between Newmarket and Exning, and on the chalk hills between Northfleet and Graveſend: and the rough or hairy oat-graſs, which he diſtinguiſhes by the appellation of *gramen avenaceum hirſutum, paniculâ purpuro-argentiâ ſplendente*, and which abounds in the paſtures about the earl of Cardigan's houſe at Twittenham, in Middleſex. He alſo includes under this genus, all the feſtuca kinds, of which Mr. Stillingfleet gives the following account, in his Obſervation on Graſſes, ſubjoined to his tranſlations of ſeveral ingenious tracts, ſelected from the Tranſactions of the Academy of Upſal.

Sheeps feſcue, which he diſtinguiſhes by the name of *feſtuca ovina*, is the graſs moſt eſteemed for the food of ſheep in Sweden, where they have not ſuch downs as we have.

Gmelin ſays, that the Tartars chooſe to fix, during the ſummer, in thoſe places where there is the greateſt plenty of this graſs, becauſe it affords a moſt wholſome nouriſhment to all kinds of cattle, but chiefly ſheep: and he obſerves, that the ſepulchral monuments of the ancient Tartars are moſtly found in places which abound with this graſs, which ſhows, adds he, that it has long been valued among them.

This graſs abounds in many parts of England and Wales, and particularly on all the fineſt ſheep paſtures in Herefordſhire, Oxfordſhire, Norfolk, &c. Mr. Stillingfleet obſerves, that it is a very early graſs, and that, contrary to what Linnæus ſays, either ſheep, or ſome other animals do eat the flowering ſtems of this graſs; for, when he ſearched for it upon Banſtead downs, he could ſee no part of it but the radical leaves, except among buſhes near the hedges, where it was guarded from the ſheep.

Mr. Stillingfleet ſays, that he has always ſeen the purple feſcue along with the fine bent and ſilver hair graſs, which will be ſpoken of hereafter, particularly on Banſtead downs, in great plenty, in a place incloſed in order to keep the ſheep out. From thence he is inclined to think, that this is the chief graſs all over the downs; but as the flowering ſtems in the other parts were intirely gone at the time of his viewing it, except along the hedges, he could not be certain in this reſpect.

After candidly declaring his want of knowledge of the qualities of the flote feſcue, which he calls *feſtuca fluitans*, Mr. Stillingfleet quotes a curious paſſage in the Tranſactions of the Academy of Upſal, where the author of a piece entitled *Plantæ Eſculentæ* ſays, that the ſeeds of this graſs are gathered yearly in Polland, and from thence carried into Germany, and ſometimes into Sweden, and ſold under the name of manna ſeeds, and that they are there much uſed at the tables of the great, on account of their nouriſhing quality and agreeable taſte. Mr. Stillingfleet then adds, that one Mr. Dean, a very ſenſible farmer at Ruſcomb, in Berkſhire, aſſured him, " that a field of about four acres, which always lay under water, and was occupied by his father when he was a boy, was covered with a kind of graſs that maintained five farm horſes in good heart, from April to the end of harveſt, without giving them any other kind of food, and that it yielded more than they could eat." Some of it was carried to Mr. Stillingfleet, who found it to be the flote feſcue, with a mixture of the marſh bent: but whether this laſt contributes much towards furniſhing ſo good paſture for horſes, ſeems doubtful to him. They both throw out roots at the joints of the ſtalks, and are therefore likely to grow to a great length.

Linnæus ſays, that the bran of this graſs will cure horſes troubled with bots, if they are kept from drinking for ſome hours.

In the index of dubious plants, at the end of Ray's Synopſis, mention is made of a graſs called *gramen caninum ſupinum longiſſimum*, longeſt ſupine dog's graſs, which grows at Maddington in Wiltſhire, and in ſome parts of Wales, to the length of twenty-four feet, and is uſed for the fattening of hogs. Its ſtalks are of the creeping kind, and touch the ground at ſeveral of their knots; for they do not riſe much in height. Mr. Stillingfleet thinks it the flote feſcue, and rightly adviſes farther inquiries concerning it. But he does not ſeem here to have conſulted Mr. Worlidge, who ſays, ſpeaking of this graſs, that it is extraordinarily ſweet, but not ſo eaſily propagated as hath been imagined, the length thereof being occaſioned by the waſhing of a declining ſheepdown, from whence haſty rains bring with them much of the fatneſs of the dung of the ſheep, which ſubſides upon the ſmall meadows where this graſs grows: ſo that in ſprings not ſubject to theſe ſhowers, or on lands not enriched by that fertiliſing ſoil brought down to them, this graſs does not thrive ſo well.

The vernal graſs, which Mr. Stillingfleet calls *anthoxanthum odoratum*, and which is at leaſt a ſpecies of Ray's *gramen vernum ſpicâ brevi laxâ*, and of C. Bauhin's *gramen vernum pratenſe ſpicâ flaveſcente*, vernal graſs, with a looſe yellowiſh ſpike, is one of the earlieſt graſſes, and grows very commonly in all our meadows, paſtures, and other grounds. It is found in plenty upon thoſe paſtures which ſheep are fond of, and from whence excellent mutton comes; and therefore it is moſt likely to be a good graſs for ſheep paſtures. Mr. Stillingfleet ſays, he has found it on all kinds of grounds, from the moſt ſandy and dry to the moſt ſtiff and moiſt, and even in bogs. It is very plentiful in the beſt meadows about London, viz. towards Hampſtead, and Hendon; and its ſeeds may be gathered very eaſily, as it ſheds them upon the leaſt rubbing. This graſs gives a grateful odour to hay.

Mr. Liſle remarks, that the *gramen parvum repens perpureâ ſpicâ*, ſmall creeping graſs, with a purple ſpike, is no indication of bad ground, though it be a very bad graſs. Ray ſays, that it is very common in paſtures. There ſeems to be a great ſweetneſs in it. The ſame may be ſaid of the *gramen criſtatum*, or ſmooth creſted graſs, which alſo abounds every where in our meadows and paſtures.

The meadow fox-tail graſs *(gramen alopecuroides)* abounds in our beſt meadows about London, and makes very good hay; perhaps the beſt of any that is brought to market here. Mr. Stillingfleet obſerved in the ſpring of the year 1762, a meadow near Hampſtead, which conſiſted of this graſs chiefly, with ſome of the vernal graſs and the corn-brome graſs: but it is ſcarce in many parts of England, particularly in Herefordſhire, Berkſhire, and Norfolk; though it might be gathered at almoſt any time of the year, even from hay-ricks, as it does not ſhed its ſeeds without rubbing, which is the caſe of but few graſſes.

The water fox-tail *(alopecuroides paludoſum)* is alſo found in ſuch meadows about London as are ſound and lie under water in the winter. Mr. Stillingfleet thinks it may, perhaps, be a proper graſs to ſow on ſuch grounds.

Mr. Stillingfleet has always found the fine bent-graſs, which he names *agroſtis capillaris*, in great plenty on the beſt ſheep paſtures, as on Malvern-hills, Bagſhot-heath, and all the high grounds in Herefordſhire, Berkſhire, Oxfordſhire, and Norfolk, and other places remarkable for good mutton.

The ſame may be ſaid of the mountain hair-graſs, which he calls *aira flexuoſa*; and of the ſilver hair-graſs, which is his *aira caryophillea*.

The quaking-graſs, cow-quake, or lady's-hair, as it is called in ſome places, is the *gramen tremulum maximum*, of C. Bauhin, and J. Ray, and the *briza ſpiculis cordatis, floſculis ſeptendecim*, Hort. Cliff. 23. Briza with heart-ſhaped little ſpikes, and ſeventeen flowers in each. Though a very poor and ſlender graſs, Mr. Liſle thinks it no indication of poor land where it grows: for, as Mr. Ray obſerves, it is the moſt common graſs of any in all the paſture grounds throughout England.

Mr. Miller deſcribes it as having an annual root, which ſends up many broad hairy leaves, between which ariſe ſlender ſtiff ſtalks, from a foot to near two feet high, dividing upward into a large looſe panicle, garniſhed with heart-ſhaped ſmall ſpikes, each having about ſeventeen ſmall floſcules, or florets; and theſe, after the flowers are paſt, are ſucceeded by a ſingle ſeed. The heads hang by ſlender long foot-ſtalks, which are moved by every wind, ſo that they generally appear ſhaking; from whence it had the name of quaking-graſs. There is a ſmaller ſpecies of it, which is a native of England; but, I believe, of no greater value than the former. Theſe graſſes come to head in May: and this gave riſe to the Engliſh proverb, May, come ſhe early come ſhe late, makes the cow quake.

Matweed *(gramen ſparteum)* is of the broom kind, and delights in ſandy places, near the ſea. Even clouds of ſand blown over it do not hurt, but, on the contrary, promote its growth. It has been of excellent ſervice in fixing looſe ſands, as, if I have been rightly informed, it once did very remarkably in Norfolk. Of ten ſpecies of this plant, which Mr. Ray diſtinguiſhes, the following are the chief. 1. *Spartum Plinii, ſive juncus Hiſpanicus*, the true matweed of Pliny, or Spaniſh broom; 2. *Gramen ſparteum paniculâ brevi folliculo incluſâ*, hooded matweed; 3. *Gramen ſparteum marinum Anglicanum*, Engliſh ſea matweed, or marram; 4. *Spartum maximum maritimum Hollandicum, ſpicâ ſecalinâ*, the greateſt Holland matweed, with a rye ſpike; 5. *Gramen ſparteum pennatum*, Feather-graſs; and 6. the *Gramen ſparteum juncifolium*, or *ſpartum parvum*, ſmall matweed.

Mr. Stillingfleet ſays, that the beſt mutton he ever taſted, next to that which comes from hills, where the purple and ſheep's feſcue, the fine bent, and the ſilver hair graſſes abound, was fed upon the creſted dog-tail graſs, which he and Mr. Hudſon call *cynoſurus criſtatus*. He therefore rightly judges it proper for parks; and confirms this opinion, by adding, that he knows a park where this graſs abounds, which is famous for excellent veniſon. It makes a very fine turf upon dry, ſandy, or chalky ſoils: but unleſs it be ſwept over with the ſcythe, its flowering ſtems will look brown; as is the caſe of all graſſes which are not fed by a variety of animals: for that ſome animals will eat the flowering ſtems, is evident from commons, where one ſcarcely ſees any part of the graſſes, except the radical leaves.

Mr. Miller thinks the cock's-foot graſs (Ray's *Gramen dactylon*, Hiſt. p. 1271) the capon's-tail graſs (Ray's *Gramen murorum ſpicâ longiſſimâ*, Hiſt. p. 1286) and the millet graſſes *(Gramina miliacea)* too coarſe to deſerve attention in England; though ſome of their ſpecies are very uſeful in the warm parts of America, where there is a great ſcarcity of finer graſs, and even much better adapted for ſuch climates, than any of our European graſſes; becauſe many of them lie flat on the ground, and emit roots from their joints, by which means they are well prepared for heat; of which their large and juicy ſtalks likewiſe enable them to bear an extraordinary degree.

The purple, or, as it is commonly called, red meadow trefoil, which is C. Bauhin's *Trifolium pratenſi purpureum*, has already been ſufficiently diſtinguiſhed from the common red clover, or red honeyſuckle (Ray's *Trifolium purpureum majus, pratenſi ſimile, Syn.* 328) which though Mr. Liſle thinks otherwiſe, is undoubtedly a native of England, as is manifeſt from its ſpontaneous and flouriſhing growth on the top of many mountains, particularly in even the moſt northern parts of Scotland, where no mortal ſurely ever dreamt of cultivating it. The ſpecies called yellow meadow trefoil, or hop-clover, is C. Bauhin's *Trifolium pratenſe luteum, capitulo lupuli, vel agrarium*; and the ſmaller kind of this, commonly called noneſuch, or black ſeed, is the *Trifolium luteum, lupulinum, minimum.* M. Duhamel rightly prefers the firſt of theſe ſorts for artificial paſtures, and obſerves, that it is the only ſpecies now cultivated in France, for that purpoſe.

Our meadows afford us the white meadow trefoil, honeyſuckle-graſs, or white Dutch clover, which is the *trifolium pratenſe album* of C. Bauhin, and by far the beſt ſort of clover for laſting paſtures, becauſe it is the ſweeteſt and moſt abiding of all the plants of this kind.

This white clover, beſides being perennial, ſends forth roots and ſhoots from every joint of its trailing branches, for it does not riſe high, and thereby forms the cloſeſt ſward of any of the artificial graſſes. It is exceeding ſweet food for all ſorts of cattle: for which reaſon a quantity of the ſeeds of this plant ſhould always be ſown with the other graſs-ſeeds, on whatever land is intended to be laid down for paſture. The uſual allowance of this ſeed is eight pounds to an acre. But it never ſhould be ſown with corn; becauſe this will weaken it, ſo that it will be ſcarcely worth ſtanding. And yet, as Mr. Miller obſerves, ſuch is the covetouſneſs of moſt farmers, that they will not be prevailed on to alter their old cuſtom of laying down their ground with a crop of corn; though they loſe twice the value of that corn, by the poorneſs of the graſs, which will not then come to a good ſward: and one whole ſeaſon is alſo loſt: for if this ſeed is ſown in the ſpring, without corn, there will be a crop of hay to mow by the middle, or latter end of July, and a much better after-feed for cattle the following autumn and winter, than the graſs which is ſown with corn will produce the ſecond year. It may alſo be ſown with graſs-ſeed in autumn, in the manner before directed for the common red clover; and if the ſeeds grow kindly, this autumnal ſowing will afford a good early crop of hay the following ſpring. If the ground is well rolled after this crop is taken off, the clover will mat cloſe upon it, and form a thick ſward.

Conſiderable quantities of the ſeeds of this white clover are imported hither annually from Flanders, by the way of Holland; from whence it has received the name of Dutch clover: not that it is more a native of that country, than of this; for it is very common in the paſtures all over England; but the ſeeds of it were never collected here, for ſowing, till of late years; nor are there yet many perſons in this kingdom who ſave them, though they may be ſaved with the ſame eaſe, and in the ſame manner, as is practiſed for the red clover. Every farmer who would improve his land, ſhould therefore ſow an acre or two with this white clover, unmixed, merely for the ſake of its ſeeds, which are often ſold at a great price. He will by this means ſave the expence of buying them; and he will eaſily find purchaſers for any quantity he may have to ſpare.

I do not know that the narrow leaved plantain, or ribwort *(Plantago anguſtifolia)* hath ever been cultivated purpoſely for the food of cattle. It grows, indeed, in almoſt all paſtures: but, as it will thrive upon dry very ſpots, becauſe it ſtrikes a deep root, it may probably deſerve farther trial.

The late Dr. Eliot, recommends two ſorts of graſſes, natives of North America, of which he lately ſent over a parcel of the ſeeds to the London Society for the Encouragement of Arts, &c. by whom they have been diſtributed here, ſo that we may hope ſoon to know their ſucceſs in this country, and of which he has given an account in his Eſſays upon Field-Huſbandry in New England. *See the articles* BIRD-GRASS, *and* TIMOTHY-GRASS.

GRASS-*Walks.* As to graſs-plats and green walks, they are made, for the moſt part, not by ſowing graſs-ſeed, but by laying turfs: and indeed the turfs from a fine common or down, are much preferable to ſown graſs: but if walks or plats are to be made by ſowing, the beſt way is to procure the ſeed from thoſe paſtures where the graſs is naturally fine and clear, or elſe the trouble of keeping it from ſpiry or benty graſs will be very great, and it will ſcarce ever look handſome.

In order to ſow graſs-walks, the ground muſt be firſt dug; and when it has been firſt dreſſed and laid even, it muſt be very carefully raked over, and all the clods and ſtones taken off, and then covered over an inch thick with good mould. This being done, the ſeed is to be ſown pretty thick, that it may come up cloſe and ſhort; it muſt then be raked over again, to cover the ſeed, that if the weather ſhould happen to be windy, it may not be blown away. It ought alſo to be obſerved, that where graſs is ſown in gardens, either for lawns or walks, there ſhould always be a good quantity of the white trefoil or Dutch clover ſown with it; for this will make a fine turf much ſooner than any other ſown graſs, and will continue a better verdure than any other of the graſs-tribe.

In order to keep graſs-plats or walks handſome, and in good order, you may ſow in autumn freſh ſeed over any places that are not well filled, or where the graſs is dead; but nothing improves graſs ſo much, as mowing and conſtant rolling.

When turf is laid in gardens, it is a general practice to cover the ſurface of the ground, under the turf, either with ſand or very poor earth; the deſign of this is, to keep the graſs fine, by preventing its growing too rank. This is proper enough for very rich ground, but it is not ſo for land that is poor; for when this is practiſed in ſuch places, the graſs will ſoon wear out, and decay in patches.

GRASS-*Leaſe,* graſs-lands, or lands appropriated to graſs, for feeding of cattle.

GRATTEN, a term uſed in Cornwal, to imply the mowing of graſs, the firſt year after the land has been manured with ſea-ſand; and this operation they call mowing in gratten.

GRAVEL, a congeries of ſmall pebbles, which, being mixed with a ſtiff loam, makes laſting and elegant walks in our gardens.

Opinions, with regard to the choice of gravel, are various; ſome are for having it as white as poſſible, and in order to render it the more ſo, cauſe the walks to be often rolled with ſtone-rollers, which add a whiteneſs to the ſurface. But this renders them very troubleſome to the eyes, by reflecting too ſtrongly the rays of light: ſuch gravel, therefore, as will lie ſmooth, and reflect the leaſt, ſhould be preferred. Again, ſome ſcreen the gravel too fine, but this is an error; for if it be caſt into a round heap, and the great ſtones only are raked off, it will be the better. There are many kinds of gravel which do not bind, and by this means cauſe a continual trouble of rolling, to little or no purpoſe; as for ſuch, if the gravel be looſe or ſandy, you ſhould take one load of ſtrong loam, and two of gravel, and ſo caſt them well together.

The beſt and moſt eſteemed gravel is that of Blackheath, in Kent, which being mixed with a proper proportion of loam (found alſo on the ſame common) makes the moſt beautiful and laſting walks any where; nor is it confined to a few places about London, for we have known ſeveral tons of it exported to adorn the pope's garden at Rome, although it may be ſuppoſed ſo much beneath his holineſs's dignity to tread upon it; but Italy cannot produce a more handſome *terra firma.*

The month of March is the propereſt time for laying gravel; for it is not prudent to do it ſooner, or to lay walks in any of the winter months before that time. In making theſe walks, great regard muſt be had to the level of the ground, ſo as to lay the walks with eaſy deſcents towards the low parts of the ground, that the wet may be eaſily drained off: but when the ground is level, it will be proper to have ſink-ſtones laid by the ſides of the walk, and at convenient diſtance, to let off the wet; and when the ground is naturally dry, the drains from the ſink-ſtones may be contrived ſo as to convey the water into ſeſſpools, from which the water will ſoak away in a ſhort time; but in wet lands there ſhould be under-ground drains, to convey the water off, either into ponds, ditches, or the neareſt place proper to receive it.

Some are apt to lay gravel walks too round, but this is an error; becauſe they are not ſo good to walk upon; and beſides, it makes them look narrow; one inch is enough in a crown of five feet; and it will be ſufficient, if a walk be ten feet wide, that it lies two inches higher in the middle than it does on each ſide; if fifteen feet, three inches; if twenty feet, four inches; and ſo in proportion.

For the depth of gravel-walks, ſix or eight inches may do well enough; and a foot in thickneſs will be ſufficient for any; but then there ſhould always be a depth of rubbiſh laid under the gravel, eſpecially if the ground be wet.

Some turn up gravel-walks into ridges, in December, in order to kill the weeds; but this is very wrong, ſince it never anſwers the end; and, therefore, if conſtantly rolling them after rain and froſt, will not effectually kill the weeds and moſs, you ſhould turn the walks in March, and lay them down at the ſame time.

In order to deſtroy worms that ſpoil the beauty of gravel or graſs-walks, ſome recommend the watering them with water made very bitter, by ſteeping walnut-tree leaves in it; but if, in the firſt laying of the walks, there be a good bed of lime-rubbiſh laid at the bottom, it will prove the moſt effectual method to keep out the worms, for they never harbour near lime.

GRAVELLY-*Land,* that which abounds with gravel and ſand. *See the article* SANDY-LAND.

The beſt manure for this ſort of land is marl, or any ſtiff clay that will diſſolve with the froſt, cow-dung, chalk, mud, and half rotten ſtraw from the dunghill.

GREASE, a diſeaſe incident to horſes and other cattle, conſiſting of ſwellings and gourdineſs of the legs.

In order to treat this diſorder with ſome propriety, without having recourſe to the falling down of humours for its explanation, we ſhall conſider it as ariſing from two different cauſes; a fault or relaxation in the veſſels, or a bad diſpoſition of the blood and juices. In order to this, it will be neceſſary to obſerve, that the blood and juices are carried to the extreme parts by the arteries, and returned by the veins; conſequently the blood muſt riſe perpendicularly in the latter, in order to return from the extremities to the heart. And hence ſwellings in the legs of horſes may be eaſily accounted for, as a partial ſtagnation of the blood and juices may be naturally expected where the circulation is languid, eſpecially when there is a want of due exerciſe, and a proper muſcular compreſſion on the veſſels to puſh forward the returning blood, and propel the inert, and half ſtagnating fluids through their veſſels. In ſhort, the blood, in ſuch caſes, cannot ſo eaſily aſcend and deſcend, or a greater quantity will be brought by the arteries than can be returned by the veins.

The greaſe then, conſidered in this light, muſt be treated as a local complaint, where the parts affected are alone concerned, the blood and juices being yet untainted, and in good condition; or as a diſorder where they are both complicated: but when it is an attendant on ſome other diſtemper, as the farcy, yellow dropſy, &c. ſuch diſeaſes muſt firſt be cured before the greaſe can be removed. In the former caſe, moderate exerciſe, proper dreſſing, cleanlineſs, and external application, will anſwer the purpoſe; in the latter, internals muſt be called in to our aſſiſtance, with proper evacuations.

When a horſe's heels are firſt obſerved to ſwell in the ſtable, and ſubſide, or go down, on exerciſe, let care be taken to waſh them very clean every time he comes in, with ſoap-ſuds, chamberlye, or vinegar and water, which, with proper rubbing, will frequently prevent or remove this complaint: or let them be well bathed twice a day with old verjuice, or the following mixture, which will brace up the relaxed veſſels; and if rags dipped in the ſame are rowled on, with a proper bandage, for a few days, it is moſt likely the ſwellings will ſoon be removed by this method only, as the bandage will ſupport the veſſels till they have recovered their tone. To anſwer this end alſo, a laced ſtocking, made of ſtrong canvaſs, or coarſe cloth, neatly fitted to the part, would be found extremely ſerviceable, and might eaſily be contrived by an ingenious mechanic.

> Take rectified ſpirit of wine four ounces, diſſolve it in half an ounce of camphor, to which add wine-vinegar, or old verjuice, ſix ounces; white vitriol, diſſolved in a gill of water, one ounce; mix together, and ſhake the phial when uſed.

But if cracks or ſcratches are obſerved, which ouſe and run, let the hair be clipped away, as well to prevent a lodgment (which becomes ſtinking and offenſive by its ſtay) as to give room for waſhing out dirt or gravel, which, if ſuffered to remain there, would greatly aggravate the diſorder.

When this is the caſe, or the heels are full of hard ſcabs, it is neceſſary to begin the cure with poultices, made either of boiled turneps and lard, with a handful of linſeed powdered, or oat-meal and rye-flour, with a little common turpentine, and hogs lard, boiled up with ſtrong beer grounds, or red wine lees. The digeſtive ointment being applied to the ſores for two or three days, with either of theſe pultices over it, will, by ſoftening them, promote a diſcharge, unload the veſſels, and take down the ſwelling, when they may be dried up with the following:

> Take white vitriol and burnt alum, of each two ounces; Ægyptiacum one ounce; lime water a quart, or three pints: waſh the ſores with a ſponge dipped in this, three times a day, and apply the common white ointment, ſpread on tow; to an ounce of which may be added two drams of ſugar of lead.

Or the following waſh and ointment may be uſed for that purpoſe.

> Take half an ounce of Roman vitriol, diſſolved in a pint of water; then decant off the clear into a quart bottle, add half a pint of camphorated ſpirits of wine, the ſame quantity of vinegar, and two ounces of Ægyptiacum.

> Take honey four ounces, white or red lead, powdered, two ounces, verdigreaſe in fine powder one ounce; mix together.

Some, for this purpoſe, apply allum-curd; others a ſtrong ſolution of allum in verjuice, with honey; and many of theſe forms may eaſily be contrived. But let it be remembered, that as ſoon as the ſwelling is abated, and the moiſture leſſened, it would be very proper to keep the legs and paſterns rolled up with a firm bandage, or linen rowler, two or three fingers wide, in order to brace up the relaxed veſſels, till they have recovered their natural tone.

This method is generally very ſucceſsful, when the diſtemper is only local, and requires no internal medicines: but if the horſe be full and groſs, his legs greatly gorged, ſo that the hair ſtares up, and is what ſome term penfeathered, and has a large ſtinking diſcharge from deep foul ſores, you may expect to meet with great trouble, as theſe diſorders are very obſtinate to remove, being often occaſioned by a poor dropſical ſtate of blood, or a general bad diſpoſition in the blood and juices.

The cure in this caſe, if the horſe is full and fleſhy, muſt be begun by bleeding, rowels, and repeated purging; after which diuretic medicines are frequently given with ſucceſs. Thus,

> Take four ounces of yellow roſin, one of ſal prunellæ; grind them together with an oiled peſtel, add a dram of oil of amber, and give a quart of forge-water every morning, faſting two hours before and after taking, and ride moderately.

As this drink is found very diſagreeable to ſome horſes, I would recommend the nitre balls in its ſtead, given to the quantity of two ounces a day, for a month or ſix weeks, mixed up with honey, or in his feeds: take the following alſo for that purpoſe.

> Yellow roſin four ounces, ſalt of tartar, and ſal prunellæ, of each two ounces; Venice ſoap half a pound; oil of juniper half an ounce; make them into balls of two ounce weight, and give one every morning.

Or,

> Take nitre two ounces; camphor one dram, honey enough to make into a ball; give as the former.

The legs in this caſe ſhould be bathed or fomented, in order to breath out the ſtagnant juices, or to thin them, ſo that they may be able to circulate freely in the common current. For this purpoſe foment twice a day with a diſcutient fomentation, in which a handful or two of wood aſhes has been boiled; apply then the above poultice, or the following, till the ſwelling has ſubſided, when the ſores may be dreſſed with the green ointment till they are properly digeſted, and then dried up with the water and ointment above recommended.

> Take honey one pound, turpentine ſix ounces, incorporate with a ſpoon; and add of the meal of fenugreek and linſeed, each four ounces; boil in three quarts of red wine lees, to the conſiſtence of a poultice; to which add, when taken from the fire, two ounces of camphor in powder; ſpread it on thick cloths, and apply warm to the legs, ſecuring it on with a ſtrong rowler.

If the ſores are very foul, dreſs them with two parts of the wound ointment, and one of Ægyptiacum; and apply the following, ſpread on thick cloths, and rowled on.

> Take of black ſoap one pound, honey half a pound, burnt allum four ounces, verdigreaſe powdered, two ounces, wheat flour a ſufficient quantity.

If the diuretic balls ſhould not ſucceed, they muſt be changed for the antimonial and mercurial alteratives, already mentioned; but turning a horſe out in a field, where he has a hovel or ſhed to run to at pleaſure, would greatly contribute to quicken the cure; and, indeed, would in general effect it alone: but if this cannot be complied with, let him be turned out in the day time.

If the horſe is not turned out, a large and convenient ſtall is abſolutely neceſſary, with good dreſſing and care: this ſtall ſhould be ſix feet wide, that a tall horſe may ſhoot out his legs at length, ſo that the blood may circulate freely, without meeting with reſiſtance, which it naturally muſt, when a horſe lies all on a heap, or with his legs under him: nor ſhould the ſtable be paved with too great a declivity; for if the horſe ſtands too low with his hind legs, moſt of his weight will reſt upon them; and give him the greaſe, eſpecially if he be at all inclined to be gourdy.

The laſt thing we ſhall recommend, is to make him lie down in the ſtable as often as poſſible. This is undoubtedly of the utmoſt conſequence, as it will not a little contribute to the removal and cure of this diſorder; for by only changing the poſition of his legs, a freer circulation would be obtained, and the ſwelling taken down: whereas it is in general greatly aggravated by the obſtinacy of the horſe, which refuſes to lie down at all, probably from the pain it gives him in bending his legs neceſſary for that purpoſe; by which means the ſtiffneſs and ſwelling increaſes, till the over-gorged and diſtended veſſels are obliged to give way, and, by burſting, diſcharge the fluids that ſhould circulate through them. *Bartlet's Farriery, page* 284.

GREASE melted. *See the article* MOLTEN-GREASE.

GREEN-HOUSE, a conſervatory, or houſe erected in a garden, for preſerving ſuch tender and exotic plants as cannot bear the cold of our winters, if expoſed to the open air.

The following deſcription of a green-houſe is taken from Mr. Miller's Gardener's Dictionary, as the conſervatory given by that ingenious gardener is very well adapted to this climate.

The length of theſe houſes muſt be proportioned to the number of plants they are intended to contain; but their depth ſhould never be greater than their height in the clear, which, in ſmall or middling houſes, may be ſixteen or eighteen feet, and in large ones from twenty to twenty-four. The windows in front ſhould extend from about one foot and a half above the pavement, to within the ſame diſtance of the ceiling, which will admit of a corniche round the building, over the heads of the windows. In a ſmall green-houſe, the ſaſhes ſhould not be leſs than four or five feet broad; and in a large one, they ought not to exceed ſeven and a half; the ſhutters of which ought to fall back cloſe to the piers on the inſide, that, when open, they may not prevent any of the rays of light from reaching the plants. The piers between theſe windows, ſupporting the building, ſhould be as narrow as poſſible; for which reaſon they ſhould be either of ſtone or well-burnt brick. If they are of ſtone, they ought not to exceed two feet and a half in front, and ſhould be ſloped off backward to about eighteen inches broad, by which means the rays of the ſun will not be obſtructed by the corners of the piers, as they would be if they were ſquare: but if they are built of brick, it will be proper to make them near three feet in front, otherwiſe they will be too weak to ſupport the building: theſe I would alſo adviſe to be ſloped off in the manner directed for the ſtone.

At the back of the green-houſe, there may be erected an houſe for tools, and many other purpoſes; which will be extremely uſeful, and alſo prevent froſt from entering the houſe that way; ſo that the wall between theſe need not be more than two bricks and an half in thickneſs; whereas, were it quite expoſed behind, it ſhould be at leaſt three bricks in thickneſs; and by this contrivance, if you are willing to make an handſome building, and to have a noble room over the green-houſe, you may make the room over the tool-houſe, and carry up the ſtair-caſe in the back, ſo as not to be ſeen in the green-houſe; and hereby you may have a room twenty-five or thirty feet in width, and of a proportionable length: and under this ſtair-caſe, there ſhould be a private door into the green-houſe, at which the gardener may enter in hard froſty weather, when it will not be ſafe to open any of the glaſſes in the front. The floor of the green-houſe, which ſhould be laid either with marble ſtone, or broad tiles, according to the fancy of the owner, muſt be raiſed two feet above the ſurface of the ground whereon the houſe is placed, which, in dry ground, will be ſufficient: but if the ſituation be moiſt and ſpongy, and thereby ſubject to damps, it ſhould be raiſed at leaſt three feet above the ſurface: and if the whole is arched with low brick arches under the floor, it will be of great ſervice in preventing the damps riſing in winter, which are often very hurtful to the plants, eſpecially in great thaws, when the air is often too cold to be admitted into the houſe, to take off the damps. Under the floor, about two feet from the front, I would adviſe a flue of about ten inches in width, and two feet deep, to be carried the whole length of the houſe, which may be returned along the back part, and be carried up in proper funnels adjoining to the tool-houſe, by which the ſmoak may paſs off. The fire-place may be contrived at one end of the houſe, and the door at which the fuel is put in, as alſo the aſh-grate, may be contrived to open into the tool-houſe, ſo that it may be quite hid from the ſight, and be in the dry, and the fuel be laid in the ſame place, whereby it will always be ready for uſe.

I ſuppoſe many people will be ſurpriſed to ſee me direct the making flues under a green-houſe, which has been diſuſed ſo long, and by moſt people thought of ill conſequence, as indeed they have often proved, when under the direction of unſkilful managers, who have thought it neceſſary, whenever the weather was cold, to make fires therein. But however injurious flues have been under ſuch management, yet, when ſkilfully managed, they are of very great ſervice: for though perhaps it may happen that there will be no neceſſity to make any fires in them for two or three years together, as, when the winters prove mild, there will not; yet, in very hard winters, they will be extremely uſeful to keep out the froſt, which cannot be effected any other way, but with great trouble and difficulty.

Withinſide of the windows, in front of the green-houſe, you ſhould have good ſtrong ſhutters, which ſhould be made with hinges, to fold back, that they may fall back quite cloſe to the piers, that the rays of the ſun may not be obſtructed thereby. Theſe ſhutters need not to be above an inch and a half thick, or little more; which, if made to join cloſe, will be ſufficient to keep out our common froſt: and when the weather is ſo cold as to endanger the freezing in the houſe, it is but making a fire in your flue, which will effectually prevent it: and without this conveniency it will be very troubleſome, as I have often ſeen, where perſons have been obliged to nail mats before their windows, or to ſtuff the hollow ſpace between the ſhutters and the glaſs with ſtraw, which, when done, is commonly ſuffered to remain till the froſt goes away; which, if it ſhould continue very long, the keeping the green-houſe cloſely ſhut up, will prove very injurious to the plants: and as it frequently happens, that we have an hour or two of ſun-ſhine in the middle of the day, in continued froſts, which is of great ſervice to plants, when they can enjoy the rays thereof through the glaſſes; ſo when there is nothing more to do than to open the ſhutters, which may be performed in a very ſhort time, and as ſoon ſhut again when the ſun is clouded, the plants may have the benefit thereof whenever it appears; whereas, where there is ſo much trouble to uncover, and as much to cover again, it would take up the whole time in uncovering and ſhutting them up, and thereby the advantage of the ſun's influence be loſt. Beſides, where there is ſo much trouble required to keep out the froſt, it will be a great chance if it be not neglected by the gardener: for if he be not as fond of preſerving his plants, and as much in love with them as his maſter, this labour will be thought too great by him; and if he takes the pains to cover the glaſſes up with mats, &c. he will not care to take them away again, until the weather alters; ſo that the plants will be ſhut up cloſe during the whole continuance of the froſt.

There are ſome people who commonly make uſe of pots filled with charcoal to ſet in their green-houſe in very ſevere froſts; but this is very dangerous to the perſons who attend theſe fires; and I have often known they have been almoſt ſuffocated therewith; and at the ſame time they are very injurious to the plants: nor is the trouble of tending upon theſe ſmall; and the many hazards, to which the uſe of theſe fires is liable, have juſtly brought them into diſuſe with all ſkilful perſons; and as the contrivance of flues, and of the fires, are but ſmall charges, they are much to be preferred to any other method for warming the air of the houſe.

The back part of the houſe ſhould be either laid over with ſtucco, or plaſtered with mortar, and white waſhed; for otherwiſe the air in ſevere froſt will penetrate through the walls, eſpecially when the froſt is attended with a ſtrong wind; which is often the caſe in the moſt ſevere winters. There are ſome perſons who are at the expence of wainſcoting their green-houſes; but, when this is done, it is proper to plaſter with lime and hair behind the wainſcot, to keep out the cold; and, when they are lined with wainſcot, they ſhould be painted white, as ſhould the ceiling, and every part within-ſide of the houſe: for this reflects the rays of light in much greater quantity than any other colour, and is of ſignal ſervice to plants, eſpecially in the winter, when the houſe is pretty much cloſed, and but a ſmall ſhare of light is admitted through the windows: for, at ſuch times, I have obſerved, that in ſome green-houſes which have been painted black, or of a dark colour, the plants have caſt moſt of their leaves.

Where green-houſes are built in ſuch places as will not admit of rooms over them, or the perſon is unwilling to be at the expence of ſuch building, there muſt be care taken to keep out the froſt from entering through the roof. To prevent which, it will be very proper to have a thickneſs of reeds, heath, or furze, laid between the ceiling and the tiles: in the doing of which, there muſt be care taken in framing the joiſts, ſo as to ſupport theſe, that their weight may not lie upon the ceiling, which might endanger it: for theſe ſhould be laid a foot thick at leaſt, and as ſmooth as poſſible, and faſtened down well with laths, to prevent their riſing; and then cover it over with a coat of lime and hair, which will keep out the air, and alſo prevent mice and other vermin, from harbouring in them; which, if left uncovered, they would certainly do. For want of this precaution, there are many green-houſes built, which will not keep out the froſt in hard winters; and this is many times attributed to the glaſſes in front admitting the cold, when the fault is in the roof: for where there is only the covering, either of tiles or ſlates, and the ceiling, every ſevere froſt will penetrate through them.

In this green-houſe you ſhould have treſſels, which may be moved out and into the houſe; upon which you ſhould fix rows of planks, ſo as to place the pots or tubs of plants in regular rows one above another, whereby the heads of the plants will be ſo ſituated as not to interfere with each other. The loweſt row of plants, which ſhould be the forwardeſt towards the windows, ſhould be placed about four feet therefrom, that there may be a convenient breadth left next the glaſſes to walk in front: and the rows of plants ſhould riſe gradually from the firſt, in ſuch a manner, that the heads of the ſecond rows ſhould be entirely advanced above the firſt, the ſtems only being hid thereby; and, at the backſide of the houſe, there ſhould be allowed a ſpace of at leaſt five feet, for the conveniency of watering the plants; as alſo to admit of a current of air round them, that the damps, occaſioned by the perſpiration of the plants, may be the better diſſipated, which, by being pent in too cloſely, often occaſions a mouldineſs upon the tender ſhoots and leaves; and when the houſe is cloſe ſhut up, this ſtagnating rancid vapour is often very deſtructive to the plants: for which reaſon alſo you ſhould never croud them too cloſe to each other, nor ſhould you ever place ſedums, euphorbiums, torch thiſtles, and other tender ſucculent plants, amongſt oranges, myrtles, and other ever-green-trees; for, by an experiment which I made anno 1729, I found that a ſedum, placed in a green-houſe among ſuch trees, almoſt daily increaſed its weight, although there was no water given to it the whole time; which increaſe of weight was owing to the moiſture imbibed from the air, which, being replete with the rancid vapours perſpired from the other plants, occaſioned the leaves to grow pale, and in a ſhort time they decayed, and dropped off; which I have often obſerved has been the caſe with many other ſucculent plants, when placed in thoſe houſes which were filled with many ſorts of ever-green-trees, that required to be frequently watered.

Therefore, to avoid the inconvenience which attends the placing of plants of very different natures in the ſame houſe, it will be very proper to have two wings added to the main green-houſe; which will greatly add to the beauty of the building, and alſo collect a greater ſhare of heat. The green-houſe ſhould be placed exactly fronting the ſouth; and one of the wings faces the ſouth-eaſt, and the other the ſouth-weſt; ſo that, from the time of the ſun's firſt appearance upon any part of the building, until it goes off at night, it is conſtantly reflected from one part to the other; and the cold winds are alſo kept off from the front of the main green-houſe hereby: and, in the area of this place, you may contrive to place many of the moſt tender exotic plants, which will bear to be expoſed in the ſummer ſeaſon: and in the ſpring, before the weather will permit you to ſet out the plants, the beds and borders of this area may be full of anemonies, ranunculus's, early tulips, &c. which will be paſt flowering, and the roots fit to take out of the ground, by the time you carry out the plants; which will render this place very agreeable during the ſpring ſeaſon that the flowers are blown; and here you may walk and divert yourſelf in a fine day, when, perhaps, the air in moſt other parts of the garden will be too cold for perſons not much uſed thereto, to take pleaſure in being out of the houſe.

In the center of this area may be contrived a ſmall baſon for water, which will be very convenient for watering of plants, and add much to the beauty of the place: beſides, the water, being thus ſituated, will be ſoftened by the heat, which will be reflected from the glaſſes upon it; whereby it will be rendered much better than raw, cold water, for theſe tender plants.

The two wings of the building ſhould be contrived ſo as to maintain plants of different degrees of hardneſs; which muſt be effected by the ſituation and the extent of the fire-place, and the manner of conducting the flues.

But I would here obſerve, that the wing facing the ſouth-eaſt ſhould always be preferred for the warmeſt ſtove; its ſituation being ſuch, as that the ſun, upon its firſt appearance in the morning, ſhines directly upon the glaſſes; which is of great ſervice in warming the air of the houſe, and adding life to the plants, after having been ſhut up during the long nights in the winter ſeaſon. Theſe wings, being ſixty feet in length, may be divided in the middle by partitions of glaſs, with glaſs doors to paſs from one to the other. To each of theſe there ſhould be a fire-place, with flues carried up againſt the back wall, through which the ſmoke ſhould be made to paſs, as many times the length of the houſe, as the height will admit of the number of flues; for the longer the ſmoke is in paſſing, the more heat will be given to the houſe, with a leſs quantity of fuel; which is an article worth conſideration, eſpecially where fuel is dear. By this contrivance, you may keep ſuch plants as require the ſame degree of heat in one part of the houſe, and theſe will thrive in a much leſs warmth in the other part.

The other wing of the houſe, facing the ſouth-weſt, may alſo be divided in the ſame manner, and flues carried through both parts, which may be uſed according to the ſeaſons, or the particular ſorts of plants which are placed therein; ſo that here will be four diviſions in the wings, each of which may be kept up to a different degree of warmth: which, together with the green-houſe, will be ſufficient to maintain plants from all the ſeveral countries of the world; and, without having theſe ſeveral degrees of warmth, it will be impoſſible to preſerve the various kinds of plants from the ſeveral parts of Africa and America, which are annually introduced into the Engliſh gardens; for when plants from very different countries are placed in the ſame houſe, ſome are deſtroyed for want of heat, while others are forced and ſpoiled by too much of it; and this is often the caſe in many places, where there are large collections of plants.

In the building theſe wings, if there are not ſheds running behind them their whole length, the walls ſhould not be leſs than two bricks thick; and if they are more, it will be better; becauſe, where the walls are thin, and expoſed to the open air, the cold will penetrate them; and when the fires are made, the heat will come out through the walls; ſo that it will require a larger quantity of fuel to maintain a proper temperature of warmth in the houſe. The back part of theſe houſes, having ſloping roofs, which are covered either with tiles or ſlates, ſhould alſo be lined with reeds, &c. under the covering, as is before directed for the green-houſe; which will keep out the cold air, and ſave a great expence of fuel; for the cloſer and better theſe houſes are built, and the glaſſes of the ſlope, as alſo in front, well guarded by ſhutters or reeds in a hard froſt, the leſs fuel will be required to warm the houſes; ſo that the firſt expence of building theſe houſes properly will be the cheapeſt, when the after expence of fires is taken into conſideration.

The ſloping glaſſes of theſe houſes ſhould be made to ſlide, and take off; ſo that they may be drawn down more or leſs, in warm weather, to admit air to the plants; and the upright glaſſes in front may be ſo contrived, as that every other may open as doors upon hinges; and the alternate glaſſes may be divided into two: the upper part of each ſhould be contrived ſo as to be drawn down like ſaſhes; ſo that either of theſe may be uſed to admit air, in a greater or leſs quantity, according as there may be occaſion.

But, beſides the conſervatories here mentioned, it will be proper to have a deep hot-bed frame, ſuch as is commonly uſed to raiſe large annuals in the ſpring: into which may be ſet pots of ſuch plants as come from Carolina, Virginia, &c. while the plants are too ſmall to plant in the open air; as alſo may other ſorts from Spain, &c. which require only to be ſcreened from the violence of the froſts, and ſhould have as much free air as poſſible in mild weather: which can be no better effected than in one of theſe frames, where the glaſſes may be taken off every day when the weather will permit, and put on every night; and in hard froſts, the glaſs may be covered with mats, ſtraw, peaſe-haulm, or the like, ſo as to prevent the froſt from entering the pots to freeze the roots of the plants, which is what will, many times, utterly deſtroy them; though a ſlight froſt pinching the leaves or ſhoots very ſeldom does them much harm: if theſe are ſunk a foot or more below the ſurface of the ground, they will be the better, provided the ground is dry; otherwiſe they muſt be wholly above ground: the ſides of this frame ſhould be built with brick, with a curb of wood laid round on the top of the wall, into which the gutters, on which the glaſſes ſlide, may be laid: the back wall of this frame may be four feet high, and the front one foot and an half; the width about ſix feet, and the length in proportion to the number of plants. *Miller's Gard. Dict.*

GREEN-SCOURING, a diſeaſe to which ſheep and bullocks are often ſubject.

The beſt remedy for this diſorder is verjuice; a wine glaſs full is enough for a ſheep, and a pint for a bullock. *Liſle's Huſbandry, vol.* II. *page* 211.

GRIP, or *Gripe*, a ſmall ditch cut acroſs a meadow or ploughed-field, in order to drain it. It is otherwiſe called a water-furrow.

GRIPES, a very acute diſeaſe to which horſes are very often ſubject.

There ſeems to be no diſtemper ſo little underſtood by the common farrier, as the gripes or cholic in horſes, one general remedy, or method, ſerving them in all caſes; but as this diſorder may be produced by very different cauſes, the method of cure muſt alſo vary, otherwiſe the intended remedy, injudiciouſly applied, will not only aggravate the complaint, but make it fatal. We ſhall divide this diſorder into three different ſpecies: the flatulent or windy, the bilious or inflammatory, and the dry gripes; each of which we ſhall diſtinguiſh by their different ſymptoms, and then point out the proper remedies.

The flatulent, or windy cholic is thus known. The horſe is often lying down, and as ſuddenly riſing again with a ſpring; he ſtrikes his belly with his hinder-feet, ſtamps with his fore-feet, and refuſes his meat; when the gripes are violent, he will have convulſive twitches, his eyes be turned up, and his limbs ſtretched out as if dying, his ears and feet being alternately very hot and cold; he falls into profuſe ſweats, and then into cold damps; ſtrives often to ſtale, and turns his head frequently to his flanks; he then falls down, rolls about, and often turns on his back; this laſt ſymptom proceeds from a ſtoppage of urine, that almoſt always attends this ſort of cholic, which may be increaſed by a load of dung preſſing on the neck of the bladder.

Theſe are the general ſymptoms of cholic and gripes from wind, drinking cold water when hot, and when the perſpirable matter is retained, or thrown on the bowels by catching cold; in all which caſes they are violently diſtended. Cribbing horſes are more particularly ſubject to this complaint, by reaſon they are conſtantly ſucking in great quantities of air.

The firſt intention is to empty the ſtrait gut with a ſmall hand dipt in oil, which frequently makes way for the confined wind to diſcharge itſelf; and by eaſing the neck of the bladder, the ſuppreſſion of urine is taken off, and the horſe ſtales and gets eaſe.

Farriers generally ſtrike a fleam into the bars of a horſe's mouth, which ſeems to be of little or no uſe; for where a quantity of blood is intended to be taken away, the veſſels of this part are neither large or numerous enough to furniſh it; ſo that it is more eligible to take it from the neck-vein, and is always proper in full, ſanguine, plethoric, young horſes.

The following ball and clyſter ſeldom fail of giving relief in theſe caſes:

> Take Straſburgh or Venice turpentine, and juniper-berries pounded, of each half an ounce; ſalt-prunella, or ſalt-petre, an ounce; oil of juniper, one dram; ſalt of tartar, two drams: make into a ball, with any ſyrup; it may be given whole, and waſhed down with a decoction of juniper-berries, or a horn or two of ale.

If the horſe does not break wind, or ſtale plentifully, he will find no relief; therefore in an hour or two give him another ball, and add to it a dram of ſalt of amber; which may be repeated a third time, if found neceſſary. During the fit the horſe may be walked and trotted gently, but ſhould by no means be harraſſed beyond his ability, or dragged about till he is jaded.

The following clyſter may be given, between the balls, or alone, and repeated occaſionally:

> Take chamomile flowers two handfuls; aniſe, coriander, and fennel ſeeds, of each an ounce; long pepper half an ounce: boil in three quarts of water to two; and add Daffy's elixir, or gin, half a pint; oil of amber half an ounce, and oil of chamomile eight ounces.

The ſubſequent balls and drink are alſo very proper for this purpoſe, and to remove gripes occaſioned by drinking cold water when hot, or catching cold after violent exerciſe:

> Take powder of aniſe, cumin, and fennel ſeeds, of each half an ounce; camphor two drams; pellitory of Spain, one dram; oil of juniper fifty drops, make into a ball with any ſyrup, and waſh it down with a horn or two of ale.

Or,

> Take mithridate, or Venice treacle, two ounces; Matthew's pill two drams; camphor one dram, diſſolved in a little ſpirit of wine; powder of freſh anniſeed one ounce; or the ſame quantity of the cordial ball; diſſolve in a pint and half of ale.

Or,

> Take philonium one ounce, or an ounce and an half; tincture of ſenna, or Daffy's elixir, and ſallad oil, of each half a pint: give warm for a drink, and repeat it if neceſſary.

Either of theſe medicines are well calculated for this purpoſe; but as the ingredients may not always be ready at hand, or procureable, we ſhall put down a couple of drinks that have frequently, on trial, been found ſucceſsful, and are eaſily prepared. It is to be obſerved, that the horſe ſhould be well rubbed, clothed, and littered with clean ſtraw up to his belly.

> Take of Caſtile ſoap, or hard ſoap; nitre, or ſalt-petre, of each one ounce; juniper-berries and ginger, each half an ounce: Venice turpentine, or roſin, diſſolved with the yolk of an egg, ſix drams: mix with a pint and a half of warm ale, or a decoction of juniper-berries, with a large onion boiled with them. This may be repeated twice or thrice.

Or,

> Take a pint of brandy, rum, or geneva, with as much ſweet oil, and give for a drink. Should this not ſucceed, boil an ounce of pepper or ginger, in a quart of milk; and add to it a handful of ſalt, and half a point of oil: this given warm, will (according to Burdon) purge in two or three hours.

The ſigns of a horſe's recovery, are his lying quiet, without ſtarting, or tumbling, and his gathering up his legs, and ceaſing to laſh out; and if he continues an hour in this quiet poſture, you may conclude all danger over.

The next ſpecies of cholic we ſhall deſcribe, is the bilious or inflammatory, which, beſides moſt of the preceding ſymptoms, is attended with a fever, great heat, panting, and dryneſs of the mouth; the horſe alſo generally throws out a little looſe dung, with a hot ſcalding water, which when it appears blackiſh, or of a reddiſh colour, and fetid ſmell, denotes an approaching mortification.

In this caſe the horſe ſhould immediately be bled to the quantity of three quarts; and it ſhould be repeated, if the ſymptoms do not abate in a few hours. The emollient clyſter, with two ounces of nitre diſſolved in it, ſhould be thrown up twice a day, to cool the inflamed bowels; plenty of gum arabic water ſhould be taken; and a pint of the following drink given every two or three hours, till ſeveral looſe ſtools are procured; and then it ſhould be given only night and morning, till the diſorder is removed.

> Take ſenna three ounces, ſalt of tartar half an ounce; infuſe in a quart of boiling water an hour or two; then ſtrain off, and add two ounces of lenitive electuary, and four of glauber ſalts.

If this diſorder is not removed by theſe means, but the inflammation and fever increaſe, attended with a diſcharge of the fleſh-coloured water above deſcribed, the event will moſt probably be fatal; and the chief thing to be depended on now, muſt be a ſtrong decoction of Jeſuits bark, given to the quantity of a pint every three hours, with a gill of red port wine.

A quart of the ſame may be uſed for a clyſter, with two ounces of Venice turpentine, diſſolved with the yolks of two eggs, an ounce of diaſcordium, and a pint of red wine, and given twice a day: if the horſe recovers, give two or three mild rhubarb purges.

To a horſe of little value, give the following, which, in theſe caſes, has been found ſucceſsful.

> Take diapente one ounce, diaſcordium half an ounce, myrrh, in powder, two drams; make it into a ball with two drams of oil of amber, to be given twice or thrice a day.

The laſt we ſhall deſcribe is the dry gripes, or the cholic, which ariſes often from coſtiveneſs: it is diſcovered by the horſe's frequent and fruitleſs motion to dung, the blackneſs and hardneſs of the dung, the frequent and quick motion of his tail, the high colour of his urine, and his great reſtleſſneſs and uneaſineſs.

In this caſe the ſtrait gut ſhould be examined and emptied, with a ſmall hand, oiled properly for that purpoſe; the emollient oily clyſter, given under the article *clyſter*, ſhould be thrown up twice a day; and the above purging drink given, till the bowels are unloaded, and the ſymptoms removed.

The diet for a horſe in the gripes ſhould be ſcalded bran, warm water gruel, or white water, made by diſſolving four ounces of gum arabic in a quart of water, and mixing it with this other water.

From this hiſtory and diviſion of gripes and cholics, with their different treatment, it appears how abſolutely neceſſary it is they ſhould be well underſtood, in order to be managed ſkilfully: it is plain, too, that violent hot medicines ſhould, in every ſpecies of this diſorder, be guarded againſt, and given with great caution and diſcretion, even in the firſt kind of flatulent cholic, where indeed they can only be wanted; yet too often, when prepared by the farriers, with oil of turpentine, geneva, pepper, and brine, &c. they even increaſe that diſorder, by ſtimulating the neck of the bladder too forcibly, heating the blood, and inflaming the bowels, till a mortification is brought on them. Theſe are in general the conſtant appearance of horſes that die of this diſorder, whoſe bowels, being examined for that purpoſe, have been found inflamed, full of red and livid ſpots, ſometimes quite black, criſped with extream heat, and rotten.

GRIPS, the ſwaiths, or ſmall heaps of corn, lying in the field, as it is cut down with the ſcythe or ſickle.

GROATS, oats, after the ſhells are taken off.

GROVE, a ſmall wood impervious to the rays of the ſun.

Groves are the greateſt ornaments of a garden; nor can a garden be complete that has not one or more of theſe. In ſmall gardens there is ſcarce room to admit of groves of any extent; yet in theſe there ſhould be at leaſt one contrived, which ſhould be as large as the ground will allow of; and where theſe are ſmall, there is more ſkill required in the diſpoſition, to give them the appearance of being larger than they really are.

Groves are of two ſorts, viz. open and cloſe; open groves are ſuch as have large ſhady trees, which ſtand at ſuch diſtances, as that their branches may approach ſo near to each other, as to prevent the rays of the ſun from penetrating through them: but as ſuch trees are a long time in growing to a proper ſize for affording a ſhade, ſo where new groves are planted, the trees muſt be placed cloſer together, in order to have ſhade as ſoon as poſſible; but in planting of theſe groves, it is much the beſt way to diſpoſe all theſe trees irregularly, which will give them a greater magnificence, and alſo form a ſhade ſooner than when the trees are planted in lines; for when the ſun ſhines between the rows of trees, as it muſt do ſome part of the day in ſummer, the walks between them will be expoſed to the heat, at ſuch times, until the branches of theſe trees meet; whereas, in the irregular plantations, the trees intervene, and obſtruct the direct rays of the ſun.

When a perſon, who is to lay out a garden, is ſo happy as to meet with large full grown trees upon the ſpot, they ſhould remain inviolate, if poſſible; for it will be better to put up with many inconveniencies, than to deſtroy theſe, which will require an age to retrieve; ſo that nothing but that of offending the habitation, by being ſo near as to occaſion great damps, ſhould tempt the cutting them down.

Moſt of the groves which have been planted in England, or thoſe celebrated gardens in France, are only a few regular lines of trees; many of which join to the habitation, or lead to ſome building, or other object: but theſe do not appear ſo grand, as thoſe which have been made in woods, where the trees have grown accidentally, and at irregular diſtances, where the trees have large ſpreading heads, and are left at ſuch diſtance as to permit the graſs to grow under them, then they afford the greateſt pleaſure; for nothing is more noble than fine ſpreading trees with large ſtems, growing through graſs, eſpecially if the graſs is well kept, and has a good verdure; beſide, moſt of theſe planted groves have generally a gravel walk, made in a ſtrait line between them; which greatly offends the ſight of perſons who have a true taſte: therefore, whenever a gravel walk is abſolutely neceſſary to be carried through theſe groves, it will be much better to twiſt it about, according as the trees naturally ſtand, than to attempt regularity: but dry walks under large trees are not ſo uſeful as in open places; becauſe the dropping of the trees will render theſe walks uſeleſs, after rain, for a conſiderable time.

Cloſe groves have frequently large trees ſtanding in them; but the ground is filled under theſe with ſhrubs, or under-wood; ſo that the walks which are made in them are private, and ſcreened from the winds, whereby they are made agreeable for walking, at ſuch times when the air is too violent or cold for walking in the more expoſed part of the garden.

Theſe are often contrived ſo as to bound the open groves, and frequently to hide the walls, or other incloſures of the garden: and when they are properly laid out, with dry walks winding through them, and on the ſides of theſe ſweet ſmelling ſhrubs and flowers irregularly planted, they have a charming effect; for here a perſon may walk in private, ſheltered from the inclemency of cold or violent winds, and enjoy the greateſt ſweets of the vegetable kingdom: therefore, where it can be admitted, if they are continued round the whole encloſure of the garden, there will be a much greater extent of walk: and theſe ſhrubs will appear the beſt boundary where there are not fine proſpects to be gained.

Theſe cloſe groves are by the French termed boſquets, from the Italian word boſquetto, which ſignifies a little wood; and in moſt of the French gardens there are many of them planted; but theſe are reduced to regular figures, as ovals, triangles, ſquares, and ſtars: but theſe have neither the beauty or uſe which thoſe have that are made irregularly, and whoſe walks are not ſhut on each ſide by hedges, which prevents the eye from ſeeing the quarters; and theſe want the fragrancy of the ſhrubs and flowers, which are the great delight of theſe private walks; add to this the keeping of the hedges in good order, is attended with a great expence; which is a capital thing to be conſidered in the making of gardens. *Miller's Gard. Dict.*

GROUND, a general name for land, be the ſoil what it will.

The Romans were very attentive to examine the nature of the ground before they broke it up, and diſtinguiſhed it into three ſituations, champaign, hilly, and mountainous. They rightly approved moſt of a champaign country, declining gradually from the foot of a hill toward the ſouth, or ſouth-eaſt; if a hill riſing gently; and if a mountain neither lofty, nor rugged, but covered with plenty of wood and graſs. Either of theſe ſituations is eligible, according to the purpoſe for which the ground is intended; ſome plants affecting hotter, others colder expoſures; ſome delighting to dwell on hills, others in vallies; and ſome again being indifferent to either: but, generally ſpeaking, moſt vegetables chooſe the warm and kindly ſoil of low grounds, fertiliſed by what the rains bring down to them from the hills and more elevated parts.

The ſpontaneous produce of the earth is an infallible indication of the nature and quality of the ground. Wild thyme ſhews it to be good for feeding cattle; betony and ſtrawberries direct to wood; camomile points out a mellow ſoil fit for wheat; burnet indicates land fit for paſture; and mallows denote it proper for the uſes of the kitchen-garden, as has been obſerved by lord Bacon, Mr. Evelyn, and others.

On the contrary, ſays the laſt mentioned of theſe writers, ſome ground is ſo cold, as naturally to bring forth nothing but gorſe, broom, holly, yew, juniper, ivy, box, &c. which may perhaps direct us to the planting of pines, firs, and other perennial verdures in ſuch places.

Moſs, ruſhes, wild tanſy, ſedge, flags, fern, yarrow, and withered, blaſted, ſhrubby, and curled plants, are natural indications of a very bad ſoil.

The nature of the ground may alſo be pretty well gueſſed at, by the quality of the water which runs, or is ſtrained through it.

By the ſmell, which, upon the falling of the firſt rains after a long drought, is very pleaſing, and even fragrant, from good and natural mould; but diſagreeable and noxious, if the ground contain any mineral, or other ill quality, as is remarkable in marſhes and fenny places.

By the taſte, all earths, as well as plants, abounding more or leſs in their peculiar ſalts; ſome ſweet and grateful; others bitter, hot, or aſtringent; and others flat and inſipid; eaſily diſcovered by the method which Columella directs, of digging up ſome of the under mould, out of that part of the land which is deemed the worſt, and mixing it thoroughly in an earthen veſſel, with ſweet water, which, when poured off after the groſſer parts have ſubſided, will retain the taſte of the earth ſoaked in it.

The touch will immediately ſhew whether it be ſoft, pliant, fat, and ſlippery; whether it ſticks to the fingers, or melts and diſſolves on the tongue; in which caſe the ſoil may be deemed rich. If it be gritty, light, and porous, it is bad.

Mould fit for the production of plants is of an uniform ſubſtance, unmixed with the contrarieties of ſoft and hard, churliſh and mild, moiſt and dry: neither is it too unctuous or too lean; but light, and crumbles eaſily; yet is conſiſtent enough to be wrought and kneeded. It is of ſuch due tenacity as to retain a juſt degree of moiſture, and neither ſoils the fingers, nor cleaves much to the ſpade, which eaſily enters it. Of this kind is the ſoil uſually found under the turf of paſture-grounds, upon which cattle have been long fed and foddered. In ſhort, that is the beſt mould which is blackeſt, cuts like butter, ſticks not obſtinately, breaks into ſmall bits, ſmells ſweet, is tempered without cruſting or chopping in dry weather, or becoming poachy in wet, which ſhines after the plough, where flocks of crows follow the ploughman, and, as Pliny expreſſes it, peck at his very heels.

As to colour, next to the blackiſh, the pre-eminence is generally given to the darker gray, and after that to the ruſſet: the clear tawny is reputed worſe; the light and dark aſh-colour (light of weight and reſembling aſhes) good for very little: and the yellowiſh red, the worſt of all.

The common opinion, that all hot grounds are red or brown; cold and dry, blackiſh; cold and moiſt, whitiſh; hot and moiſt, ruddy; is, notwithſtanding the ſpecious arguments alledged in favour of it, from the exhalation of minerals, the heat of the ſun, and other accidents, exploded by Columella, who propoſes, as a much ſurer way to judge of the goodneſs of land, digging a trench, and afterwards throwing back the ſame earth that was dug out, treading it down well when it is returned. If, ſays he, through a kind of ferment as it were, there be more than enough to fill the trench, it is a certain ſign that the ſoil is fat: if there be not enough, we may be ſure that it is poor and lean; and if the quantity be juſt ſufficient to fill the hole from whence it was taken, it is of a middling quality.

Mr. Evelyn, after examining the component parts of ſeveral ſorts of ſoils, concludes, that the very fineſt earths and beſt moulds, however to appearance mixed with divers imperfect bodies, may, for aught we know, conſiſt more of ſandy particles, than of any other whatever. Hence he infers, that earth, ſtript of all heterogeneous particles, retains only weight, and an inſipid ſiccity; and doubts whether it afford any thing more than embracement to the firſt rudiment of plants, protection to the roots, and ſtability to the ſtem; being “unprolific till married to ſomething of a more maſculine virtue, which irradiates her womb: but, otherwiſe, nouriſhing only from what is added, without any action or material contribution: for, ſays he, what gives the divers tempers to moulds, ſeems rather to be cauſed by the perpetual and ſucceſſive rotting of vegetable and animal ſubſtances, than by any peculiar and ſeparate principle; the clammineſs of the earth ſeeming rather ſomething extrinſical and accidental to it, than natural and originally conſtitutive. We know indeed, that the earth is, without any artificial auxiliaries, indued with a wonderful prolific virtue: but as this is liable to be loſt, or to decay, and never can be expected from ſome grounds, without helps; it may be worth our while to conſider, by what expedients the deſired effect of perpetuating its vigour may beſt be accompliſhed.”

The means of giving and perpetuating this vigour now becomes properly the ſubject of our farther enquiry, conſiſtent with what was obſerved before, that in order to the earth's having this vigour, it ſhould be conſtantly kept in an alkaline or calcarious ſtate. Mr. Evelyn is clearly of this opinion, when he ſays, “I firmly believe that were ſalt-petre to be obtained in plenty, we ſhould need but little other compoſt to meliorate our ground.” In other words, could the earth be always kept in a ſtate fit for collecting nitre, it would conſequently be always in a ſtate fit for the production of plants. They who are acquainted with chemical reſearches, know, that nitre is obtained from ſubſtances of a mixed nature. Its baſis is a calcarious earth, to which muſt be added putrid or alkaline ſubſtances, eſpecially of the vegetable kind.

Mr. Evelyn and ſome later writers have ſpoken ſo much of the effects of nitre, and nitrous earths, in vegetation, that many have imagined nitre to be eſſentially neceſſary in the growth of plants: though Dr. Woodward aſſures us, that, by all the trials he has been able to make, the very contrary ſeems to be the caſe; for that nitre, when contiguous to a plant, rather deſtroys than nouriſhes it. When, therefore, they mention nitre, and nitrous earths, it is more than probable that they mean earth in a ſtate fit for collecting nitre: but when the alkaline ſubſtances are once ſaturated by the acid in the air, or when the alkali is brought to a neutral ſalt, as nitre is, its fertile ſtate then ceaſes, and it becomes a hard compact body, much more impervious to the roots of plants than it was before.

The nature of calcarious ſubſtances, and that of the two kinds of alkalis, viz. the fixed alkaline ſalt of plants, and the volatile alkali ariſing from animal and putrid vegetable ſubſtances, has already been explained.

Farmers commonly ſay, that lime (to which might be added all other calcarious ſubſtances) does not fatten, but only mellows the earth; meaning, according to Dr. Woodward, that it does not contain in itſelf any thing of the ſame nature with the vegetable mould, or, in other words, afford any matter fit for the formation of plants; but that it only ſoftens and relaxes the earth; by that means rendering it more capable of entering into, and of nouriſhing the ſeeds and vegetables ſet in it, than it would otherwiſe be. It is well known how apt lime is to be put into a ferment and commotion by water. Now this commotion can never happen when the lime is mixed with earth (and it retains its qualities of lime) however hard and clodded the ground may be, without opening and looſening it. What Dr. Woodward ſays of ſalt in general, may more properly be applied to the fixed alkaline ſalt of plants. Every one, ſays he, muſt have obſerved, how apt all ſorts of ſalts are to be wrought upon by moiſture, and how eaſily they melt and run with it. When this happens to thoſe that are in the earth, the clods which they are mixed with, moulder and fall aſunder. The ſame gentleman farther obſerves, that if we would render the earth truly fruitful, it muſt be by the addition of ſuch ſubſtances as former crops have robbed it of, or ſuch as contains in itſelf vegetable matter.

The ſeveral manures which are found beſt to promote this end, are chiefly, either parts of vegetables, or of animals; of animals, ſays the doctor, which either derive their own nouriſhment immediately from vegetables, or from other animals that do ſo, and which, being returned to the earth, ſerve for the formation of other ſimilar bodies. Theſe vegetable and animal ſubſtances, are the matter from whence Mr. Evelyn thinks the earth derives that clammineſs which he takes to be a ſure indication of a rich ſoil.

If the effects of the putrefaction of vegetable or animal ſubſtances, when mixed with, and ſeparated in the earth, be duly attended to, we ſhall find this a very probable opinion. Vegetables, or animals, if expoſed to the air, ſoon putrify and fly off into the air: but when they are divided into ſmall portions, and mixed with the earth, the earth renders the progreſs of their putrefaction ſlower, and intangles the volatile alkaline particles, which would otherwiſe fly off into the air. Theſe are not only ſtrongly attractive of moiſture, but, like the fixed alkali, attract the acid in the air, and effervefce with it; whence the double advantage of a moiſt and looſe ſoil.

If we attend to the infinite number of animals and vegetables which are rendered volatile by putrefaction, and fly off into the air; and to the quantity of perſpirable matter from animals and vegetables ſent into the air; and alſo to the effects of the acid found every where in the air on ſuch ſubſtances mixed with the earth; we need no longer wonder at the efficacy which writers, in all ages, have aſcribed to the air, with regard to its quality of enriching the earth.

That the peculiar richneſs of ſoils is owing to the putrid or rotten particles mixed with them, is an opinion of long ſtanding. This is Virgil's *putre ſolem*, rotten, crumbling, or looſe earth; and that which Columella diſtinguiſhes by the appellation of *pinguis et putris*, fat and rotten, or fat, looſe, and crumbling, as the ſoil which yields the greateſt profit with the leaſt labour and expence, becauſe it is naturally neareſt that ſtate which cultivation is intended to effect; "for, to cultivate, is no other thing but to open, looſen, and ferment the earth."

From theſe principles it is that we account for the appearances before-mentioned of good ſoils, ſuch as, their blackiſh or dark colour (which is that of all ſoils in a putrid ſtate) their ready crumbling, eaſy mouldering, fragrance of ſmell, &c.

Mr. Evelyn conſtantly imputes the fruitfulneſs of the earth to a nitrous ſalt: but if theſe rich putrid ſubſtances are ſubſtituted inſtead of that ſalt (and it ſeems highly probable that he means them) we ſhall find that his reaſoning will appear full as ſtrong, more intelligible, and indeed more rational. The ſubſtance of p. 312, and 313, of his Philoſophical Diſcourſe of earth, ſo far as relates to this matter, will run thus:

"It is this putrid quality which entices roots to affect the ſurface of the earth, upon which the fertiliſing rains and dews deſcend; which makes all covered and long ſhaded earth, abound in fertility; which reſuſcitates the dead and mortified earth, when languiſhing and ſpent by our indulgence to her verdant offspring; her vigour being quite exhauſted, till the rains and ſhowers gently melt into her boſom what we adminiſter to ſupply that which has been conſumed. It is this which fertiliſes and renders Egypt ſo luxuriantly fruitful after the inundations of the Nile, &c."

GROUND-IVY, the name of a trailing plant, which ſtrikes out roots from the joints of its ſtalks: but as it generally grows under hedges, and upon the ſides of banks, it cannot be of any great diſadvantage to the ſoil.

GRUB, the name of a large maggot, produced from the eggs of a certain ſpecies of butter-fly. It is of a large ſize, and often does great injury to the corn by undermining it, and preying on its roots. It produces the beetle, and is by ſome called the rook-worm, becauſe rooks are particularly fond of it. The beſt way of deſtroying the grub, is good and frequent ploughings, which will clear the ground however infeſted with this inſect, for ſome years at leaſt.

GRUBBING, the clearing of lands from the roots and ſtumps of trees, buſhes, &c.

Mr. Worlidge rightly obſerves, that the beſt and cheapeſt method of grubbing up thorny ſhrubs, broom, graſs, &c. is ingeniouſly delivered by Gabriel Platt. The inſtrument he has recommended for this purpoſe reſembles a three-grained dung-fork, but much larger and ſtronger, according to the bigneſs of the ſhrubs, &c. the ſtale thereof reſembling a large and ſtrong lever. This inſtrument being placed about half a foot, or any other reaſonable diſtance from the root of the ſhrub, &c. and driven to a good depth, with a ſtrong hedging beetle, then raiſed by laying under it a ſtone or log of wood, is pulled down by means of a rope faſtened to the upper end of the ſtale, and the whole buſh wrenched up by the roots.

GUTTERING-*Plough*, a ſmall and ſimple inſtrument uſed in ſome counties for draining wet lands.

It is ſmall, and worked by a ſingle man. A trench four or five inches broad, and ſix or eight deep, may be eaſily made with it; and on that account it is much uſed for making drains in bleaching grounds, and may do very well for wet clay meadow-land, where the ſoil is ſhallow, and apt to produce a large quantity of ruſhes.

It conſiſts of a piece of iron about five inches broad, and pointed at the end. Upon this piece two other pieces are fixed perpendicular to the former, one on each ſide, the fore-edges inclining backward; ſo that the three edges of the inſtrument form a capital A. To the bottom plate is fixed a ſocket, for receiving the ſtale, which is ſet higher or lower by means of a wedge on the under ſide. At the end of the ſtale is a croſs piece three feet long, againſt which the man's breaſt is placed when he ſhoves the inſtrument before him in order to cut the drain. A rib twenty-four inches long is fixed on the ſocket, and at the end of it a peg about a foot long, and two inches diameter is faſtened to the ſide of the ſtale with ſcrews. This peg reſteth on the land, when the clod is turned out of the mouth of the inſtrument.

H.

HACK, a pick-axe, or mattock, having only one, and that a broad end.

HARE, a miſt.

HARROW, an inſtrument for breaking the clods of earth, and covering the corn when ſown. It is a ſort of wooden drag, made in the form of a ſquare, with large iron-teeth or tines. The reader will find different ſorts of harrows deſcribed under the articles BEANS, LUCERNE, &c.

HART-CLOVER, melilot.

HARVEST, the ſeaſon when the corn is ripe, cut down, and carried into barns, &c.

Wheat which is full of weeds ought to be cut three or four days ſooner than ordinary, that the weeds may have time to wither before the corn become too ripe: for if it be not cut till the grains are full ripe, it will be liable to conſiderable damage by ſhedding, loſs of colour, and injuries from rain, whilſt it remains expoſed for the weeds to dry. A ſingle ſhower, indeed, or even a day's gentle rain, whilſt it lies in ſwarth, is thought to be rather beneficial to the grain, by making it feel dry and ſlippery, and threſh the better: but all poſſible care ſhould be taken to guard againſt its being wetted too much. When, through any unavoidable accident, it is laid up not thoroughly dry, though it will not take much harm in the mow, it will ſweat and cling together when laid in a heap after being threſhed, and look as white, with mouldineſs, as if it had been ſtrewed with flour. Such corn will not keep, and therefore ſhould be ſent to market, and ſold, as ſoon as it is threſhed.

In Oxfordſhire, and ſeveral other countries, they bind up their wheat in ſheaves, though it be full of weeds, and ſet three ſheaves ſomewhat ſloping againſt three others, after which they cover their tops with two ſheaves opened at their ear ends, which are extended and placed downward. In this ſituation they let their wheat ſtand three weeks or a month in the field, before they carry it in; for no wet can hurt it, nor is it apt to grow in the ear, when thus ſheltered.

In their wheat-pooks, as they call them, in Wiltſhire, the ſheaves are ſet in a circle, with their ears uppermoſt, and another circle of ſheaves is placed upon that, and ſo on, contracting each round, till the pile ends in a point, upon which a ſheaf opened, and turned with the ears downward, is placed, like the ſhackle of a hive; for an ear turned downward will not grow, though ever ſo much wet fall upon it, and the bottom of a ſheaf being broader than its top, every upper one ſhelves over the under, like the eaves of a houſe. A load, or two loads, may be thus put into a pook, which is a very good way to ſecure corn againſt rain, and to give the weeds among it time to dry. But, as Mr. Liſle rightly judges, this method is not altogether proper when the wheat is intended to be laid up in a rick; becauſe, if the weather prove wet, mice will run to it for ſhelter, and will be carried in with the pooks. It is the general way of making wheat-ricks in the iſle of Wight, without thatching.

Though moſt corn is bettered by lying awhile in ſwarth, or grips, to take the dews, which contribute to render its grain plump and of a good colour; yet its ſtraw becomes thereby the worſe for fodder, unleſs it was cut before it had attained full maturity, and lies out no longer than till it be ſufficiently ripened.

In hot dry ſummers, when the corn ripens fully, and its own vigour gives it a proper colour, and plumps up the grain ſo that the huſks readily yield their contents when threſhed, wheat need not lie out in grip, before it is ſheaved, or in ſheaf, unleſs it be very full of graſs and weeds: but in cold ſummers, the wheat is horny and pale, the grains are thin and require being plumped, and their huſks cling ſo cloſe, that they muſt be mellowed, in order to make them threſh well. The full grain which ſwells the chaff, even till it opens, in good and fruitful years, lies almoſt bare to every moiſture; and the heavy ears then ſpread and hang over the ſheaf, which of courſe opens wider, and lets the rain into the bonds ſooner than in leſs kindly ſeaſons, when, the wheat being light, the ears in the ſhock ſtand more upright and cloſer together.

In proportion to the heat of the weather, greater expedition is neceſſary in reaping; for corn, when haſtily ripened, ſcorched up by the ſun, and full in grain, ſoon takes a ſtain, is damaged by wet, and eaſily ſheds at every blaſt of wind. The prudent huſbandman ſhould therefore, in ſuch caſes, employ the greater number of reapers; for he cannot deſire more, than that his corn be perfectly ripe, and of a good colour: for which reaſon, the leſs it then lies abroad in grip or ſheaf, the better it will be. Cutting it high up, ſo as to avoid the intermixed graſs as much as poſſible, by which means it is the ſooner fit for carting, has been found very ſerviceable on theſe occaſions; and Mr. Liſle is of opinion that, eſpecially in hilly countries, corn can never be better houſed, if thorough ripe, hard, and not weedy, than by gripping and carting as faſt as it is cut down; becauſe the dampneſs which it takes by lying on the ground all night, is not eaſily removed.

It is always moſt adviſable to turn the grips of wheat which is left out, very early after their being cut down, in order to get them dry as ſoon as poſſible. By this means they are kept the longer from ſprouting in the ear, in caſe of rain: for if dripping weather or driving miſt ſhould enſue, and continue for any time, after they have been already loaded with wet, all the art of man cannot prevent their growing: nay, even independent of other accidents, the bare weight of the ears will ſink the grips of wheat to the ground, though they have been laid ever ſo light and hollow; and they will certainly be injured thereby, if ſuffered to lie long out in wet weather. The beſt method of guarding againſt this, is by laying them in triangles, as directed by M. de Lille.

A principle ſomewhat ſimilar to this ſeems to be the reaſon why the farmers in Leiceſterſhire, and Northamptonſhire, in particular, where the land is rich, deep, lies flat, and is much incloſed, leave a very high wheat ſtubble, upon which the grips are ſupported, lie the hollower from the ground, and conſequently are the eaſier dried by the ſun and wind; for it is to be obſerved, that the fatter and richer the ſoil is, the ſooner the grips will grow after they have taken wet, if they lie upon the naked ground; much ſooner than they would, in the ſame caſe, in a hilly country, where the land is poor. Huſbandmen there, beſides eſteeming it an advantage that they can ſtow a greater number of ſhort-cut ſheaves in their barns, think the loſs of the ſtraw compenſated by the excellent thatch which they make of the ſtubble. In ſome places they mow it for drying malt.

The forwarder the harveſt is, and the warmer the ſeaſon, the longer the corn may ſafely lay in the field, either in grips, or ſheaves: for this expoſure to the air, after it is cut down, mellows it, and makes it threſh better and look finer. Thus, when the wheat harveſt takes place by the middle, or at leaſt before the latter end of July, of which we have had inſtances, there can be little danger in letting the wheat lie abroad four or five days or a week, if it be not over ripe when cut, even though a rainy day or two ſhould come: for at that time of the year the ſun is ſo hot, the days are ſo long, the graſs ſo ſhort, and the dews generally ſo little, that the corn ſoon dries, even after a hard ſhower; whereas in the middle, and ſtill more toward the latter end of Auguſt, the rainy ſeaſon frequently begins, the dewy nights grow ſo long, the graſs is ſo rough, and the ſun's drying power ſo much abated, that, if wet weather comes on then, the corn will be much more apt to grow.

A caution which Mr. Liſle recommends as ſingularly important in hilly countries, is, not to bind the grips of wheat up into ſheaves too early in the day; becauſe, in ſuch a ſituation, the grips take ſo great a damp by having laid on the ground, that, though the ſtraw, and chaffy ears may ſeem to be dry when the dew is firſt gone off, and after the ſun may have ſhone an hour or two upon them, yet there will remain an inward dampneſs in the corn, and within the ſtraw, which, if laid up in that condition, will come damp from the rick or barn at threſhing time. The afternoon is therefore certainly beſt for gripping and binding into ſheaves in ſuch countries, but ſo that this work may be finiſhed before the day is over. The bands ſhould, however, be laid in the morning, that they may not crack; for the ſtraw will not twiſt after the ſun is up, but will be brittle, and break off below the ears. The turning of three or four of the ſtubble or bottom ends of the ſtraw to the ears of the band, helps greatly to add to its ſtrength and toughneſs.

The bands for binding up the ſheaves ſhould not be ſpread but in fair weather, becauſe, being preſſed down by the grip or two which it is neceſſary to lay upon them to keep them in their places and prevent their being untwiſted by the ſun, they will grow ſooner than any other corn, if rain ſhould come; for they cannot dry, on account of their lying undermoſt. But though the bands muſt always be made while the morning dew is upon them, the ſheaves ought not by any means to be bound up wet: if they are, they will certainly grow mouldy.

Farmers do not always attend ſufficiently to the binding up of their ſheaves, but ſuffer the reapers, for diſpatch, to tie the bands juſt underneath the ears, inſtead of binding them at the other end; the conſequence of which is, that they will hardly hold together to be flung into the cart at harveſt, and will certainly be in great danger of falling to pieces before they are threſhed.

If a little rain is foreſeen in harveſt time, it is beſt to bind the grips up into ſheaves as faſt as they are made; becauſe ſmall ſhowers will wet the ſingle grips ſo much that they cannot be bound up, and thoſe ſhowers may be the fore-runners of greater rains. The ſheaves, being bound, will ſoon dry after ſuch wet. But if a hard rain is foreſeen, the beſt way is not to bind up into ſheaves, becauſe they will then be wet to the bands, and muſt all be opened again. One of Mr. Liſle's neighbours, to whom this happened, unſheafed ſome of his wheat to dry it, opened it, and turned it ſo often, that the ears broke off, by which he loſt half his corn. Caution ought therefore to be uſed in this caſe, leſt by curing one evil we create a worſe.

All farmers agree, that rain which comes with a driving wind, is the worſt of any weather for ſheaves of wheat out in the field; and that it is worſe than a downright ſoaking rain for ſuch ſheaves as are wet to the bands.

In a wet harveſt, ſmall ſheaves are beſt, becauſe, thin at top, and falling cloſe, the rain does not ſink down into the middle of them, and ſo go through into the bands, as it is apt to do in great ſheaves, which lie broader, and take a larger compaſs. Small ſheaves are alſo beſt, when many weeds are intermixed with the corn, becauſe the air, wind, and ſun, have then a greater power to dry them, than they could have if the ſheaves were large.

It has been the opinion of ſome good farmers, that if the weather be likely to continue fair, it is beſt to lay the ſheaves, the night after the wheat is cut, one by one, flat on the ground, in order to make their ſtraw lie the cloſer together, and their ears ſtand the ſtiffer, and more upright, by which means they will be leſs apt to open at the top, and rain will have the leſs power to penetrate them when laid in ſhocks.

Reapers ſhould take care, in placing their grips, to lay the ſtraw end in the furrow, and the ears out, becauſe theſe will then ſtand ſloping up, and lie tolerably dry, even though rain ſhould come; but in the other way, they would ſoon grow.

Mr. Liſle remarks, in his Obſervations (which might have been thrown into a more regular, as well as more laconic form, before they were publiſhed; for that gentleman certainly never intended, that his unconnected notes and memorandums ſhould appear in the manner in which he penned them merely for his own uſe) that “ one of his reapers, when he had made up ſome wheat into ſheaves, the wheat being long-eared and lop-heavy, ſaid, rain had not need meet with thoſe ſheaves before they were carried home.” Mr. Liſle aſked him, “ Why ſo?” To which the other replied, “ becauſe the ears being long and heavy, were buſſle-headed, that is, did hang their heads downward into the ſheaf, ſo that (in caſe a rain ſhould run down to the bands) neither ſun nor wind could enter in to dry them; whereas, ſaid he, when the ears are ſhort, and not heavy, they ſtand upright and hollow, ſo that the ſun and air may eaſily dry them.”

The ſtraw of blighted wheat, being hollow and ſpungy, is very apt to imbibe moiſture; for which reaſon the beſt way is to houſe ſuch corn as ſoon as it is tolerably dry, eſpecially if there be the leaſt proſpect of rain; for if ſtraw of that looſe texture ſhould once ſoak in wet, and ſhowery weather ſhould afterward come on, it would require much more time than other corn to dry and fit it for threſhing.

Experience has ſhewn, that wheat keeps better when ſtacked in the ear unthreſhed, than its grain does alone, when threſhed out and laid up in granaries: beſides which, a farther advantage which attends the ſtacking of this corn, is, that the huſbandman need not threſh it but as his markets or other occaſions require; whereas, if it were to remain long in the barn, he would not be able to preſerve it from rats, mice, and other vermin, which harbour in the walls, roofs, &c. of ſuch buildings.

To guard againſt theſe enemies, as well as againſt the dampneſs of the ground, which would otherwiſe occaſion great loſs (for there have been inſtances of its rotting piles of corn to the thickneſs of a yard, or more) four, ſix, or more ſtrong poſts, according to the intended ſize of the ſtack, are driven into the ground, beams of a proper ſtrength are laid acroſs them, and upon theſe is made a floor to ſupport the ſtack. Some farmers build theſe platforms for their ſtacks ſo high from the ground, that there is room to ſhelter their carts and other implements of huſbandry under them: and ſome again, as an additional ſecurity againſt rain and birds, erect ſides and a roof, by which means they form a kind of barn: but this is needleſs, if the corn be ſtacked, as it ought to be, in ſheaves, with the ears turned inward, and the ſtraw ends outward, and the top well thatched with good wheat ſtraw, which is the beſt of any for thatching. They likewiſe cover the ſupporting poſts with tin, for about a foot in breadth from the top, to prevent the mice and rats getting up: but this method ſoon proves ineffectual, becauſe tin is very apt to ruſt, and conſequently loſes its ſmoothneſs. A better way, as Mr. Mortimer adviſes, is to cover thoſe poſts with Dutch tiles, ſuch as chimnies are commonly ſet with, becauſe they will always keep ſmooth. Others make their ſupporters of two hewn ſtones, one of which, being about three feet high, and ſloped from the bottom, where it is two feet wide, to the top, where it is but a foot thick, ſtands upright, and is covered with a large flat ſtone, about a yard ſquare, or, which is better, of a round form. This not only prevents rats and mice from climbing up, but is alſo a ſecurity againſt the dampneſs of the ground. Others again, whoſe method is the beſt of all, lay a foundation of brick as wide as the ſtack is intended to be, and build round it a brick wall, about two feet high, capped with hewn ſtones, which project ſufficiently outward, to hinder the aſcent of any ſort of vermin. If either rats or mice ſhould, by the help of any thing accidentally reſted againſt the ſtack, chance to climb up, and get into the corn, they will not be able to remain there long, becauſe, as they cannot live without water, neceſſity will force them down, and their former means of climbing being removed, they cannot get up again. If any of them chance then to be left in the ſtack, they will ſoon die there for want of drink.

Particular care ſhould be taken in the ſtacking of wheat, always to lay the ear ends of the ſheaves inward, and upon a riſe, ſo as to keep the middle of the ſtack full while it is worked up: for in this caſe, when it ſettles, the ſinking will be chiefly on the outſide, which will thereby be made to lie the cloſer, and the ſtraw ends being outward, and inclining downward, birds cannot get at the grain, nor can rain be driven up to the ears. The ſhorteſt and thinneſt ſheaves ſhould be uſed in the topping of the ſtack, becauſe it cannot be ſo conveniently drawn in and narrowed with great long ſheaves. They ſhould be taken from off the ſame ground, if the huſbandman wants to keep any particular ſort or growth of corn pure and unmixed. Where leſs nicety is obſerved, oats, or ſome other kind of coarſe grain, are frequently laid on the top of the ſtack of wheat, under the thatch, the better to preſerve it from being wet. Wheat, properly ſtacked, will keep in perfect order for many years.

Mr. Liſle, who does not approve of ſtacking any corn but wheat, when room can be found for it in the barn, thatched a long rick of vetches, brought up ſharp, with barley ſtraw, to the thickneſs of three feet, and yet found, upon cutting it, that the rain had penetrated through this thick covering, and done conſiderable damage to the vetches. He imputes this, firſt, to barley-ſtraw's being more woolly and ſpungy than wheat ſtraw, which is cloſe and hard; and, ſecondly, to the ſtack's having ſweated and heated pretty much, in which caſe the covering of ſtraw is always hollowed and ſoftened, and conſequently rendered the more apt to admit and retain wet.

The ſtalks of oats are naturally ſo ſmooth and ſlippery, that they are apt to ſlide in the ſtack, which then frequently tumbles down, eſpecially if this corn was very dry when carried in. An oat rick muſt therefore not be widened by any means beyond its foundation, which generally is of faggots, nor ſhould its ſides ever bulge out, but, on the contrary, they ſhould be gradually contracted. Barley, having a rough ſtem, may be piled more upright.

When ſparrows rooſt at night in holes, under the eaves of a ſtack of corn, it is reckoned a ſure ſign that there are neither rats nor mice in the rick; for their ſqueaking and running about in the night, would diſturb the birds, ſo that they would not ſtay there.

HASK, a huſky cough.

HATTOCK, a ſtock of corn, conſiſting of twelve ſheaves. In ſome countries it implies only three ſheaves laid together.

HAVER, a name given to oats in ſome parts of England.

HAW, a cloſe, or ſmall field.

HAW, is alſo the common name for the fruit of the white thorn.

HAW, likewiſe ſignifies a ſwelling of a ſpongy texture, growing in the inner corner of the eye of a horſe, and ſometimes ſo large, as to cover a part of the eye.

HAY, a general name for any kind of graſs, cut and dried for the food of cattle.

When graſs is to be made into hay, the farmer will be directed in the ſeaſon for mowing it, by the quality of the graſs. When the crop is very great, it ſhould be cut as ſoon as the bottom of the graſs grows yellow: for if it ſtands longer, more will be loſt by the quantity of leaves rotted at the bottom, and the ill flavour which theſe will give to the reſt, than will be gained by its growth. When other circumſtances permit the choice of time, it ſhould be when the graſs is in full bloom, before the ſtalks begin to harden, and rather early than late, becauſe the more ſap remains in the roots, the ſooner the next crop will ſpring up. There is not, however, any general rule for this; becauſe, in ſome caſes, the ripe ſeeds add a great value to the hay, as in ſainfoin and burnet; and, in others, the growth of the graſs itſelf brings a recompenſe, as in the fowl-meadow graſs.

A dewy or duſky morning ſhould be choſen for cutting the graſs, becauſe, being then fulleſt of ſap, it ſtands beſt to the ſcythe. When the high noon-tide ſun has dried the graſs, and made it recline its head, the mower will employ his time more uſefully in making the hay already cut, than in continuing to mow, with great additional labour, graſs, which no longer makes the due reſiſtance.

Our farmers in general are very inattentive to the management of their hay whilſt in the cock, to which is in a great meaſure owing the loſs which they (or rather the nation) ſuſtain every year, by the damage which the hay receives from rain.

To guard as much as poſſible againſt this accident, let the hay-makers follow the mowers, and, if the weather be quite fine, ſpread out the graſs as faſt as it is cut down, eſpecially if it lie ſo thick in the ſwarth, that neither the air nor ſun can paſs freely through it: but if wet be feared, let it remain in the ſwarth. At night, make it into graſs cocks, and the next day, as ſoon as the dew is off the ground, ſpread it again, and turn it, that it may wither on the other ſide; then handle it, and if you find it dry, make it up into large cocks. If the weather continue favourable during the ſecond day, the graſs will, by that time, be ſo dry as to bear being kept in theſe cocks till the day on which it is be carted, when it ſhould be ſpread out again in the morning, to receive a farther drying, if wanted. If theſe cocks are made as tall and as taper as can be, conſiſting with their ſtanding ſafely, the winds, by paſſing through them, will dry them gently and equally; and though rain ſhould fall upon them, it will not do much hurt, becauſe the greateſt part of it will run off directly, and the ſun and wind will ſoon dry that which may have penetrated into the cocks. Theſe cocks have therefore a great advantage over the common ſmall and low ones: for if a rainy ſeaſon comes on, theſe laſt will be ſo thoroughly wetted, that the wind will not be able to pierce ſufficiently to dry them. More hay is, perhaps, loſt for want of making the cocks properly, than by all the rains which happen in the hay-making ſeaſon.

The method here recommended is confirmed by the experience of a New England huſbandman, whoſe account of it to the reverend Dr. Elliot run thus:

“ I ſhall relate to you my own practice in making of hay, though it may ſeem ſmall and trifling at the firſt mentioning: but finding that it ſaves me near two fifths of the time and labour I uſed to be at in this article, and that my hay is, I think, better than when I uſed to purſue the uſual method, I eſteem myſelf juſtified in communicating it to the public. My method is this: I mow my graſs, and let it lie in the ſwarth till the dew is off the next morning: then I turn and ſpread my hay, and let it lie in the ſun till the after part of the day, when I take it up and cock it well, and never meddle more with it, till I cart it into my barn, or ſtack it. If the weather be good, it will do well to cart after it has ſtood two days in cock. This, I have found by five or ſix years conſtant experience, anſwers for any ſort of hay, except ſalt-hay and red clover, of which laſt I have not had ſo long trial: but with reſpect to clover hay, I managed it laſt ſummer after this manner, viz. I followed my mowers, as they cut the graſs, I ſpread it as thin as I could, and before night I put it in cock. The next day, after the dew was off, I ſpread it again; in the afternoon, I cocked it a ſecond time, and meddled no more with it till I carried it. The appearance of the hay ſince, makes me judge that no man has better of the ſort. My firſt coming into this practice was purely accidental. After cutting my graſs, five or ſix years ago, I put it in cock the next day; but my avocations then were ſuch, that I had no time in which I could poſſibly take any farther care of my hay for many days. When I had diſpatched my other affairs, I returned to it, and found it in as good order (that is to ſay the bulk of it) as ever I had hay in my life. Reflecting then, how much labour may be ſaved by this method, I have followed the ſame practice ever ſince, and find it anſwer very well. The reaſon why I think my hay really better is, becauſe I take it for granted, that the more juice or natural moiſture we can retain in it, without corrupting and rotting the ſtalk, the richer and more nouriſhing it is. The too often turning and ſpreading of hay in the ſun extracts too much of the richneſs thereof; and one day's thus lying will take away ſuch a quantity of the moſt watery particles, as that the remainder is only ſufficient to raiſe a proper fermentation thereof when in the cock, while the ſmallneſs of the body there keeps that fermentation from riſing to ſuch a height as to corrupt it. After twenty-four hours, the fermentation will gradually abate; and the pitching of the hay into the cart, and afterwards into the mow, or ſtack, ſo checks it, that it will not again riſe to ſuch an height as to be detrimental. Cattle are fonder of this hay, than of that which is made in the common way, and leſs of it will ſupport them."

It would be almoſt needleſs to obſerve, that no narrow wheels ſhould ever be brought upon paſtures, not even in the drieſt ſeaſon of the year, as that of hay-making generally is. The advantages of broad wheels, which help to roll and level the ground, and render the draught much eaſier, whether on graſs, or any other ſoil in which narrow wheels will ſink, have been confirmed by experience; and are as ſelf-evident, as it is that the latter cruſh and bury, and thereby deſtroy great numbers of the plants of graſs, wherever they are dragged.

If the hay has ſweated a little in the cock, there will be the leſs need for its ſweating afterwards in the rick, where it will then lie ſo much the cloſer, and conſequently keep the better.

For the method of making lucerne and ſaintfoin, *ſee the articles* LUCERNE *and* SAINTFOIN.

HAY-BOTE, a liberty which a tenant for life, or a term of years, has of taking buſhes, wood, &c. for repairing fences, gates, and the like. It alſo ſignifies the liberty of cutting wood, for making rakes and forks uſed in making hay.

HAYN, or *Hayn-up*, implies the action of incloſing with a hedge, in order to preſerve graſs-grounds from cattle.

HAZLE-*Mould*, a moderately compact earth, containing a large quantity of reſin-coloured ſand.

HEAD-LAND, the land running acroſs the others at the head of the field, left for the turning of the plough.

HECK, a door; alſo a rack for cattle to feed at.

HECKLE, an inſtrument uſed in the dreſſing of flax and hemp. *See the articles* FLAX *and* HEMP.

HEDGE. *See* FENCE.

HEIRS, young trees in coppices.

HEE-GRASS, ſtubble of graſs.

HELM, a hovel; alſo ſtraw prepared for thatching.

HEMP, the name of a plant too well known to need any deſcription here; but it may not be improper to remark, that the flowers and the fruit (commonly called ſeeds) of hemp always grow ſeparately on different ſtems, and conſequently on different plants, as this never has more than one ſtem proceeding from the root.

The flower-bearing ſpecies, which is the *Cannabis florifera*, Off. *Cannabis erratica*, C. B. P. *Cannabis fœmina*; J. B. *Cannabis ſterilis*, Dod. Pempt. and which is moſt frequently termed female hemp, ſhould properly be called barren hemp, flowering hemp, or male hemp, ſince it is this which bears the *farina fœcundans*, or fecundating duſt, without being impregnated with which the ſeeds that grow on the other ſtems of the other ſpecies would not come to maturity, or at leaſt would not be capable of producing plants, when ſown.

This other ſpecies, which bears the ſeeds, and which botaniſts diſtinguiſh by the appellation of *Cannabis fructifera*, Off. *Cannabis ſativa*, C. B. P. *Cannabis mas*, J. B. *Cannabis fœcunda*, Dod. Pempt. and which is commonly termed male hemp, ſhould be called ſeed-bearing hemp, or female hemp; becauſe it is this which, with the help of the impregnation it receives from the *farina fœcundans* of the male, produces ſeeds capable of yielding plants of either ſpecies.

What may chance to be the future proportion between the number of male plants, and that of female, in a hemp-ground, cannot poſſibly be gueſſed at the time of ſowing, as no ſort of mark can be diſcerned on the ſeed, by which they may be diſtinguiſhed: nor indeed can any judgment be formed in this reſpect, before the male plants begin to flower, that is to ſay, in general, till about two months after ſowing; unleſs it be from a remark which the moſt curious obſervers have made, that the male hemp is ſlenderer than the female, and that all its parts are more delicate: to which may be added, that the male plant is always forwardeſt in its growth, and that it generally riſes about half a foot higher than the female; thereby plainly indicating it to be the deſign of nature, that the fecundating duſt which iſſues from the flower may by that means be the more eaſily conveyed to the grain on the ſeed-bearing ſtalks, in order to its impregnating that feed.

With regard to the temperature of the air that is fitteſt for the growth of hemp, M. du Hamel obſerves, in his Treatiſe on Cordage, that this plant does not like hot countries; that temperate climates ſuit it beſt; and that it thrives very well in pretty cold regions, ſuch as Livonia and Canada, which produce it in abundance, and very good. M. Marcandier is indeed of opinion, that though extremely hot countries are not favourable to its growth, yet, as this plant is but a ſhort time in the ground, it may be cultivated in any place that is habitable by men.

The wiſe legiſlature of this country has ſhewn its opinion of the importance of raiſing hemp in our own dominions, by the bounty given by parliament for the importation of it from North America; and our truly laudable Society for the Encouragement of Arts, Manufactures, and Commerce, has likewiſe judiciouſly contributed to this deſirable end, by offering a very conſiderable premium to the cultivators of hemp in that vaſt province of the Britiſh empire.

The ſoil for hemp ſhould be a ſoft rich loam, eaſily brought into fine tilth; and it ſhould be well manured. Newly broken up land is found to be peculiarly good for this plant; but flat grounds lying on the ſides of rivers, and enriched by the ſediment left on them when the waters overflow, are the beſt of all for it. If hemp is to be ſown on very ſtrong ſoils, they muſt be brought into ſo good tilth, and be ſo well manured, that their mould may remain looſe: in this caſe, ſuch ſoils yield very great crops. Dry lands are not fit for hemp: it does not riſe well in them, but remains ſhort and ſtinted in its growth, and its fibres are then generally too woody, which renders them hard. All theſe are conſiderable defects, even for the coarſeſt works. It is however true, that, in rainy years, it ſucceeds better on dry grounds, than on moiſt: but as ſuch years are not the moſt common, the beſt ſituation for a hemp-ground is generally thought to be along the ſide of a ſtream, or of a ditch ſo full of water, as that the water may conſtantly be nearly on a level with the ſurface, but without overflowing it while the hemp remains on the ground.

It is the cuſtom in ſome countries to form hemp-grounds, which are appropriated ſolely to this purpoſe: whereupon the author of a very judicious account of the culture of hemp, in the Memoirs of the Royal Society of Agriculture at Tours, juſtly obſerves, that, "beſides that all ſoils delight

light in a change of plants; hemp is ſo far from impoveriſhing the ground, that the leaves which fall from it become a ſufficient manure, and the depth to which the roots go, eſpecially if the crop of hemp be great, leave the ground ſufficiently looſe to ſow upon it even a crop of wheat immediately after the hemp has been pulled, without any other expence than ſowing the ſeed and harrowing it in; or if turnips or a ſpring crop be more convenient to the farmer, theſe alſo will thrive well after the hemp. It is ſaid, that the hemp which grows on an eſtabliſhed hemp-ground is ſofter and more ſilky than that which is raiſed elſewhere: but the difference, if any, is very inconſiderable; for the hemp which grows in the other parts of Anjou, for example, is found to be as good as that which is produced by any of the few eſtabliſhed hemp-grounds in that province."

As it is eſſential to have the ground in exceeding fine tilth, the firſt ploughing ſhould be given it as early in the autumn as the huſbandman's other buſineſs will permit. Some are ſo curious in the preparation of their ground for hemp, that they give this firſt ſtirring by hand; and tho' it be a more tedious and more expenſive way than ploughing, they think that the difference of the crop repays them well. In whatever manner it be done, the ground ſhould be looſened as deep as poſſible, and laid rough, that it may be the better mellowed by the winter's froſt, eſpecially if the ſoil be ſtrong. If the hemp is to be ſown on ground purpoſely broken up, and which is covered with coarſe graſs, or other ſimilar productions, its ſurface ſhould be pared off and burnt; or it ſhould otherwiſe be brought to a perfectly fine tilth. The ground ſhould be ploughed again in February, or more early if the ſeaſon will permit; and then alſo ſhould be laid on the manure, whether of horſe-dung, or the ſcouring of ponds and ditches, after it has had time to ripen; for theſe are preferable to cow-dung; though all manures, which render the earth light, are fit for hemp. Mr. Du Hamel remarks, that marle is not, to his knowledge, uſed for this purpoſe. He likewiſe thinks, that it is beſt to dung the hemp ground every year before the winter ploughing, in order that the dung may have time to rot during that ſeaſon, and that the ſpring ploughing may afterwards mix it the more thoroughly with the earth; for all hemp grounds ſhould be well dunged at leaſt once a year.

To prepare the hemp ground thoroughly for receiving the ſeed, it ſhould have two or three good ploughings in the ſpring, or even more if the farmer's conveniency will permit, and the nature of the ſoil be ſuch as to admit of them; for the more frequently it is ſtirred in the ſpring, in proportion to the quality of the ſoil, the better the crop will be. About a fortnight or three weeks ſhould intervene between each of theſe ploughings, and they ſhould at laſt lay the ground quite ſmooth and even. If any lumps or clods of earth yet remain after all theſe ploughings, they ſhould be broken by hand: for the whole hemp ground muſt be as level, and of as fine a mould, as the beds of a garden.

The firſt ſpring ploughing ſhould be given acroſs the former; and before the next ploughing is the proper time to ſpread ſheeps dung, pidgeons dung, poultry dung, or whatever other ſuch like manures are uſed; though ſtill it is to be feared, that, if the ſpring prove dry, theſe hot dungs may burn the ſeed, which they would not do if they were laid on before the winter: but in this caſe a greater quantity of dung muſt be uſed, or leſs advantage muſt be expected from it.

The ſeaſon for ſowing hemp depends in a great meaſure on the quality of the ſoil. In dry light ground, it ſhould be ſown as ſoon as the danger of froſt, or other inclemency of the weather, is over, in the latter end of April or beginning of May, that ſo it may get up early, and, by covering the ground, prevent the danger of drought. In wet cold grounds, it ſhould be ſown later, that is to ſay, not till the ſun has exhaled the too great moiſture of thoſe grounds; and this may not be till the middle, or even the latter end of May. The author of the before mentioned account of hemp, in the Memoirs of the Royal Society of Agriculture at Tours, adviſes to ſow hemp even ſo late as the latter end of June, in caſe the ſeaſon for it be not favourable ſooner; and he obſerves, that the crop ſown then will be as plentiful, and of as good a quality, as if the ſowing had not been delayed ſo long, eſpecially if a very dry ſeaſon does not come on immediately after. The truth of this is evinced by the experience of thoſe who are obliged to ſow a ſecond, and ſometimes a third crop, when their former ſowing has miſcarried through the inclemency of the weather, and particularly of froſt, which is a great enemy to hemp. Another reaſon too, which he aſſigns in favour of late ſowing of hemp, is, that the huſbandman may by this means have an opportunity of deſtroying the firſt growth of weeds, which would choak the hemp, if it were ſown before they had come up.

The huſbandman ſhould be particularly attentive to the weather, when he ſows hemp; for the ſeaſon then ſhould neither be too dry, nor too rainy. If either of theſe is the caſe, he had better defer his ſowing; though he ſhould, if poſſible, always chooſe a time juſt after a gentle fall of rain.

The hemp ſeed that is ſown ſhould always be of the growth of the preceding year, becauſe, as it is a very oily grain, its oil is apt to become rancid, if it be kept long, and the ſeed then loſes greatly of its vegetative power, inſomuch, that, when it is two years old, many of the grains will not riſe at all; and if it be older, a yet leſs quantity will grow. Experience has alſo proved, that, as in other grain, ſo likewiſe in this, it is adviſable every ſecond or third year to chooſe the ſeed from a ſoil different from that on which it is to be ſown.

When the ſoil is deep, and in fine order, it is beſt to ſow this ſeed thick, eſpecially if the hemp be intended for fine uſes, becauſe the plants run moſt into height, when they ſtand cloſeſt together, and their fibres are then by much the finer. They ſhould not, however, ſtand ſo very thick as to choak one another; becauſe this would occaſion a conſiderable loſs of plants. It is therefore neceſſary to obſerve a medium, the knowledge of which is eaſily acquired by practice: and indeed, in general, hemp grounds ſeldom are too thinly ſtocked with plants, unleſs when part of the ſeed has been deſtroyed by froſts, drought, or other accidents. The uſual quantity is three buſhels to an acre.

As ſoon as the hemp ſeed is ſown, it muſt be carefully covered with earth, either by means of a harrow, if the ground has been ploughed, or with a rake, if it has been dug by hand; and beſides this precaution, the whole hemp ground muſt be conſtantly watered till the ſeed has riſen; for otherwiſe numbers of birds, and eſpecially pigeons, will deſtroy it entirely, without ſparing even the ſeeds that have been well buried. It is true, that pigeons and birds which do not ſcratch, do no great hurt to the grains of corn that are well covered with earth: but the huſks of theſe grains do not riſe up out of the ground with their green ſhoots, as thoſe of hemp always do; and then it is that theſe birds, miſtaking them for perfect ſeeds, tear them away with the young plants to which they adhere, and thereby commit vaſt havock. So greedy are the pigeons, in particular, after theſe ſeeds, that none of the common ways of frightening birds will keep them off: nay, M. Du Hamel aſſures us, that he has ſeen ſtrong men, and even dogs, ſo wearied out with fatigue, as to be forced to give up the taſk, when the hemp ground has been large. Happily this troubleſome work does not laſt long; for when the hemp has put forth a few leaves, it requires no farther tending.

Though hemp cannot be weeded without great hazard of damaging the crop, becauſe whatever plants of it are twiſted, bent down, or broken, through inadvertence of the weeders, or by any other cauſe, never riſe again; yet if the weeds are ſo numerous and rank, as to endanger their ſmothering of the hemp, it is neceſſary to root them out, and the moſt careful perſons muſt be employed for this work, which, when rightly executed, is alſo attended with this farther advantage, that the pulling up of the weeds looſens the ſurface of the earth, and thereby forwards the growth of the plants.

In very dry ſeaſons, it will be proper to overflow the hemp ground, if it can be done. To this end ſome authors adviſe letting in the water from the ditches, as is practiſed for rice grounds. If any parts of the hemp ground are in danger of being burnt up, it will be adviſable to water them, or perhaps rather the whole in ſuch caſe, even by hand.

If, by any accident, the hemp grows very thin, ſo as to be thereby in danger of branching out too much, and of becoming woody; this ſhould be an additional motive for keeping it perfectly clear of weeds, in order to let it remain for ſeed, which will be ſo much the better for the plants having ſtood thin.

The male hemp (which is the ſpecies that produces the *farina fœcundans*) ripens earlier than the female, generally by three weeks, or even a month: but the time of the ripening of either depends much on the nature of the ſoil. The male hemp ſhews its ripeneſs by turning yellow at top, and whitiſh at the bottom of the ſtem: but this ſort, in particular, ſhould be pulled rather before it is quite ripe, that is to ſay, while it is yet ſomewhat green; for if it be too ripe, its fibres will adhere ſo ſtrongly to the reed, as not to be ſeparated therefrom, without ſome loſs; neither will they be ſoft, and conſequently not ſo fit for domeſtic uſes, as thoſe of hemp that is pulled before it has attained to a perfect maturity.

The ripeneſs of the female or ſeed-bearing hemp, is known, not only by the ſame ſigns as that of the male, but alſo by the ſeeds beginning to turn brown, and by the capſules which contain them beginning to open.

As ſoon as the male hemp is ripe, it is pulled ſtem by ſtem, and with caution not to injure the female hemp, which, as we before obſerved, muſt remain on the ground ſome weeks longer, that is to ſay, till it alſo is ripe, and then it muſt likewiſe be pulled ſtem by ſtem.

Each handful that is thus pulled ſhould conſiſt of plants, as nearly as poſſible of equal length, and their roots in particular ſhould be placed as even as can be. Some tie up each handful, eſpecially of the male hemp, with a ſtalk of hemp, then lay it in the ſun to dry its leaves and flowers, which they afterwards beat off, by ſtriking it againſt a tree or wall; they then put ſeveral of theſe handfuls together, ſo as to form a pretty large bundle, and in this condition they carry it to the watering place.

I have juſt mentioned what M. Du Hamel ſays of the common practice of drying the hemp before it is ſteeped: but I muſt here obſerve, that it is a matter of doubt, whether this plant ſhould be dried before it is ſteeped. Thoſe who are for drying it firſt, ſay, that the hemp becomes thereby ſtronger than when it is ſteeped without having been previouſly dried: for my part, I muſt confeſs, that this drying ſeems to me to be a needleſs trouble; for as it is neceſſary in the ſteeping of hemp, that a certain degree of putrefaction ſhould ariſe, ſufficient to deſtroy the texture of that glutinous ſubſtance which connects the fibres to the woody part of the hemp, it certainly is more adviſeable to lay the hemp in the water as ſoon as can be after it has been pulled, becauſe the more there is of the natural moiſture left in this glutinous ſubſtance, the ſooner the putrefaction will begin. If, either by deſign or accident, the hemp has been dried, the putrefaction comes on more ſlowly and more unequally, and the fibres contract a hardneſs which the ſteeping afterwards will not eaſily correct.

The common height of hemp, when full grown, is from five to ſix feet: but M. Du Hamel remarks, that the ſtems of the hemp which is cultivated near Biſchwiller, in Alſace, are ſometimes upwards of three inches in diameter at their bottom, and above twelve feet high. Theſe, indeed, are ſo deeply rooted, that even a very ſtrong man can hardly pull them up.

When the female hemp is let ſtand till its ſeed is perfectly ripe, its bark becomes woody, and ſo coarſe, that no future operation can bring it to a proper degree of fineneſs. For this reaſon, it is generally pulled before the ſeed is quite ripe: but as it is manifeſtly the huſbandman's intereſt to ſow none but the beſt ſeed, he ought not to grudge the ſacrificing of the goodneſs of a ſmall part of his hemp, to the ſuperior advantage of obtaining perfect ſeed, by letting a proper number of theſe plants ſtand till their ſeeds have attained full maturity. The judicious M. de Chateauvieux, whoſe attention extended to the moſt proper method of cultivating every uſeful plant, did not neglect ſo important an object as the quality of the hemp employed in cordage, and the means of obtaining its ſeed in the greateſt perfection. However, not having had opportunities of continuing his experiments long enough to draw certain concluſions from them, he invites all thoſe who have the public good at heart, to make experiments which may lead to the utmoſt improvement of the culture of this plant: "but, ſays this friend of mankind, theſe motives of œconomy are vaſtly inferior to the ineſtimable advantage of ſaving ſhips, their cargoes, and their crews, which often depends on the ſtrength of their ſails and cables."

On the twenty-ſixth of April, 1753, he ſowed ſix beds with his drill plough, placing ſix rows in each bed. The beds were ſeven feet wide, and the ſoil ſtrong, but in very fine tilth. He treated his plants with great care, according to the principles of the new huſbandry: but both that and the enſuing year were unfavourable to the growth of hemp. However, he obſerves, in general, that his plants were five or ſix feet high, that their ſtems were large, and their bark very thick and ſtrong. They were very fruitful in ſeed, eſpecially the two outer rows, which had profited moſt by the hoeings. M. Aimen, from forty plants of hemp, raiſed in the common way, and which might be deemed fine ones, had only a pound and an half of ſeed; but a ſingle plant which grew by itſelf, yielded him ſeven pounds and a half, of much better ſeed than any that is produced in the common way. From hence it reſults, that it muſt be of great advantage to the huſbandman to ſet apart a ſpot of ground ſufficient to rear thereon as many plants of hemp, as will afford him ſeed enough for the purpoſe of ſowing, and to cultivate them according to the principles of the new huſbandry.

In ſome countries, to complete the ripening of the ſeed, round holes are dug, about a foot deep, and three or four feet in diameter, in different parts of the hemp ground, and the handfuls of pulled hemp are ſet as cloſe together as can be in theſe holes, with their ſeed ends downward, and their roots uppermoſt; after which, to keep them in this poſition, the whole is tied round with bands of ſtraw, and the earth that was taken out of the hole is thrown up all around this great ſheaf, ſo as quite to bury the heads of the hemp, which, when thus covered, heat by means of the moiſture contained in them, in the ſame manner as a ſtack of green hay, or a heap of dung. This heat completes the ripening of the hempſeed, and diſpoſes it the more eaſily to quit its huſks; and when it has been brought to this condition, the hemp is taken out of theſe holes, where it would become mouldy, if it were left longer in them. But, as is juſtly obſerved in the excellent Memoirs of the Royal Society of Agriculture at Tours, it is hard to conceive, how an operation which tends to bring on at leaſt ſome degree of putrefaction, can ripen the ſeed; and therefore this muſt be at beſt a very dangerous practice, eſpecially as a ſeed ſo very oily as that of hemp, and conſequently ſo apt to become rancid, cannot but be liable to be rendered ſtill more ſo by this degree of heat.

In other places, where the crops of hemp are great, the huſbandmen do not bury the heads of their ſeed hemp in the manner above deſcribed, but only lay it in heaps, with the ſeed ends one againſt another: others, whoſe crops are ſmaller, content themſelves with ſpreading upon the ground a cloth to receive their hempſeed; and others again only ſpread their bundles upon a clean ſpot of ground, with all the heads turned the ſame way. The ſeed ends thus placed are beaten ſlightly, either with a ſtick, or a light flail. The ſeed which falls out eaſieſt is always the ripeſt and beſt, and ſhould therefore be reſerved for ſowing the next ſpring: and as to that which remains in the heads of the hemp after this operation, it is got out by combing the heads on the teeth of a ripple, which pulls off the leaves, the huſks of the ſeeds, and the ſeeds themſelves, all together. Theſe are gathered in a heap, and left in that condition for a few days, in order that they may heat a little, after which they are ſpread out to dry, then they are threſhed, and finally, the ſeeds are ſeparated by winnowing and ſifting. This ſecond ſeed is much inferior to the firſt, and accordingly it is uſed only for extracting oil from it, or for feeding of poultry.

It is, on this occaſion, juſtly remarked in the Memoirs of the Royal Society of Agriculture at Tours, that by the threſhing of hemp there is always danger of bruiſing ſome of its ſeeds, and that the bruiſed ſeed will not grow, though it may be fit for yielding oil. Nor is this all; for by threſhing out the ſeed, there is a mixture of imperfect ſeed with that which is fit for ſowing; and this is the reaſon why huſbandmen have always found it neceſſary to ſow a greater quantity than would otherwiſe be requiſite, in order to make up for the uncertainty of its growth.

The method of ſeparating the fineſt grains of wheat for ſowing, by throwing the corn to a diſtance on a barn floor, is equally adviſable for obtaining the heavieſt and beſt hemp ſeed, where proper care has not been previouſly taken to provide ſuch. In this caſe, the ripple may be uſed to ſeparate the whole of the ſeed from the plant, and this will prevent the inconveniencies which ariſe from the threſhing or beating out of the ſeed.

The method of laying the hemp down in order to its being ſteeped, is to place it in bundles at the bottom of the water, there to cover it with a little ſtraw, to keep the dirt from ſticking to it, and then to load it with pieces of wood and large ſtones, to keep it down, ſo that it may be always five or ſix inches below the ſurface of the water.

The intention of ſteeping the hemp in water is, to make its bark part the more eaſily from the reed, and to deſtroy the outer ſkin; or, if I may here be allowed the language of anatomiſts, the cellular membrane which connects the hemp with the reed. All this is effected by only a ſmall degree of putrefaction, ſo that it is dangerous to let the hemp lie too long in the water, for it will then be over ſteeped, that is to ſay, the water will not only have acted upon the outer ſkin and the connecting fibres, but it will alſo have leſſened the longitudinal coheſion of the fibres; in ſhort, the hemp will be too much rotted, and in this caſe the ſtrength of thoſe fibres will be proportionably impaired. On the contrary, when the hemp has not lain long enough in water, its bark adheres to the reed, its fibres are hard, and they cannot ever after be rendered ſufficiently fine. There is therefore a medium to be obſerved; and this medium depends, not only on the length of time that the hemp is to remain in the water, but alſo,

1. On the quality of the water; it being ſooner ſteeped ſufficiently in ſtanding water, than in a running ſtream; and ſooner in ſtagnant putrid water, than in that which is clear.
2. On the temperature of the air; for it requires leſs time to be ſufficiently ſteeped in hot weather, than in cold.
3. On the quality of the hemp; that which has been raiſed on a rich mould where it has not wanted for water, and which has been pulled whilſt yet a little green, being ſooner ſteeped to a proper degree, than that which has grown on a ſtiff or dry ground, and which has been let ſtand till it was quite ripe.

In general, when the hemp has been ſteeped but a ſhort time, its fibres are thought to be the better. Hence ariſes the opinion, that hemp ſhould not be ſteeped but in hot weather; and for this reaſon alſo it is that many, when the autumn is cold, defer the ſteeping of their female hemp till the next ſpring. It is likewiſe for the ſame cauſe that ſome prefer ſteeping their hemp in ſtanding water, or even in ſtagnant waters, that is putrid, rather than in ſpring or running water.

M. Du Hamel, to whom we are indebted for the foregoing remarks, ſteeped hemp in different ſorts of water, and it appeared to him, that the fibres of the hemp ſteeped in putrid ſtanding water were ſofter than thoſe of that which had been ſteeped in running water: but they contract in water which does not run, a diſagreeable colour, which does not indeed do any real injury to the hemp, for that which has been thus ſteeped is afterwards the moſt eaſily bleached; but yet, as this colour diſpleaſes, and the hemp is the leſs ſaleable for it, endeavours are always uſed, if poſſible, to make a ſmall ſtream of water paſs through the ſteeping places, thereby to change the water in thoſe places, and to prevent its becoming putrid.

He ſucceeded likewiſe in rendering hemp fit to ſeparate from the reed, by ſpreading it upon a meadow in the ſame manner as is practiſed for bleaching of linnen: but he found this method tedious and troubleſome; nor did the fibres of the hemp ſo prepared ſeem to him to differ much from thoſe of hemp ſteeped in the common way.

He alſo tried the boiling of hemp in water, in hopes of bringing it ſpeedily to the ſame condition as it is in when taken from the uſual place of ſteeping: but when, after having been boiled upwards of ten hours, it was taken out of the water, in order to be dried, it was not at all fit for either peeling or breaking. It is true that, while it yet remained hot and wet, its bark ſeparated eaſily from the reed; but at the ſame time it peeled off like a ribbon; the glutinous ſubſtance which connects the longitudinal fibres, and makes them adhere cloſely to each other, not being at all deſtroyed, ſo that they could not be ſeparated, nor was it poſſible to divide them into fine threads. It is evident from what has now been ſaid, that no preciſe time can be fixed for the ſteeping of hemp; ſince the quality of the hemp, that of the water, and the temperature of the air, haſten or retard this operation.

M. Marcandier is of opinion that the fineſt and cleareſt water is always the beſt for ſteeping hemp; and he approves of the method of thoſe who make a kind of ditch on the edge of a river, where the water, being more ſtill and warm, ferments eaſily, and penetrates more quickly the parcels of hemp that are laid in it. When they are taken out of this ditch, it will be ſufficient to waſh them in the current of the river, which will carry off all the gum and mud that would otherwiſe cleave to them. He holds, that the hemp which has been ſteeped in rivers is always whiteſt, and of the beſt quality; and that that which has lain in ditches, pools, or reſervoirs of ſtanding water, is always of a bad colour, has a very diſagreeable ſmell, is loaded with dirt, and loſes a great deal in the dreſſing. Theſe are M. Marcandier's ſentiments on this ſubject; and if they are the reſult of his experience, as I preſume them to be, I cannot but regret his not having related the particulars of his experiments.

The judiciouſly accurate Memoirs of the Society which the illuſtrious ſtates of Brittany have eſtabliſhed for the improvement of Agriculture, Commerce, and Arts, are more particular in this reſpect, and conſequently more ſatisfactory. After obſerving, that it is ſtill undetermined whether hemp ought to be ſteeped in running or ſtanding water, that each cultivator of this plant gives the preference to the method he has been uſed to follow, and that naturaliſts have not yet written any thing deciſive on the choice of the waters fitteſt for this preparation, the moſt important of any that hemp undergoes, becauſe it is on this that the eaſe and goodneſs of the hackling, ſpinning, and fabricating in a great meaſure depends; the Memoirs, I ſay, of theſe zealous patriots inform us, that one of the members of their office at Rennes thought that this diverſity of opinions and cuſtoms might proceed from running water's being, in fact, always preferable in ſome caſes, and from ſtanding water's being always the beſt in others. For example; in cold and rainy years the plant muſt be weaker, longer green, and fuller of juice, than in dry years, in which laſt the hemp will be ſtronger, but at the ſame time harder and more woody. Why then, ſay they, very judiciouſly, ſhould it be expected that the ſame waters applied to ſo different productions, ſhould have a ſimilar effect upon each?

To remove all doubt in this reſpect, the Society ordered ſome hemp to be pulled in different parts of the province of Brittany, and in different ſtates of growth. Some was pulled before it was ripe, ſome exactly when it was ripe, and ſome ſeveral days after it was ripe. Each of the parcels of theſe three ſorts of hemp was divided into two equal parts, one of which was laid to ſteep in running water, and the other in ſtanding water. They were afterwards hackled with very great care, and examined with the moſt ſcrupulous attention, by a perſon thoroughly acquainted with the defects and good qualities of this commodity.

Minute accounts of every circumſtance attending theſe experiments, and of their reſult, were ſent to the office at Rennes; and the Society, ſenſible of the vaſt importance which the aſcertaining of this point may be of in many reſpects, deſired that they might be repeated in one and the ſame year on the hemp of all the diſtricts of the province, and the reſult of their firſt experiments was as follows:

1. There was a ſenſible difference between the ſame hemp pulled in the three ſtates before-mentioned. 2. All

the hemp that was ſteeped in running water, was incomparably whiter than that of the ſame quality which was ſteeped in ſtanding water. 3. The hemp which was pulled before it was ripe, acquired the greateſt degree of whiteneſs. 4. The whole of the loſs of ſubſtance, upon ſumming up the waſte occaſioned by each particular preparation, was leaſt upon the whiteſt hemp; but that which had been ſteeped in ſtanding water yielded a greater quantity of fine fibres, and the great loſſes in point of quantity fell upon the firſt dreſſing. 5. The hemp which was judged to be the beſt before it was hackled, did not always preſerve its ſuperiority when hackled. That which was at firſt looked upon as only of a middling, or even of an inferior quality, proved to be the fineſt and beſt after it was hackled. This obſervation is of great importance, eſpecially when the hemp is intended for naval uſes.

"We ſhall not, add theſe truly intelligent patriots, limit our inquiries to a bare repetition of theſe experiments. We purpoſe to extend them further, in order to have facts which may be entirely relied on. We ſhall cauſe the beſt and beſt prepared of each different kind of hemp to be ſpun by the ſame hand, into as ſmall and fine threads as the hemp is capable of affording, that ſo we may judge to which of the different manners of ſteeping this plant the preference is due, by the greater diviſion of which its fibres may be ſuſceptible. Theſe threads ſhall be exactly weighed, and ſhall undergo ſimilar preparations in exactly ſimilar leyes; after which they ſhall be weighed again, in order to judge of their goodneſs by the diminution which each ſhall have ſuffered in the leyes, and by the degree of whiteneſs which each of them ſhall acquire. Theſe experiments, though extremely uſeful in themſelves, are, however, only introductory to a greater enterprize: they will lay a ſure foundation for the improvement of every manufacture of hemp, and particularly of ſail-cloth, which is an article of the utmoſt importance to all commercial nations."

The Memoirs of the Royal Society of Agriculture at Tours, for the year 1761, prefer river water, eſpecially that of rivers which run upon a bed of ſand, as the beſt for ſteeping of hemp; becauſe this water, being clear, renders the colour of the hemp brighter than it would otherwiſe be, as there is not any filth therein to ſully it: and it peels the more eaſily when ſo ſteeped, not being there liable to ſo great a degree of putrefaction, as to break the coheſion of the fibres of its bark. It is not, however, here meant, that the hemp ſhould be ſteeped in the bed of the river, becauſe the inequality of the motion of the water on the ſides, and in the middle of the hemp, would prevent the ariſing of that equal degree of putrefaction which is in this caſe eſſentially neceſſary. On the ſide of ſuch rivers, a hollow ſhould be dug three or four feet deep, and proportioned in extent to the quantity of hemp to be watered.

As it is contrary to law that the places for ſteeping hemp be made in running water, it would be of advantage to contrive them ſo that the waſte water from the ſteeping places ſhould run off upon paſture-grounds; becauſe the quantity of putrid vegetable matter which the water wherein hemp has been ſteeped carries along with it, would greatly enrich thoſe grounds; and with this view likewiſe all the water of pools or other places uſed for the ſteeping of hemp, ſhould be thrown out of them upon the graſs, as ſoon as the hemp has been removed.

It is eſſential to take heed, that the hemp be not, by any means, laid to ſteep in water in which there are any animals that might be apt to gnaw it; for theſe would cut aſunder, and totally deſtroy its fibres. Of this kind are, in particular, thoſe creatures which ſome people call freſh-water ſhrimps.

The common method of judging when the hemp has been ſufficiently ſteeped, is by trying whether the bark parts eaſily from the reed, and can be peeled off its whole length without breaking; for in this caſe it is thought to have been watered enough. However, it muſt alſo be allowed, that long practice enables the peaſants who cultivate hemp to give it, generally, a due degree of ſteeping, though they do ſometimes miſtake: and it is alſo to be obſerved, that it is the conſtant cuſtom of ſome countries to ſteep their hemp more than others. But the ſureſt way of all to diſtinguiſh whether the hemp has been ſteeped enough, is, as the Tours Memoirs remark, to take ſome of the ſtems out of the water, and then to try whether the extremity of the roots ſnaps off ſhort, and whether the bark ſeparates clear from the reed, its whole length; for in theſe caſes it is certain that the hemp has been ſufficiently watered, and it ſhould then be immediately taken out. If the bark does not ſeparate equally, but ſtops chiefly at the ſmall knots which appear on the ſtem, this ſhews that it has not been ſteeped enough.

The uſual duration of the ſteeping of the male hemp is from three to ſix days, according to the weather; and of the female hemp, from five to eight or ten days: but as only a ſmall degree of too much or too little ſteeping is equally hurtful, the utmoſt attention ſhould be exerted to hit the preciſe time of its being duly watered.

Some injudiciouſly neglect to waſh their hemp when it is taken out of the water, becauſe, ſay they, the filth brought out of the water with it will afterwards fall off: but, in the drying of the hemp, this filth gives it a bad colour, and the duſt which ariſes therefrom is extremely prejudicial to the health of the workmen.

When the hemp, after having been properly ſteeped, is taken out of the water, the bundles of it ſhould be untied, and ſpread upon ſand, or upon ſtrong rocky ground; or, if neither of theſe be at hand, it may be laid upon a field that has been lately reaped, and where the ſtubble ſtill remains ſtanding. This ſtubble will keep it hollow, and it will dry the ſooner. Some dry their hemp by ſpreading it out and ſetting it upright againſt a ſunny wall, or by laying it along the ſide of a ditch. Graſs is not fit for laying it on, becauſe there will ariſe from thence a moiſture which will rot the hemp. For this reaſon it is, that the place where hemp is ſpread to dry, ſhould be as free as poſſible from every kind of damp. When the hemp is thoroughly dry, it is bundled up again, and carried home, where it ſhould be kept in a very dry place till it is wanted for peeling or breaking.

The method of peeling hemp is ſo ſimple, that a deſcription of it would be needleſs: even children, and the aged and infirm may perform it with eaſe, by only taking one ſtalk after another, breaking the reed, and ſlipping off the bark. This may likewiſe become the employment of every perſon belonging to the farm in winter evenings, and at ſuch times as the weather will not admit of their working without doors. It muſt however be allowed, that there are ſome inconveniencies attending this method: the peeled hemp comes off in ribbands, which do not anſwer in the hackling ſo well as that which has been broken; more of the uſeleſs membranes, eſpecially towards the root, ſtill adhere to it, and, by increaſing its weight, render it, to uſe the common ſaying on this occaſion, better for the ſeller than for the buyer; beſides which, the hemp does not always peel off in equal lengths, and from thence ariſe conſiderable diſadvantages, and loſs in its future dreſſings.

The hemp which is to be broken ſhould firſt be rendered very dry; becauſe the reed will then be more brittle, and therefore part the more eaſily from the bark. There are ſeveral ways of drying it. Meſſieurs Du Hamel and Marcandier deſcribe a kind of cave or cavern, in which it is commonly dried in many parts of France. This cavern is generally ſix or ſeven feet high, five or ſix feet wide, and nine or ten feet long. A hollow under a rock is often properly made uſe of for this purpoſe: but as that cannot always be met with, it frequently is neceſſary to have recourſe to art. In this caſe, ſome form the top of their vault with dry ſtones, others cover it with broad flat ſtones, and others again only cloſe it with pieces of wood, over which they lay a quantity of earth ſufficient to ſtop up all the interſtices: but which ever of theſe methods is taken, the drying place ſhould be ſo ſituated as to be ſheltered from the north and north-eaſt winds, and be open to the ſouth, that it may receive the benefit of the ſun; becauſe the uſual ſeaſon for breaking of hemp is in clear froſty weather, when the buſineſs of the field is ſuſpended.

At about four feet above the floor of this drying place, and two feet from its mouth or entrance, three bars of wood, about an inch thick are placed acroſs the cavern, from ſide to ſide, and there fixed. On theſe bars is laid, about ſix inches thick, the hemp that is to dried. A careful perſon, which generally is a woman, then keeps conſtantly burning, under the hemp ſo laid, a ſmall fire made of fragments of the reeds of hemp that has already been broken or peeled. The perſon thus employed muſt be extremely watchful, becauſe, as this kind of fuel is ſoon conſumed, and muſt of courſe be frequently repleniſhed in order to keep a conſtant and regular fire all over the hearth (for this is abſolutely neceſſary) very great care muſt be taken that the flame do not ever riſe ſo high as to ſet fire to the hemp, which is exceedingly combuſtible, eſpecially after it has been dried ſome time. The ſame perſon alſo takes care to turn the hemp from time to time, in order that it may be dried equally in all its parts; and likewiſe to put on freſh hemp, when the former is dry enough to be taken away and ſent to the break.

Where but a ſmall quantity of hemp is to be dried, an oven is doubtleſs the ſafeſt method; and when the hemp is dreſſed at home, it may perhaps be dried as faſt by this means, as the other avocations of the family will admit of its being wanted. The only attention requiſite in this caſe, is that the oven be not ſo hot as to endanger the fine and tender fibres of the hemp: for too great a heat may not only ſcorch them, but likewiſe ſo parch the oil in the hemp, as that the hemp will afterwards remain harſh and dry, and not be ſo eaſily whitened as it might otherwiſe be.

It alſo is uſual, where the quantity of hemp is greater than can be managed with an oven, to dry it on a kiln; and this is a good method; provided the fire here be alſo very moderate, and made of ſuch materials as do not blaze or ſparkle, becauſe of the great aptneſs of dry hemp eaſily to take fire. Coke is perhaps the very beſt fuel that can be uſed for this purpoſe.

The operation of breaking hemp, by which general term is however ſtrictly meant only the breaking of the reed, which ſome call the bunn, or woody part of the ſtem, within the bark; for the bark itſelf, of which is made the filamentous ſubſtance that is ſpun and uſed in manufactures, only bends under the hand of the dreſſer, and does not break; this operation, I ſay, has hitherto generally been executed three ways, namely, by beating the hemp with beetles, which is a laborious and tedious work; or by the Dutch hand-break, which is in every reſpect much preferable to the beetle; or by fluted rollers worked by horſes, wind, or water, but of choice by the latter, where a running ſtream can be procured. This laſt is more expeditious, and leſs laborious than either of the other ways; but is dangerous to the workmen employed therein, becauſe, if by any inadvertence the rollers ſhould catch hold of their fingers, the loſs of a limb at leaſt is inevitable. The only means of preventing this dreadful conſequence, in ſuch a caſe, is to have an iron crow at hand, ready to clap inſtantly between the rollers, as is practiſed in ſugar-works, which are of a ſimilar conſtruction.

The fluted rollers are undoubtedly the beſt inſtrument for breaking hemp, becauſe the length of the ſtalk and ſtrength of the reed of this plant muſt render the Dutch-break a very tedious operation, eſpecially when large quantities of hemp are raiſed, as muſt be the caſe wherever a ſufficiency of it is cultivated to anſwer the purpoſes of the great and important manufactures in which it is employed in this nation.

The Moravian hemp mill, uſed in America, is alſo a good inſtrument. It conſiſts of a large heavy ſtone, ſhaped like a ſugar loaf, with the ſmall end cut off. A body of that form will go round in a circle, if it be moved on a plane. This is moved by a water mill, and the hemp, being laid on the floor, in its way, is bruiſed by the weight of the ſtone paſſing over it.

After the hemp has been broken, it undergoes a ſecond operation, which is commonly termed ſwingling or ſcutching. The intention here is, to ſeparate the reed from the hemp, and this is done by one or other of the following ways. In the firſt, the workman takes a handful of hemp in his left hand, and, holding it over the edge of a board, ſtrikes it with the ſharpened edge of a long, flat, and ſtrait piece of wood, commonly called a ſwingle hand, or ſcutcher. The author of the thirty-ſeventh letter in the Dublin Society's Weekly Obſervations recommends that the cutting edge of the ſcutcher be made of a circular form, in order that its greateſt force may fall on the middle of the hemp, and thereby ſpread it, by which means it will be the more equally cleared of the remaining broken pieces of the reed. But this method is, at all events, very laborious and tedious; and therefore water mills have been erected, in which ſeveral ſcutches, fixed in the ſame axle-tree, are moved with great velocity. Here the work is performed with great expedition, and much leſs fatigue to the workmen; but a greater waſte is made of the hemp, owing to the velocity with which this engine is turned.

Before the hemp thus prepared is heckled, it uſually undergoes a third operation, called beetling, the deſign of which is to looſen and thereby more thoroughly ſeparate its fibres. The beetles uſed for this purpoſe are moved either by hand or by water.

We have already deſcribed the inſtruments invented by Mr. Macpherſon for performing theſe operations with very great facility, under the article flax, and therefore need not be repeated here. See the article FLAX.

Mr. Marcandier propoſes, inſtead of ſcutching and beetling the hemp, to give it a ſecond ſteeping after it has been peeled or broken, the better to ſoften the bark that may ſtill remain hard, and not be eaſily brought to a proper degree of fineneſs. For this purpoſe, the hemp intended to be ſteeped a ſecond time is divided into ſmall parcels: theſe are tied looſely round the middle with a piece of packthread, in order that they may be managed eaſily without mixing or entangling them; and the hemp thus tied is laid in a veſſel filled with water, where it is left, more or leſs time, according to the hardneſs of its fibres and the quantity of glutinous adherent matter ſtill remaining on it. Three or four days are always ſufficient for this purpoſe: but a leſs time will do, if the hemp wants only to be cleared of that adherent matter. When it has been thus ſteeped long enough, it ſhould be waſhed very clean in a running ſtream; and if many of the fibres of the hemp are found to cling together in what our author calls ribbands, he adviſes to beat them in the manner that linen is beaten in bleaching.—It is ſafer to err in too little, than in too much ſteeping; becauſe, after the fibres have been looſened in the break, they will be the more liable to be deſtroyed by even only a ſlight degree of putrefaction. When the fibres of the hemp are ſufficiently diſengaged from each other, they ſeem, while immerſed in water, to be as completely dreſſed as if they had already paſſed through the hackle. After this watering, the parcels are opened, ſpread on a board, and laid in the ſun to dry.

M. Marcandier obſerves farther, and likewiſe from his own experience, that, after this preparation, the hemp may be again ſteeped and waſhed in a leye of pot-aſh or wood aſhes, rendered perfectly clear of all filth. This will undoubtedly contribute to the removing of any ſuch matter ſtill remaining in the hemp, as muſt neceſſarily fall off in the future preparations, before the manufacture made of the hemp is fit for uſe. And, indeed, a leye of this kind bids fair to be of ſervice in the preparing of flax as well as hemp; becauſe, both being thereby perfectly freed from every particle which muſt otherwiſe fall off in the future operations of hackling, ſpinning, bleaching, &c. the cloth or other manufacture made of them will be proportionably better and more durable. The time taken up in bleaching will, in particular, be very much ſhortened thereby.

In the whole of this proceſs, the water ſhould be warm, becauſe warm water acts more powerfully than cold in diſſolving the impurities which are to be ſeparated from the hemp; and it is alſo an indulgence to the people employed in this buſineſs, who might otherwiſe be more apt to ſlur over their work. It will therefore be moſt adviſable to perform this operation when the weather is moderately warm, thereby to ſave the trouble and expence of making fire to warm the water or the leye.

M. Marcandier having experienced the efficacy of horſe-cheſnuts in the bleaching of linen and cleanſing of woollen ſtuffs, made likewiſe uſe of a ſolution of them in water, as a leye for preparing hemp in the manner above deſcribed. The method of preparing this leye is as follows: the cheſnuts are peeled, and then raſped as fine as poſſible into ſoft water, in the proportion of two, or, at moſt, three nuts to every quart of water. This is done ten or twelve hours before the mixture is to be uſed, and in the mean while it is ſtirred from time to time, the better to diſſolve theſe raſpings and impregnate the water. The laſt ſtirring is given a quarter of an hour at fartheſt before the water is drawn off from the coarſer part of the raſpings, which ſinks to the bottom; and this is done, either by inclining the veſſel and pouring the leye off gently into another, or by lading it out by hand, while the water is yet white, and froths like ſoap-ſuds. In order to uſe this leye, it is made rather hotter than the hand can well bear, and the hemp is then ſteeped and waſhed in it, as in ſoap-ſuds.

The hemp thus prepared is carefully dried, laying the fibres ſmooth and as little intermixed as poſſible. When dry, it is doubled, and twiſted at the ends, or tied up in bundles. The farther buſineſs of the hemp-dreſſer need only be an eaſy beating of the hemp, and that chiefly to ſeparate the fibres that may have clung together in the drying, and to the common operations of the heckle. The danger ſo often fatal to the dreſſers of hemp, from the duſt drawn in with their breath, will alſo be hereby in a great meaſure avoided; and the hemp thus prepared will be white, ſmooth, ſoft, and flexible.

The ſame author extols highly the various uſes to which hemp thus prepared, and even its tow, or what is ſeparated from it by the heckle, may be applied. This hemp, he informs us, may be dyed like ſilk, wool, or cotton, and may be made into cloth, ſtuffs, and garments of all kind; and that a great advantage attending the uſe of this material is, that it will not be in danger of being deſtroyed by thoſe worms which eat woollen cloth. Theſe advantages attending hemp prepared in the manner which Mr. Marcandier has propoſed, may well deſerve the farther experiments and attention of our manufactures, eſpecially at Mancheſter, or wherever elſe our mixed ſtuffs are made.

Having now deſcribed the manner of cultivating hemp, and the ſeveral methods by which it is prepared for the manufacturer; we ſhall cloſe this article with M. Du Hamel's following directions how to judge of the quality of the hemp that has been dreſſed, and is intended for manufacturing.

It is of importance that the hemp in bales, for ſo it is always packed, be not damp; becauſe it would then weigh heavier than it ought, and would be apt to contract a heat, which might end in rottenneſs. The hemp in each head, or bundle, ſhould be as nearly as poſſible of equal length, and diminiſh gradually from the root end to the point. That which has been broken is ſofter, and its fibres are more ſeparated, than that which has been peeled. From hence it would ſeem as if this hemp might be worked up with leſs loſs of ſubſtance than peeled hemp; but yet, in fact, it generally yields the greateſt quantity of refuſe, not only becauſe it is never ſo well cleared from the reed, but alſo becauſe its fibres being mixed and intangled with each other, a greater number of theſe are broken when it is heckled. It is, however, on the whole, moſt probable, that breaking may be the beſt way of dreſſing very hard and ſtrong hemp, becauſe the break certainly contributes greatly to render it ſoft and fine.

Too great a ſtreſs is ſometimes laid on the colour of hemp: that which is of a ſilver or pearl colour is reckoned the beſt, that which has a greeniſh hue is likewiſe deemed good, that which has a yellowiſh caſt is leſs eſteemed, and the dark colour only is rejected: but at the ſame time it ſhould be obſerved, that the colour of hemp depends chiefly on the ſort of water in which it has been ſteeped, that being dark which has been ſteeped in ſtanding water, and that light coloured which has been ſteeped in running water; and therefore, that the colour of the hemp does not in fact deſerve very great attention, unleſs it be black, or of a very dark brown. In theſe caſes, indeed, it may be preſumed, that the hemp has either been ſteeped too much, or that it was packed up ſo moiſt as to have been heated in the bale. The ſmell of the hemp is more to be relied on than its colour; and in conſequence thereof, that which has a rotten, mouldy, or heated ſcent, ſhould be abſolutely rejected, whilſt that which ſavours ſtrong of only the natural ſmell of hemp ſhould be preferred, becauſe this indicates it to be of the growth of the laſt crop; a circumſtance which is much attended to in the rope-yards, becauſe new hemp is found to waſte much leſs in the working than old, though it is at the ſame time true, that it does not heckle ſo fine.

In general, it may be laid down as a rule, that the hemp which feels ſofteſt, and whoſe fibres are the fineſt and moſt equally ſeparated, is the beſt.

M. Du Hamel, who has long exerciſed with diſtinguiſhed honour, perfect diſintereſtedneſs, and judgment equal to his high and well deſerved fame, the important office of inſpector general of the marine of France, tells us, that the common way of examining the hemp there, in order to judge of its ſtrength and fitneſs for naval uſes, is, to take here and there a little of it out of each bale that is delivered into the royal ſtores, and to try whether, when a few of its fibres are put together, they break eaſily, or with difficulty, between one's hands. If they reſiſt much, the hemp is judged to be good; and if, on the contrary, they break eaſily, it is deemed bad. But this he thinks an erroneous way of judging of its quality, becauſe the fibres of coarſe and hard hemp are often ſtrong enough to bear this trial; and yet, as appears from numbers of experiments which he made with admirably nice underſtanding and preciſion, the ropes made of that hemp never are near ſo ſtrong, and conſequently not near ſo ſerviceable as thoſe made of fine, ſoft, and ſupple hemp, the fibres of which might be broken with leſs force than the former. If, to this fineneſs, suppleneſs, ſoftneſs, and ſilky feel of the hemp, ſtrength of fibres be added, ſuch hemp is perfect, and the works made of it will be leaſt bulky, and at the ſame time by far the ſtrongeſt and moſt durable. For this reaſon in particular it is, that the male or karl hemp is always preferred to the female or fimble hemp, eſpecially when this laſt has been let ſtand longer than the other, to ripen its ſeeds, in conſequence whereof it become harder and more woody, and does not yield ſo fine fibres; nor does it, therefore, bear ſo great a price. The female hemp is generally browner than the male; this laſt being of a brighter and more ſilvery colour: but however, if, upon the whole, there be not a greater quantity of female hemp in a bale, than there is of male, M. Du Hamel thinks it need not be complained of.

Two farther, and thoſe very eſſential, circumſtances which the buyer ſhould notice in his choice of hemp, are, firſt, to examine whether any of the reed be left, and whether it adheres ſtrongly to the hemp; for if it does, this is a ſign that the hemp has not been ſteeped enough: and, ſecondly, if it be free from all remains of the reed, to examine attentively its upper end, or point; for this will break too eaſily if it has been ſteeped too much, otherwiſe it will retain a proper degree of ſtrength.

The ſtore-rooms for keeping hemp ſhould be raiſed ſo high from the ground, as to be very dry; and they ſhould alſo be well aired. Great care ſhould be taken that the hemp be thoroughly dry before it is piled up in them, and ſpaces ſhould be left between the piles, for the circulation of freſh air whenever this is requiſite. The hemp ſhould alſo be ſorted when it is piled, in ſuch manner as to put together in the ſame heap, as nearly as poſſible, that which is of equal length, and of a ſimilar quality.

The owner of theſe ſtores ſhould examine them carefully from time to time, by thruſting his arm as far as he can into the piles, in order to judge whether the hemp heats; for if it does, the pile or heap ſhould be immediately taken down, and the bundles ſhould be untied, aired, and afterwards removed into other places.

Rats and mice muſt be guarded againſt with all poſſible caution; for they are extremely fond of forming their neſts in hemp, in doing of which they gnaw aſunder ſuch quantities, as thereby to occaſion very great loſs and damage.

HEPS, the fruit of the ſpecies of wild roſe, generally written hips.

HERBAGE, graſs, paſture in general. It is alſo uſed to ſignify the tythe and right of paſture.

HERD, a number of beaſts together, generally black cattle.

HERDSMAN, a keeper of herds, one employed in tending cattle.

HIDE, the ſkin of beaſts, but particularly applied to thoſe of large cattle, as bullocks, cows, horſes, &c.

Hide *of Land*, was ſuch a quantity of land as might be ploughed with one plough within the compaſs of a year, or ſo much as would maintain a family; ſome call it ſixty, ſome eighty, and ſome an hundred acres.

The diſtribution of this kingdom by hides of land is very ancient, mention being made of it in the laws of king Ina. Henry I. had three ſhillings for every hide of land, in order to raiſe a dowry for his daughter: this tax was called hidage.

HIDE-BOUND, a diſtemper in horſes, when the ſkin ſticks ſo faſt to the back and ribs, that the hand cannot ſeparate the one from the other, without great difficulty; his body is at the ſame time lean, his back-bones ſtand up, his guts are for the moſt part deficient in moiſture, and his dung dry, and more offenſive than common.

If a horſe become hide-bound by hard riding and ill keeping, he may be cured by good keeping. If it be the effect of a fever, or ſome other diſeaſe, if that be cured which is the cauſe, the effect will ceaſe; but if he has no fever upon him, and he is hide-bound only from lowneſs of blood and ſpirits, give him boiled barley, white-water, or the like, and when his fleſh is raiſed, harden it with good oats, beans, and moderate exerciſe.

HILL, an elevation of ground, leſs than a mountain, a down.

HILLS, are of great uſe in a garden; as,

1. They ſerve as ſcreens to keep off the cold, and nipping blaſts of the northern and eaſtern winds.

2. The long ridges and chains of lofty mountains, being generally found to run from eaſt to weſt, ſerve to ſtop the evagation of thoſe vapours towards the poles, without which they would all run from the hot countries, and leave them deſtitute of rain.

3. They condenſe thoſe vapours, like alembic heads, into clouds; and ſo, by a kind of external diſtillation, give origin to ſprings and rivers; and, by amaſſing, cooling, and conſtipating them, turn them into rain, and by that means render the fervid regions of the torrid zone habitable.

4. They ſerve for the production of a great number of vegetables and minerals, which are not found in other places.

It hath been found by experiment and calculation, that hills, though they meaſure twice as much as the plain ground they ſtand upon, yet the produce of the one can be no more than the other; and therefore, in purchaſing land, the hills ought not to be bought for more than their ſuperficial meaſure, *i. e.* to pay no more for two acres upon the ſide of an hill, than for one upon the plain, if the ſoil be equally rich.

It is true, that thoſe lands that are hilly and mountainous are very different, as to their valuable contents, from what are found in flat and plain ground, whether they be planted, ſown, or built upon; as for example:

Suppoſe an hill contains four equal ſides, which meet in a point at the top; yet the contents of theſe four ſides can produce no more grain, or bear no more trees, than the plain ground on which the hill ſtands, or than the baſe of it; and yet by the meaſure of the ſides there may be double the number of acres, rods, and poles, which they meaſure on the baſe or ground-plot.

For as long as all plants preſerve their upright method of growing, hilly ground can bear no more plants in number than the plain at the baſe.

Again, as to building on an hill, the two ſides of an hill will bear no more than the ſame number of houſes that can ſtand in the line at the baſe.

And as to rails, or park-paling over an hill, though the meaſure be near double over the hill to the line at the bottom, yet both may be incloſed by the ſame number of pales of the ſame breadth. *Miller's Gard. Dict.*

HILLOCK, a little hill.

HIVING *of Bees*, the placing a ſwarm of bees in a hive, in order to have the benefit of their labours. *See the article* Bee.

HOE, a tool made like a cooper's adz, to cut up weeds in gardens, fields, &c. This tool is commonly called the hand-hoe.

This inſtrument is of great uſe, and ſhould be more employed in hacking and clearing the ſeveral corners, cracks, and patches of land, in ſpare times of the year, which would be of no ſmall advantage thereto.

Horſe Hoe, a large kind of hoe, drawn by horſes, and uſed to ſtir the intervals in the New Huſbandry, and clear the corn from weeds.

Under the article Cultivator, we have deſcribed the inſtruments uſed abroad for this purpoſe; and ſhall here give two very uſeful inſtruments of the ſame kind, invented by the ingenious Mr. Hewitt, who preſented them to the Society for the Encouragement of Arts, &c. where they may be ſeen. The following letter, deſcribing theſe inſtruments, was ſent by the inventor to the Society.

Gentlemen,

Peruſing the Eſſays on Huſbandry, I obſerved particularly, that the author, page 105, expreſſeth hopes of ſeeing ſome "new-invented plough, cheap, ſimple, and rightly calculated for deſtroying weeds; keeping plants clean; and ſtirring the ground:" and, page 106, further ſays, "now as moſt people prefer uſeful, and cheap, to elegant and expenſive inventions, it is natural to wiſh for a hoe-plough intirely ſimple, and not coſtly. For the mechaniſm of thoſe deviſed hitherto, by the ingenious lovers of agriculture, is of ſo perplexed, and complicate a nature, that it will no ways anſwer the common purpoſes of huſbandry: but, being perpetually out of order, will throw the poor ploughman into deſpondency; and the rather, as neither he, nor the country plough-wright, can comprehend how to rectify any defects, or accidents, except with extreme difficulty."

The very name of a hoe-plough ſuggeſted the idea of an inſtrument, which I ſhall call a horſe-hoe; whoſe conſtruction is intirely new, ſimple, and much leſs coſtly than a common plough. Such as country plough-wrights, and ſmiths, are able to make; and ſuch as common ploughmen are able to uſe: and which ſeems, according to the hopes of the aforeſaid author, to be rightly calculated for deſtroying weeds; keeping plants clean; and ſtirring the ground.

This horſe-hoe, a model of which I beg leave, in the moſt reſpectful manner, to preſent to this honourable Society, I hope may be of a very extenſive uſe in agriculture, as it muſt be much more efficacious, and expeditious too, than any kind of hand-hoe for the deſtruction of weeds, and ſtirring the ground. For if the inſtrument does not cut below the crown, or head, of the roots, ſuch roots will ſprout again, and the firſt labour become fruitleſs; which indeed is too often the caſe of hand-hoeing: as the labourer, ſometimes, only ſcratches the ſurface of the earth, and ſhaves off the leaves of the weeds, the roots remaining intire and unhurt, to vegetate again. With this inſtrument, the huſbandman may hoe the ground ſo deep, that it will infallibly cut aſunder the roots of every weed it meets with, below the crown or head; and, conſequently, either deſtroy them, or at leaſt greatly check their future growth that ſeaſon.

This inſtrument is calculated for hoeing the intervals between the generality of plants in ſtraight rows: ſuch as tranſplanted lucerne, beans, peaſe, and turnips, ſown with a drill-plough, &c. In large gardens, hop-grounds, nurſeries, and plantations of young trees, much labour, and expence, in hand-hoeing, may probably be ſaved by the uſe of it.

In the county of Norfolk (and probably in many other places) the huſbandmen, in the months of March and April, preparing their lands for barley, generally give them a certain number of earths, according to the phraſe of that country; or, in other words, plough them a certain number of times. In thoſe months the weather is frequently very dry; and the ſoil being turned over and over again, and expoſed to the ſun and wind, becomes ſo duſty, that a great part of the ſeed will not grow without rain; which, ſometimes not falling in many weeks after the ſeed-time, cauſeth the crop to conſiſt of different growths: ſo that when the firſt grown crop is ripe for the ſcythe, the latter is but juſt eared. This evil, perhaps, may, in ſome meaſure, be remedied by the uſe of this horſe-hoe, inſtead of the common plough, at that ſeaſon. For this will ſtir, and looſen, the earth as effectually, as

The Common Horse Hoe
on Plate 26 Fig 4

the other; and, at the ſame time, neither remove, nor turn it over, which ſeems to be beneficial, in a drought, upon very light and ſandy ſoils.

With reſpect to foul ſummer fallows too, it may be of ſingular ſervice. The common plough buries the weeds, of which many grow again. This horſe-hoe will cut their roots aſunder, below the ſurface of the earth; and by leaving their foliage above it, expoſed to the ſummer ſun, the greateſt part of them will wither and die: ſo that they will not give the huſbandman much more trouble the remaining part of the ſummer. And, as this hoe may be eighteen or twenty inches broad, two acres of land may be hoed by it, as ſoon as one acre can be ploughed, by the common plough.

This new inſtrument is intended for public benefit; and to the conſideration of the public, as well as of this honourable Society in particular, it is freely ſubmitted. If it be judged an uſeful implement in huſbandry, well; if not, the pleaſure that has ariſen from the hope of doing good, has amply rewarded, for his trouble, the inventor, who has the honour to ſubſcribe himſelf,

GENTLEMEN,
Hadleigh, Your moſt humble,
April 19, 1766. and obedient ſervant,
WILLIAM HEWITT.

P. S. Since I had completed this model, I apprehended, that its utility might be rendered ſtill farther extenſive, by a very ſmall alteration; therefore, gentlemen, I take the liberty of laying before you another model, calculated for hoeing the furrows between wheat ridges, which all farmers acknowledge to be very good huſbandry, though many of them are deterred from the practice of it, for want of a cheap expeditious method of putting it in execution. An inſtrument of this kind, I am perſuaded, will very greatly expedite that uſeful work: and if it meets with your approbation, gentlemen, many lovers of improvement in agriculture may be induced to give it a fair and impartial trial.

An Explanation of the HORSE-HOE, *Plate* XVII. *Fig.* 3.

A repreſents a ſmall round curved iron-bar, fixed upon each end of the axle of the wheel, by which the horſe-hoe is drawn.

B, the wheel three feet in diameter.

C c two flat iron-bars, three feet long, fixed upon the axle of the wheel, at D d, and to the ſides of the hoe; at E e, by bolts and ſkrews: upon theſe bolts, as well as the axle of the wheel, they are moveable.

F a ſmall round iron-bar, faſtened at each end, into the two bars; C c (to ſtrengthen them) at G g, from and to G; theſe bars may be ſtraight. From G to E, let them be curved.

H, the hoe itſelf; the breadth of which may vary according to the different diſtances of the rows of plants, whoſe intervals are to be hoed.

KK, two little flat curved iron-bars, fixed by bolts, upon which they are moveable, to the bars C c. Each of them paſs through a ſtaple, fixed into the ſides of the hoe at L l. In both theſe little bars is a row of holes. In each of the ſtaples, is one hole; and, directly oppoſite to them, one hole in each of the ſides of the hoe: and, by means of two bolts, paſſing through theſe holes, and ſome of the holes in the bars K K, the hoe is fixed to any poſition; ſo that the ground may be hoed as near the ſurface, or as far below it, as is neceſſary.

M M, two wooden handles, fixed to the two ſides of the hoe, and to each other, by the croſs bar O; as long, and as high from the ground, as the handles of a common plough.

Figure 4. repreſents the horſe-hoe, intended for hoeing the furrows, between wheat ridges: which differs only, in one reſpect from the other. That hoe is flat; this is curved. The breadth, and curvature of this, muſt depend intirely upon the breadth, and curvature of the furrows, to be hoed. In which reſpect, every ſenſible farmer can eaſily direct the ſmith how to form it. But, after all, if any perſons be inclined to make trial of this inſtrument, I would adviſe them not to truſt to a verbal deſcription, but to ſend for a model of it to Thomas Tillett, a very ingenious ſmith at Hadleigh in Suffolk.

HOEING, the breaking or dividing the ſoil by tillage, while the corn or other plants are growing thereon.

It differs from common tillage, which is always performed before the corn or plants are ſown or planted, or in the time of performing it; and it is much more beneficial to the crops than any other tillage. This ſort of tillage is performed various ways, and by means of different inſtruments. Land which, before the tillage, would have yielded little, though the more it is tilled before ſowing, the more plenty of corn it yields, yet, if tilled only before the ſowing, will always have ſome weeds, and they will partake of the advantage of the tillage as well as the corn. This is one reaſon for an after tillage, ſuch as that by hoeing. But there is another conſideration that yet more requires it; this is, that as ſoon as the ploughman has done his buſineſs, by ploughing and hoeing the land, after ſowing, the ſoil, of its own accord, begins to undo it all again by tending towards its original texture and ſpecific gravity again; the altering of which was the only buſineſs of all the former tillage. The breaking the particles of the earth, and making in it new pores, and new particles, or new ſuperficies, is the great buſineſs of the plough and harrow; but, as ſoon as their uſe is over, the earth begins to coaleſce again into its own form, the particles unite together, and the artificial pores in a great meaſure cloſe up. The ſeed is nouriſhed in a worſe ground than it was firſt put into, and the more the plant grows up, and requires a larger ſupply of food, the worſe the paſture becomes. While nouriſhment is thus denied the growing plants, they are at the ſame time choaked with weeds, which being of a hardier nature than they, will grow with leſs ſupplies, and therefore thrive more vigorouſly, and rob them of a great part of the little food the land before allowed them.

Farmers in all ages have been acquainted, in ſome degree, with the uſe of tillage and dung to crops of uſeful plants; but they have ſo ill managed the time of giving theſe aſſiſtances to nature, that there is no doubt but one third part of the nouriſhment raiſed by dung and tillage, if it were given to plants and corn at many proper ſeaſons, and proportioned to the different times of their exigencies, would be of more benefit to the crop than the whole is, when applied all together at the time of ſowing.

Nature, by what ſhe does in the animal œconomy, ſeems to point out to us ſomething like the remedying this by hoeing; for when the teeth, as the plough, have tilled that ſoil or maſs which is earth altered; and when the ſaliva and the juices of the ſtomach have ſerved to divide and attenuate it, as the ſalts of dung and other manure do land; after all this, the bile and pancreatic juices are ordained to farther attenuate it, at the very time when it is ready to be exhauſted by the numerous mouths of the lacteals, ſituate in the inteſtines. This laſt operation of theſe juices ſeems analogous to the meliorating the ſoil by hoeing, after the plants are grown, and are becoming fit for uſe.

Tranſplanting is nearly allied in its nature to hoeing, but it is much inferior. The nature of this will not admit of its being a general thing; and even if it would, hoeing is better: for by tranſplanting, the plants can only be kept up to a certain period, after which they will not bear it; but hoeing may be uſed to them with advantage, to their utmoſt ſtanding, and make them vigorous all the while.

The roots of a plant are all neceſſarily broken off in tranſplanting, and it requires ſome time for it to ſtrike a whole ſet of new ones; and if the earth about it is not kept thoroughly moiſtened all this time, the new formed roots will not be able to ſhoot, and the plant will ſtarve in the midſt of plenty: but, on the contrary, in hoeing, the ſame advantage of a new paſture for the plant is obtained, by the breaking the particles of the earth, and at the ſame time no more of the roots are broken off than can eaſily be ſupplied, and the reſt remaining in their places, the plant continues growing without that ſtop or decay, which muſt happen on tranſplanting, and which it recovers only by degrees. It is obſerved, that ſome plants are the worſe for tranſplanting: lucerne and ſaintfoin are never ſo good after tranſplanting, as when they are left in their native places, at the ſame diſtances; and finochia, removed, is never ſo good and tender as when it is not.

This laſt plant receives ſuch a check from tranſplanting in its infancy, that it has afterwards a diſeaſe like the rickets, which cauſes knots and ſwellings in it, that ſpoil it as a delicacy. All the tap-rooted plants ſuffer by tranſplanting; for it is neceſſary in this to cut off the long-main root, which afterwards, however good the ſoil may be, never arrives at the length it otherwiſe would have had, and which was neceſſary for the ſucceſs of the plant.

One great benefit of hoeing is, that it keeps plants moiſt in dry weather, the advantage of which to their growth is eaſily ſeen. This good office it performs on a double account. Firſt, as they are better nouriſhed by hoeing, they require leſs moiſture, and conſequently carry off leſs; for thoſe plants which receive the greateſt increaſe, having moſt terreſtrial nouriſhment, carry off the leaſt water, in proportion to their augment, as is proved by Woodward's experiments. Thus barley or oats, being ſown on a piece of ground well divided by tillage and dung, will come up and grow well without rains, when the ſame grains ſown on another part of the ſame land, not thus dunged or tilled, will ſcarce come up at all without rains, or if they do, will wait wholly for the rains for their growth and increaſe.

The hoe alſo, particularly the horſe-hoe, for the other does not go deep enough, procures moiſture for the roots from the dews which fall moſt in dry weather; and theſe dews ſeem to be the moſt enriching of all moiſture, as it contains in it a fine black earth, which will ſubſide from it in ſtanding, and which ſeems fine enough to be the proper pabulum, or food for plants.

A demonſtration that the tilled earth receives an advantage from theſe dews, which the untilled does not, is this; dig a hole in any piece of land, of ſuch a depth as the plough uſually goes to; fill this with powdered earth, and, after a day or two, examine the place, and the bottom part of this earth, and bottom of the hole, will be found moiſt, while all the reſt of the ground, at the ſame depth, is dry. Or, if a field be tilled in lands, and one land be made fine by frequent deep ploughings, while another is left rough by inſufficient tillage, and the whole field be then ploughed acroſs in dry weather, which has continued long, every fine land will be turned up moiſt, and every rough land as dry as powder from top to bottom.

Although hard ground, when thoroughly ſoaked with rain, will continue wet longer than fine tilled land adjoining to it, yet, this water ſerves rather to chill than to nouriſh the plants ſtanding in it, and to keep out the other benefits of the atmoſphere; it leaves the ground much harder alſo than before, when it is finally exhaled out of it; and when, at length, the earth is then hardened, it can receive no benefit from any thing leſs than a deluge of rain, which ſeldom falls till the ſeaſon of vegetation is over.

As fine hoed ground is not ſo long ſoaked with rain, ſo the dews never ſuffer it to become perfectly dry. This appears from the flouriſhing ſtate of plants in hoed ground, while others near them, but in ground not hoed, are ſtarved for want of nouriſhment. The common opinion is againſt this, but obſervation proves it to be true againſt the common opinion. The vulgar are guided by this, however, and will not hoe their ground in dry weather for fear of letting in the drought, as they call it; whereas hoeing this is the only method of keeping away the drought, and without either this, or watering, they muſt periſh in theſe ſeaſons. *Tull's Horſe-Hoeing Huſbandry.*

HOG, the name of an animal too well known to need any deſcription here.

Theſe creatures are very advantageous to the countryman, not only for their great increaſe, but alſo becauſe they feed upon what would otherwiſe be of no uſe or advantage, but would be thrown away; as whey, waſhings of tubs, grounds of drinks, diſh-water, grains, &c. and their fleſh being beſt ſalted, or kept in pickle, may be eat in the ſpring, when other meat is at the deareſt; beſides the help it affords to the taking off the produce of the garden, and the variety of diſhes of the offal. Swine are indeed very greedy, and very apt to root up ground, and break the fences; and therefore the greater care muſt be taken to keep them both well rung and well yoked.

The largeſt ſwine, and the greateſt number for any particular places, are bred in Leiceſterſhire, and ſome parts of Northamptonſhire, and in the clayey countries adjacent; probably from the large quantities of beans and peaſe ſown in thoſe parts.

The wild kind are not ſo large as thoſe juſt mentioned, but are much more hardy, and better meat.

In the choice of hogs, chuſe ſuch to breed out of as have long, large bodies, are deep ſided and bellied, that have a ſhort noſe, thick thighs, ſhort legs, high claws, thick neck, a ſhort ſtrong groin, and a thick chine, well ſet with ſtrong briſtles.

To have too many ſows in one yard is not good, for their increaſe is ſo great, that they will, for want of food, not only devour whatever comes in their way, but eat one another: for a ſow will bring forth pigs three times in a year, that is, at the end of every ſixteen weeks. It is common for them to have thirteen or fourteen pigs at a litter; but the ſow can rear no more than ſhe has teats to ſuckle them with; the reſt muſt therefore be deſtroyed, or put to other ſows. If the ſow miſs the time of going to boar, that ſhe might in courſe have done, give her ſome oats parched in a pan, in her waſh, or the ſmall end of a runnet bag, and it will cauſe her quickly to go to boar. The pigs which you rear, after you have choſen out the beſt for boars and ſows, the males muſt be gelt, and the ſows ſpayed; the ſpayed gelts, as the farmers call them, are eſteemed the moſt profitable, becauſe they have a much larger quantity of fat upon their inwards, than other hogs. Young ſhoots, which are ſwine of about three quarters of a year old, are beſt for pork, and thoſe of a year, or a year and a half, for bacon. The beſt age for a ſow to bring forth pigs, is from one to ſeven years old; and the beſt age for the boar, is from two to five years old, at which time it is beſt to geld him, or ſell him for brawn; the beſt pigs to rear, are thoſe which are pigged in the ſpring, and thoſe pigged in March for pork in October.

The beſt way of taking care of ſwine, is to feed them ſo as to keep them in middling plight, till you deſign to fat them; for if you keep them too fat, it will endanger their health; and too lean will render them too ravenous. It is good to give them ſuch ſwill as you have every morning and evening, to make them come home to their ſtyes. The reſt of the day, let them graze, and get ſuch food as they can; but when the corn is upon the ground, you muſt be careful to keep them within bounds. Moiſt ſedgy grounds are good for them, the roots of which they will eat; and all ſorts of haws, heps, ſloes, crabs, acorns, maſt, cheſnuts, &c. with which, if you have plenty enough to fat them, their fleſh will eat much better and ſweeter than if fatted in a ſtye. Some, indeed ſay, their fat will not be ſo ſolid, nor ſo profitable, and therefore they commonly ſhut them up for a week or ten days, and feed them with dry peas; but this is a miſtake, experience having ſhown, that hogs fatted with acorns only have their fat as ſolid as thoſe fatted with peas. In fatting hogs in ſtyes, they obſerve to give them meat often, and but little at a time, that it may be always freſh; and likewiſe to give them as much water as they will drink, and to keep them very clean, which will help their fatting, and improve the taſte of their fleſh. But where the huſbandman lives remote from woods, or the year ſhould fail of producing acorns or maſts, they commonly fat them wholly in ſtyes with peas, if cheap; if dear, the meal of barley, rye, or offal corn, according as they are cheapeſt, which they mix with water, whey, or ſkimmed milk: with theſe they feed them till fat, which will commonly be in about a month's time, and then they feed them with peas a little before they kill them.

Obſerve, that every ſtye have a yard well paved with ſtone, if poſſible, for the hog to go out and eaſe and air himſelf, that he may keep his lodging the cleaner.

In Lieceſterſhire they have a very eaſy method of fattening great numbers of ſwine, which they do by ſtacking up their peas and beans in the form of a ſmall cottage. This they ſet near ſome running brook, and hedge a yard in round about it, taking ſome part of the ſtream into the yard for the hogs to drink at; into this yard they turn ſuch a number of hogs as they think their peas or beans will fat, where they let them live till their proviſion is conſumed, cutting the rick down, and giving it to them as they can eat it. *Mortimer's Huſbandry, vol.* I. *p.* 244.

HOG-SHEEP, or *Hoggrel*, a ſheep of a year old.

HOLT, a wood.

HOLM, an iſland in a river; it alſo ſignifies the holly.

HOOP, a meaſure equal to a peck, or quarter of a buſhel.

HOP, a well known plant of the reptile kind, whoſe flower is a principal ingredient in beer, and other malt-liquors.

A rich, deep, mellow, dry ſoil, rather inclining to ſand than clay, is, in general, beſt adapted to the cultivation of hops; but a black garden mould is excellent for this purpoſe. Stiff clays, ſpewy lands, ſuch as are apt to be overflown by floods, hard gravels, ſtony grounds, very ſandy ones, and ſuch as are not at leaſt a foot and an half deep, are altogether improper for hops.

The beſt ſituation for hop-grounds is ſuch as inclines to the ſouth, or lies open to it, ſo that they may have the benefit of the ſun during the greateſt part of the day. It muſt alſo be open, for the air to have a free paſſage and circulation between the plants, and it ſhould be ſo ſheltered to the eaſt, north, and weſt, that neither the froſty winds in the ſpring may cut off the young ſprouts, nor the more ſtormy ones in ſummer and autumn deſtroy the full-grown hops.

The ground and ſituation being choſen, the next buſineſs is to prepare it for the planting. In many parts of England, when the ground is broken up for this purpoſe, the plough goes firſt, and men follow it with the ſpades, with which they dig one ſpit deep in the furrows where the plough has paſſed, throw up the earth thus dug, and ſo continue to plough and dig till the whole is done. Either this tillage, if it be well performed, or the deep ploughings, croſs-ploughings, and harrowings, by which careful huſbandmen prepare their land for corn, will fit this for being ſown with turnip ſeeds in the end of July, or beginning of Auguſt, and if the turnips are hoed twice, ſo as to be left about eight inches aſunder, they will yield a good crop, the weeds will be deſtroyed, and the ground will be rendered looſe and fine. Another good ploughing after the turnips are taken off, will, with the enſuing winter mellowing, render it fit for being planted with hops in the ſpring.

The beſt time to begin ploughing is in October, in order that the ſoil may be properly prepared to receive the benefits of the winter's froſts, rains, and ſnows; after which, in the beginning of ſpring, it ſhould be well and deeply ploughed again, and well harrowed; and after another ploughing in March, which will be of very great ſervice, it ſhould be harrowed fine, and laid as even as can be.

When the ground is in proper readineſs for planting, ſtretch along a ſtraight ſide of the field, at fifteen or twenty feet diſtance from the hedge, and parallel to it, a line with knots or rags tied in it, as far aſunder as you deſign your hills to be, and ſtick in the ground a ſharp-pointed ſtick at every knot, as marks for the places where the hills are to be made; continue the line in this manner the whole length of the ground, and from this firſt row you may mark out the reſt of the field, either in ſquares, chequer-wiſe, at the intended diſtance of the hills, or in the quincunx form, where the hills of every row lie oppoſite to the middle of the firſt, in a triangular form.

The diſtance of the hills ſhould be, in ſome meaſure, regulated by the nature and goodneſs of the ſoil: but, in every caſe, they ſhould be far enough aſunder to admit the hoe-plough at all times without danger to the plants. If the ſoil be dry and ſhallow, ſix or ſeven feet will be a convenient diſtance: but if it be rich, moiſt, and apt to bear large hops and leaves, it may be right to allow eight or nine feet between the hills.

The moſt proper ſeaſon for planting hops, is from the beginning of March to near the middle of April, at the time when they begin to ſhoot. The Kentiſh huſbandmen approve likewiſe of October: but the common ſorts are not to be procured then, unleſs it be from a ground that is to be dug up and deſtroyed; beſides which, there is ſome danger of their rotting in the earth, if the winter ſhould prove very wet.

There are ſeveral ſorts, though the botaniſts allow but one ſpecies of hops. The moſt eſteemed are, the long white, the oval, and the long ſquare garlic hop. Theſe differ from each other in the colour and ſhape of their bells, or hops, in their degree of bearing, and in their time of ripening. The long white is moſt valued, becauſe it is a great bearer, and produces the moſt beautiful hops; for the beauty of hops conſiſts in their being of a pale bright green colour. The oval hop is beautiful, but does not yield ſo large a crop. There is a ſort of this kind of white hop, called the early, or rath hop, which ripens a week or ten days before the common, and is therefore of advantage to thoſe who would be firſt at market: but it is tenderer than the other, and does not bear near ſo plentifully. The long ſquare garlic hop is the greateſt bearer, more hardy, and ſomewhat later ripe that the former; but by reaſon of its redneſs towards the ſtalk, it is not ſo beautiful to the eye, and therefore is not ſo much eſteemed as the other ſorts.

Few hop grounds are without ſome plants of a ſort of hop which many call the female hope, but very erroneouſly; for the female hope is that which is cultivated for uſe, and this, which others name more properly the wild hop, is the male. Towards the middle of July, it puts out a great number of long looſe bunches of ſmall flowers, not at all like the true hop; and in ſomewhat leſs than a month after, that is to ſay, juſt before the true hop begins to bloſſom, they ripen, and with the leaſt motion of the wind, ſhed a farina, which is wafted all around, and is by ſome, not improbably, thought to be of uſe to impregnate other hops. Thoſe who are of this opinion adviſe, therefore, to leave one or two hills of them ſtanding in the hop-ground. But the common practice is to mark them at their firſt appearance, and to root them out afterwards, becauſe they do not bear bells or hops, and as they are generally the ſtrongeſt plants, ſets might otherwiſe be taken from them by miſtake.

There is alſo a poor ſtarved hop, called a wild hop, which is not judged to be a diſtinct ſort, but a hop which has degenerated for want of culture.

The planter of hops ought to be extremely careful in the choice of his plants, or ſets, particularly in regard to the kind of the hop: for it is a great trouble and loſs to him, when his garden proves to be a mixture of ſeveral ſorts of hops, ripening at different times. He who plants the three ſorts above mentioned, viz. the early, the long white, and the ſquare hop, in three diſtinct parts of his ground, will have the conveniency of picking them ſucceſſively as they become ripe.

Hop-ſets are cuttings from the roots or branches which grow from the main root or ſtock. They ſhould be procured, if poſſible, from grounds planted with none but the ſort which is deſired; and they ſhould be from five to ſeven or eight inches long, with three or more joints or buds on them, all the old bind and hollow part of the ſet being cut off.

The ground being prepared for planting, as before directed, towards the latter end of February, or in the beginning of March, if the ſoil be light, or late in March, if it be ſtrong and moiſt, make, in the places marked out by the ſticks ſtuck in them, holes about twelve or ſixteen inches wide, and of a depth proportioned to the nature of the ground. In general, ten or twelve inches will be a ſufficient depth. If the ground be ſhallow, and you meet with hard clay or gravel, by no means enter into this, for you would then make a baſon to retain water; but, in ſuch caſe, inſtead of going deeper, raiſe up a ſmall hill of good mould. If there is a good depth of rich mellow mould, dig the hole a foot and a half, or two feet deep, and you will find the hops thrive the better; for their tap roots naturally run downward.

When all things are ready for planting, fill up the holes with the mould before thrown out of them, if it be naturally good, after having firſt broke it fine with a ſpade: but if the ſame earth be not rich enough, make uſe of fine freſh mould, or of the compoſt provided for this purpoſe. About a peck or two of this will be ſufficient for each hill; but no new dung ſhould be put into the hole on any account.

Then, with a dibble, or ſetting ſtick, ſuch as gardeners generally uſe for planting of beans, make five or ſix holes, the depth of your ſets, one in the middle, perpendicular, and the reſt round about, ſloping and meeting at the top near the center: put your ſets therein, ſo that they may ſtand even with the ſurface of the ground; and then preſs the mould cloſe to them, and cover them with fine mould two or three inches thick. A ſtick ſhould be placed on each ſide of the hill to ſecure it.

The ground being thus planted, all that is to be done in the following ſummer, is to keep the hills and alleys clear from weeds by frequent hoeings; to dig the ground in the month of May, and to carry off all the ſtones that are turned up by digging; to raiſe a ſmall hill about the plants; to throw ſome fine mould on their roots; and, in the latter end of May, or beginning of June, to twiſt all the vines and branches together into a bunch or looſe knot, and lay them thus twiſted on the top of the hill.

Towards the latter end of February, or in the beginning of March, in the ſecond year, when the weather is kindly, open the hills, and with a ſharp knife, cut off the ſhoots of the firſt year to within an inch of the old ſtock, together with all the younger ſuckers that have ſprung from the ſets, and cover the ſtock with fine earth. To keep the knife ſharp, you ſhould have a whetſtone always by you at dreſſing.

In the third and following years, when you dig your hop-ground in February, let the earth be taken away with a ſpade or hoe, round about the hill, very near them, that you may the more conveniently come at the ſtock to cut it: then in fair weather, towards the beginning of March, if your hops be weak, begin to dreſs them; but if they are ſtrong, and in heart, the middle or latter end of March will be the beſt time; for late dreſſing reſtrains their too early ſpringing, which is the cauſe of many injuries to the hop.

After the hops are dreſſed in the ſecond year, the next buſineſs is to pole them. Poles of only ten or twelve feet long will do then; but in the third year, by which time they come to their full bearing ſtate, they will require poles of full ſize: this, if the ground be rich, and the hop vigorous, will be from ſixteen to twenty feet, or even more; or there will be danger of loſing great part of the crop.

If the hop be weak, and the ground not rich, the poles ſhould not be more than from fourteen to eighteen feet long for fear of impoveriſhing the root; for the hop will ſoon run itſelf out of heart if over poled; ſo that, as was ſaid before, there is more danger in over poling than in under poling; neither can a good crop be expected from an over poled ground, becauſe the branches which bear the hops grow very little till the buds have over-reached the poles, which they cannot do when the pole is too long. Two ſmall poles are ſufficient for a hill in a young ground.

Towards the latter end of July hops begin to bloſſom, about the beginning of Auguſt they bell, and in forward years, they are ſometimes ripe at the end of Auguſt, or beginning of September. When they begin to change colour, or are eaſily pulled to pieces, when they emit a fragrant ſmell, and when their ſeeds begin to look brown and to grow hard, you may conclude that they are ripe: then pick them with all expedition; for a ſtorm of wind will do them great miſchief at this time; and hops picked green and bright, without bruiſing or diſcolouring, will ſell for a third part more than thoſe that are otherwiſe.

When the poles are drawn up in order to be picked, the vines around them ſhould be cut aſunder, at the height of about three or four feet from the ground; for the cutting of them lower, eſpecially while the hops are green, would occaſion ſo great a flowing of the ſap, as would weaken and hurt the root.

The moſt convenient way of picking them is into a long ſquare frame of wood, called a bin. This frame is made of two poles, or pieces of wood, each nine or ten feet long, and three or four inches broad, joined together at about a foot and a half from each end, by two other pieces three feet long; and it is ſupported by four legs three feet and a half high; ſo that there remain in the middle of it a ſpace ſix feet long, three wide, and three and a half deep. In this ſpace is fixed a coarſe linen cloth, or hop-bag, cut open on one ſide, and hung hollow, either by hitching it on tenter-hooks along the inſide of the frame, or by ſtretching it on the outſide with wooden ſkewers, to receive the hops as they are picked. Three men or women, or four boys or girls, may ſtand at each ſide of the frame, and pick two poles at a time.

When you have raiſed ſome poles, bring them with the hops and vines on them, and lay them lengthwiſe upon the frames; or erect a forked prop at each end of the frame, and reſt the poles thereon, in order to their being picked. There is no occaſion to ſtrip the vines from the poles in order to their being picked. The workmen who raiſes the poles generally carries them to the frames, and the latter being very light, may be eaſily removed from one part of the ground to another.

The ripeſt hops ſhould be firſt picked: but if the hops appear to be equally ripe in all parts of the plantation, it is beſt to begin to pick them on the eaſt or north-ſide of the ground, the more effectually to guard againſt the ſouth-weſt wind's breaking into the garden.

Having choſen a ſpot of ground which contains eleven hills, place the bin upon the hill which is in the center, and after theſe are picked, remove it into another ſpot of the ſame extent, and ſo proceed till the whole is finiſhed.

The hops ſhould be picked as free as poſſible from leaves and ſtalks; for theſe would be of greater prejudice to the ſale, than any ſeeming advantage which might be expected from their weight. The bin ſhould be emptied two or three times a day into a large cloth of coarſe linen, in which the hops ſhould be immediately ſtitched up with ſkewers, and carried directly to the oaſt, or kiln, to be dried: for if they remain long in the bin, or cloth, they will ſweat and be diſcoloured.

If any brown hops are met with in the picking, care ſhould be taken to ſeparate them from the reſt, by putting them into a baſket by themſelves.

If the weather be very hot, or rainy, cut no more hops than may be picked in an hour: but, if it be poſſible, gather them in fair weather only, and when they are dry; for this precaution will ſave ſome expence of coals, and contribute to the better preſervation of their colour when they are dried. No hops ſhould be gathered when the dew is on them, for that would make them become mouldy.

When you have taken the poles from the hills, twiſt together the remaining ends of the binds, that they may not get among people's legs, and hinder their work.

Before you draw the poles, obſerve whether the hops of one pole be entangled above with thoſe of another, and if they are, cut them aſunder with a ſharp hook fixed at the end of a long pole.

If the garden be large, it may be worth while to raiſe a ſhed in the midſt of it, to ſhelter the pickers and the hops from the ſun and rain; and to lay hops in overnight, to be picked early the next morning before the dew is off the other hops. This ſhed will alſo ſerve for preſerving your poles in winter.

If there be either rain or dew upon the hops at the time when they muſt be gathered, ſhake the pole, and they will dry the ſooner. If they are over-ripe when gathered, they will ſhed their ſeeds in which the chief ſtrength of the hop conſiſts; nor will they then look ſo green, but ſomewhat brown, which is a great diminution of their value. It therefore is better to pull the hops, a little before they are ripe, than to wait till they are full ripe. Four pounds of undried hops, thorough ripe, will make one pound of dry; and five pounds of hops ſcarcely ripe, though in their full prime, will make no more when they are dried.

There are two principal ſorts of hops, viz. the green and the brown. The former yields by much the beſt colour when dried, and the other is the moſt plentiful bearer.

Brown hops are fit for brown ale, but the hops for fine pale beer muſt be green; for which reaſon theſe laſt are moſt eſteemed.

As faſt as you pick hops, dry them on a kiln; otherwiſe they will change colour: but if you cannot dry them immediately, and muſt keep them a little while, ſpread them on a floor, and by that means the damage which they will receive in a day or two will not be great.

They who have five or ſix acres of hops, may employ ten frames at a time in picking.

If any of the rath-ripe, or early hops, which bloſſom and ripen a week or ten days ſooner than the other ſorts, happen to be intermixed in the ſame plantation, they ſhould be watched carefully, in order to their being gathered in time; for if they hang till they are over ripe, they will ſhed their ſeeds, turn brown, and thereby not only become bad themſelves, but ſpoil the ſale of the others with which they are mixed. It is therefore adviſable to mark at the bloſſoming ſeaſon, the hills in which they are, in order to dig them up and replant thoſe ſpots: for the trouble of pulling them up ſeparately, when they are ſcattered here and there in a hop-ground, and of carrying them, ſometimes a conſiderable way, to a convenient place, to be picked, is very great, and cannot be avoided otherwiſe than by either baniſhing them totally, which would not be quite conſiſtent with the huſbandman's profit, as they fetch a good price by their coming firſt to market; or, which is the beſt way, by planting them in a garden by themſelves.

Very particular care ſhould be taken that the hops be thoroughly and equally dried. In this lies the greateſt dificulty and art in the management of them: for if they are over-dried, they will change colour, look brown, and be judged to be burnt, whereby their value will be greatly diminiſhed; and if they be under-dried, they will loſe their colour and flavour. Experience has ſhewn, that an handful only of under-dried hops will ſpoil many pounds of others, by taking away their fine ſmell and colour.

The beſt way of drying them is with a charcoal fire, on a kiln covered with hair-cloth, of the ſame form and faſhion as is uſed for drying of malt, under which head this common ſort of kiln will be more particularly ſpoken of hereafter. It is found to ſuffice in places where only a few hops are raiſed, and a great deal of malt is made: but where the hop-planters have a much greater quantity of hops than can be dried in due time on their malt-kiln, (for hops, as was ſaid before, ought to be dried as ſoon as poſſible after they are picked) they build, in the following manner, ſeveral ſmall kilns on purpoſe for drying of hops.

Eight or ten acres of hop-ground require a building of about ſixty feet long, and fifteen wide in the clear. At one end of this building is a boarded room, to receive the green hops which are brought from the hop-ground, and which lie ſpread out there till there be room to put them on the kilns: at the end of the building is another large boarded room, for receiving the hops from the kiln when they are dried, and for them to lie in heaps to ſweat till they are fit for bagging. In the intermediate part of the building, three or four kilns, of eight or ten feet ſquare each, are conſtructed thus, cloſe to one another.

If the middle building is, we will ſuppoſe, twenty-eight feet long, and fifteen feet wide, there will be room for three kilns of eight feet ſquare each in the clear, and for their reſpective walls. Theſe kilns ſhould lie in a line along the back wall, and will come forward above nine feet; ſo that there will remain a paſſage five feet wide and twenty-eight feet long at the front of the kilns.

To form each kiln, build the walls of brick, nine inches thick, and let each of the four ſides be eight feet long in the clear, and ſeven feet high. The principal parts of the kiln are, in the upper part, the bed or floor whereon the hops are to be laid in order to their being dried; and in the under part, the furnace, ſteddle, or lanthorn, for the fire. The bed or floor in a kiln of eight feet ſquare, ſhould be about ſix feet from the lower floor, ſo that it it will be about a foot below the top of the wall. This foot of wall riſing above the bed, ſerves to keep in the hops on the kiln, and for men to walk upon round about the kiln, to look to the drying of the hops. The bed, or floor, may be made of wooden rails an inch ſquare, laid very even and level, into a croſs beam, a quarter of an inch aſunder: or if the kiln be arched below, the floor may be laid with long bricks, or ſtones reſting on the tops of the arches, at about two inches diſtance from each other.

In making the lower part of the kiln, place the mouth of the furnace at the bottom, in the middle of the front wall of the kiln, and let it be fourteen inches wide and ſixteen high. Joining to the mouth of the furnace on the inſide, build the ſteddle or lanthorn, of brick, four inches thick. This lanthorn ſhould be fourteen or ſixteen inches wide, three feet perpendicularly high in the ſide walls, and it ſhould reach from the front wall of the kiln to within a foot and an half of the back wall; ſo that there will be room for a man to paſs between it and the back wall, and the length of the lanthorn thus made will be about ſix feet. On its ſide walls, bricks of a foot length are to be raiſed on their ends, leaning to and bearing upon one another, ſo as to form a covering like the roof of a houſe; or the top of the lanthorn may be regularly arched over.

In building the ſide walls of the lanthorn, after you have laid the two firſt rows of brick, leave at the end of every brick in the three or four following rows, an open ſpace or hole, four or five inches wide, chequer-wiſe, both in the ſides and in the back, and lay the uppermoſt row or two of bricks cloſe together, as in the bottom rows, for the better ſupport of the roof. By this means there will be three or four rows of holes, which are deſigned to convey the heat equally to all parts under the hair-cloth. The roof ſhould be well plaiſtered on the inſide with hair and lime, that it may the better reflect the heat.

In the front-part of the kiln, on one ſide of the furnace, and at the height of two feet from the ground, a ſmall door ſhould be made, three feet high, and two wide, ſo that a man may eaſily get in to ſet every thing to rights about the ſteddle. There ſhould alſo be ſteps or ſtairs to go to the upper floor, where the hops are dried; and as there is a paſſage below, five feet wide, along the front of the kilns; ſo will there be, directly over head on the upper floor, a like paſſage, which will be of uſe for bringing the green hops from their room, and laying them on the kiln, and for carrying them to the ſtore-room after they are dried. For greater conveniency, both theſe rooms ſhould be on the ſame floor as the upper-part of the kiln.

A farther caution neceſſary to be obſerved, is that no holes be made within a foot of the fire-place or mouth of the furnace, and that all the parts about the kiln be conſtructed ſo cloſe that no wind or air may poſſibly get in. The farther end of the ſteddle ſhould be built of brick up to the top, with holes in it as in the ſides.

The kiln ſhould be ſquare, and may be ten, twelve, or fourteen feet over at the top; but there ſhould be a due proportion between the height and breadth of the kiln, and the ſize of the ſteddle where the fire is kept, viz. if the kiln be twelve feet ſquare on the top, it ſhould be nine feet high from the fire, and the ſteddle ſhould be ſix feet and an half ſquare; and ſo proportionably in other dimenſions. Theſe kilns are made at a ſmall expence.

In drying of hops, firſt lay the hair-cloth very even on the bed or floor of the kiln, and ſpread the green hops thereon, about ſix inches thick, laying them with a rake as ſmooth as poſſible, not thicker in one place than another. Let the kiln be moderately warmed before you lay on the hops; then keep an even and ſteady fire under them, but not too fierce at firſt, for fear of ſcorching them; and let not the fire ſlacken, but rather increaſe it till the hops are nearly dried, leſt the moiſture or ſweat, which the fire has raiſed, fall back and diſcolour the hops. For theſe reaſons chiefly it is, that no cool air ſhould be ſuffered to come into the kiln while the hops are drying, and that wind, which would make the fire burn too violently, ſhould not be permitted to blow on the mouth of the furnace. After the hops have lain thus about ſeven, eight, or nine hours, have left off ſweating, and leap up when beaten with a ſtick, then turn them upſide down with a broad malt-ſhovel, or ſcoop made for that purpoſe, or caſt them up into a heap in the middle, and afterwards ſpread them equally on all ſides. Let them remain in this ſituation for two or three hours more, till every hop, if poſſible, be thoroughly and equally dried; and then with a hair-cloth, remove them to the heap where they are to lie till they are bagged. If they do not dry in one place ſo much as in the reſt, which may be perceived by touching them with a ſtick or wand, and obſerving whether they rattle when ſo touched, as they will do when dry; make them thinner in the places where they rattle leaſt. They muſt not be turned while they ſweat; for that will burn them, and make them loſe their colour. The fire may be diminiſhed a little before they are turned, and refreſhed again afterwards: but thoſe times excepted, the heat ſhould be kept as equal as poſſible.

Hops are fully dried when their inner ſtalks become brittle and break ſhort on rubbing, and when their leaves fall off eaſily, and feel very criſp. When they crackle and leap a little, as they will do upon the burſting of their ſeed, then is the time to take them off the kiln.

If the fuel uſed for this purpoſe be either wood or turf, it ſhould be charred firſt, becauſe ſmoke ſpoils the colour and ſmell of hops. Charcoal made of old rotten poles is moſt commonly uſed. Cinders of ſea-coal are alſo very good; and it is found by experience that Kilkenny coal dries hops perfectly well, becauſe it does not ſmoke, and gives a conſtant uniform heat for a long time. The fire ſhould be made at the mouth only of the furnace; for the air will diſperſe the heat ſufficiently from thence to all parts of the kiln: and that it may be conſtantly of the ſame gentle degree, neither too ſtrong nor too weak, it may be of ſervice to make uſe of a thermometer, by marking upon which the degree of heat proper for drying hops, as ſoon as that degree is aſcertained by experiment, you may always after know how to regulate your fire with great exactneſs: for, putting the thermometer within-ſide the kiln for a ſhort time, you may obſerve, by the height of the liquor, when the heat is come to a right pitch, and when it is either too high or too low, and ſo increaſe or ſlacken the fire accordingly. Any ſervant may, with the help of this inſtrument, be able to mend and correct the fire with great certainty, and not be liable to commit miſtakes, which often prove exceedingly detrimental to the hops. When you begin drying, loſe no time in the proſecution of that work, but employ people night and day, to attend it with the utmoſt care, till it be finiſhed. A large malt-ſhovel full of charcoal, thrown into the mouth of the furnace of a kiln eight feet ſquare, will laſt an hour.

It is obſerved that hops dried in the ſun loſe their richneſs of flavour, as other herbs do when they are dried that way. If they are laid on a floor to dry, without uſing a fire, they will loſe their ſtrength, be apt to ſweat or ferment upon change of weather, and not be fit for packing. Fire exhales their watery parts, and, by retaining the oily, preſerves their flavour and colour.

Hops break all to powder if they are bagged hot from the kiln. To prevent this, they ſhould be laid in a heap, to ſweat and grow tough; and if they are then covered for a while cloſe with blankets, to keep the air from them, they will bag the better. There is no limited time for their ſweating, that varying according to the weather: three or four days are commonly ſufficient; but it is a certain rule, that when the hops feel moiſt and clammy, and can be ſqueezed in the hand, or trodden cloſe, without breaking, they are then fit for bagging. The harder they are trodden, the better they will keep.

The bags proper for this occaſion are made of coarſe linen cloth. They are commonly about eleven feet long, and near two yards and a half in circumference, and contain about two hundred and an half weight of hops. The ſmall bags, called pockets, contain about half that weight.

The manner of bagging is thus: make a round or a ſquare hole, but a round one is moſt convenient, about twenty-ſix or thirty inches over, in the floor of the chamber where the hops are laid in heaps after they are ſweated. This hole ſhould be large enough to receive the bag, and for a man to go up and down it with eaſe. Tie with a piece of packthread, an handful of hops in each lower corner of the bag, to ſerve as handles for the more eaſy lifting or removing of the bag; and, with packthread, faſten the mouth of the bag to a frame, or hoop, ſomewhat larger than the mouth of the hole, that the hoop may reſt on its edges, and ſtrong enough to bear the weight of the hops when the bag is full, and of the man who treads them. The upper part of the bag being thus fixed by the hoop, let the reſt of it hang down through the hole; but not ſo near to the lower floor as to touch the ground: then throw into it a buſhel or two of hops, and let a man go into the bag, and with ſhoes that have no heels, tread the hops down on every ſide, as hard as he can, till they lie cloſe. Let more hops be then caſt into the bag, and be trodden down as before; and continue this till the bag is full. When that is done, untie it from the hoop, let it down, and ſew up its mouth as cloſe as you can, obſerving at the ſame time to tie up ſome hops in the upper corners, as was done before in the lower. The harder the hops are preſſed, and the cloſer and thicker the bag is, the longer and better the hops will keep.

When they are thus bagged, lay them upon a boarded floor, and in a dry place; for dampneſs would injure them greatly. At the ſame time all proper meaſures muſt be taken to guard againſt rats and mice, which, though they do not eat hops, are very apt to ſpoil them, by making neſts and lodging in them.

Some, in treading the hops, uſe a fifty pound weight, faſtened to a rope, and placed in the middle of the bag. The man in the bag treads about it with his feet, and lifts it up now and then, to preſs them the cloſer together.

As ſoon as the hops are picked, ſtrip their haulm or vines from off the poles, and, as your laſt work, lay the poles up ſo that they may be preſerved. This is done either by ſtacking, piling, or houſing.

The ſtacking is performed thus: ſet up three poles, like an erect triangle, or rather ſix poles, let into the ground with an iron crow, and placed circularly, but inclining to one another ſo as to meet, and be tied faſt together with bands of the haulm of the hops, within a yard of the top. The poles deſtined for the ſame ſtack ſhould then be erected ſpeedily againſt this frame; for if they are ſuffered to lie on the ground, eſpecially in wet weather, they will receive more damage in a fortnight, than by their ſtanding out upright all the reſt of the year. When they are ſet up, about three hundred to a ſtack, bind them round with a rope of twiſted haulm, to keep them together. By this means the outer poles only are ſubject to the injuries of the weather, and keep all the inner ones dry, excepting at their tops and bottoms, the former of which are for the moſt part expoſed to the air, as the latter are to the moiſture of the earth. It is therefore a good method to cover the top of the ſtacks of poles with haulm, and to lay ſtones, bricks, or ſand, at their bottom, to preſerve their but ends from rotting.

Many chuſe to pile them up lengthwiſe, in different parts of the hop ground, laying three or four old poles athwart at bottom, to preſerve them from the dampneſs of the earth, and ſetting ſeveral poles erect in the ground on each ſide of the pile, to prevent its ſlipping: they then lay the poles on one another, placing the ſmaller ends inwards, and the bigger outward; ſo that the pile ſhould conſequently be ſomewhat longer than the poles: and when it is raiſed high enough, they bind it acroſs with ropes of twiſted haulm, to keep it upright and ſteady, and then cover it with haulm, to defend the poles from rain. This is a better method than the former; but the beſt way of all to preſerve the poles, is to build in the hop ground a ſhed or two, which may ſerve as a ſhelter for picking the hops in ſummer, and laying up the poles in winter, with leaſt danger of their being hurt or ſtolen.

From October to March, there is nothing to be done in the hop ground, but to provide and bring manure into it, and to give the alleys their winter's digging or ploughing.

If you bring dung into your ground, be ſure it be well rotted, and lay it on the alleys to mix with the earth, but not on the hills, dung being apt to produce vermin, which are extremely injurious to hops. Cold dungs, ſuch as cows and hogs dung, are better for hops than horſe dung, unleſs the ſoil be cold and wet, and then hot dung, ſuch as that of ſheep, and even of pigeons, will not be improper.

A ſmall dunging every ſecond year is ſufficient, and a plentiful dunging will ſerve for three years, if the ſoil be tolerably good.

Dung was formerly more in uſe for hop grounds than it is at preſent, experience having ſhewn, that lime, limeſtone, gravel, ſea-ſand, marle, eſpecially the ſhelly marle, aſhes, and many other manures, are the moſt proper means of correcting the defects of ſoils, anſwer the end better, and laſt much longer.

The management of the hop ground during the third and every ſubſequent year (for it will continue to yield good crops during upwards of twenty years, if it be rightly cultivated) is the ſame as above directed; ſo that it will require pretty conſtant care and attendance, eſpecially from the beginning of March to the end of September. This you may lay down as a certain rule, that the more pains you take, and the greater expence you are at, in the due culture of the ground, and management of the hops, the greater will be your profit.

The charge of an acre of hop ground, in moſt parts of England where hops are cultivated, is computed thus: three pounds for the huſbandry, four pounds for the wear of the poles, five pounds for picking and drying, one pound ten ſhillings for dung, one pound for rent, and ten ſhillings for tythe; in all, fifteen pounds a year: but in ſome places they pay four or five pounds an acre yearly for the rent of the land.

The hop planters in England commonly agree with hop dreſſers, to do, for three pounds to three pounds ten ſhillings an acre, all the huſbandry part, in which is included the ſummer and winter digging of the ground, the pruning and dreſſing of the hops and hills, the poling and tying, ſeveral hoeings and making up the hills from time to time, the laying of the dung on the ground, and all other works, except the bringing of the dung to the ground, and the picking and drying of the hops, which laſt buſineſſes are performed by others; ſo that a gentleman has little trouble with his hop ground: he need only be careful that the undertaker does every part of the work in its proper ſeaſon; and it is ſo much the intereſt of the undertaker to be punctual in this, that, if he neglects hoing when the weeds appear, he will, by ſuch neglect, greatly multiply his trouble and labour in rooting them out afterwards.

An Engliſh acre requires about three thouſand poles, the price of which varies according to their ſize. In ſeveral places it is uſual to give as many ſhillings for an hundred poles as the poles are feet long; ſo that for an hundred poles of twenty feet long they give twenty ſhillings; but where poles are in great plenty, they give but fifteen ſhillings for thoſe of that length. A recruit of five hundred poles yearly will keep an acre of hop ground in conſtant repair; ſo that poles are about a third part of the yearly charge, the picking and drying are eſtimated at another third, and the reſt is laid out in the managing of the ground.

The hop planters in England reckon, that they have but a moderate return when the produce of an acre of hops does not ſell for more than thirty pounds. They frequently have fifty, ſixty, eighty, or an hundred pounds for an acre; nay, ſome have got conſiderably more than even this laſt ſum for every acre of hops, at a time when the crops of other hop grounds have failed in general, and theirs have ſucceeded. But if, on one hand, ſuch extraordinary profit, being very uncertain, is not to be depended upon; ſo, on the other, it ſhould not be paſſed over quite unnoticed, becauſe it is among the chances which may make amends for failing years. Upon the whole, if the total charge of an acre of hops is computed as above, at fifteen pounds a year, and its produce, at an average of years, at thirty pounds only, the clear profit from an acre will be fifteen pounds a year.

Though it be common in England to ſee ten, twenty, thirty, or more acres of hop ground in the hands of one man; and though ſome who ſpare neither care, induſtry, or expence, to make their plantations of this kind flouriſh, receive two thouſand pounds a year for their hops, notwithſtanding the high price of labour, manure, and every other article relating to their proper management; yet the intelligent huſbandman will eaſily perceive,that it is not prudent for poor farmers, or men of ſmall fortune, to engage far in this branch of improvement; for it requires a pretty conſiderable ſtock at firſt to cultivate a large plantation, to furniſh it with poles, and to perform every other requiſite. The expence will neceſſarily be great, and the undertaker muſt expect to lie out of his money for two or three years, before he can have any return of profit; and even when his hops do come to their bearing-ſtate, and he is in hopes of making good the charges he has been at, a bad ſeaſon may fruſtrate his expectation. Small parcels of hops, ſuitable to the abilities of the farmer; for even the pooreſt may eaſily ſpare time and labour, to plant a few of them in a corner of his garden, or other ground, and to ſet ſallies, willows, or aſh, for poles in his hedges or elſewhere, will yield him a pretty profit, without his laying out any money: ſo that, in ſetting forth the expences and riſk which attend the cultivation of hops, we mean only to caution the huſbandman, whoſe circumſtances are but middling, againſt embarking too far in this branch of agriculture.

Ground that is fit for the raiſing of hops, is alſo fit for the raiſing of hop-poles of one kind or other. But to be more particular: low, wet, cold, marſhy, boggy ſoils, or ſuch as are ſituated near rivers, are fit for all the aquatic ſorts, ſuch as poplars, abeles, alders, willows, oſiers, and ſallies, which produce hop-poles in four or five years from their firſt planting. If the ſoil be dry and warm, or a ſtrong, mellow, rich loam, the aſh and the cheſnut, which make the beſt poles for hops, will thrive greatly therein, and be fit for poles in nine or ten years from the time of ſetting them: and if theſe are planted around the hop-ground, they will both ſhelter the ground, and afford a ſupply of poles, without the expence of carriage. Elms alſo are quick growers; and when they are planted cloſe together, they ſhoot up tall and ſtrait, and make good poles.

Aſh and cheſnut poles, but eſpecially thoſe of cheſnut, are ſo tough and durable, that three ſets of them will laſt twenty years: but poles of alder, poplar, abele, oſiers, or ſallies ſoon rot, or become brittle; ſo that five ſets of them, at leaſt, will be requiſite within that time. The aquatic kinds are therefore to be eſteemed only for a firſt ſupply, till the plantations of aſh and cheſnut become fit for the future recruit of the hop-ground.

Hops are, like other vegetables, liable to various accidents and diſtempers, the principal and moſt fatal of which are the fly, the fen or mould, the mildew, and what the planters call fire-blaſts.

The reverend Dr. Hales, treating of this ſubject in his excellent Treatiſe of Vegetable Statics, gives us the following account of the ſtate of hops in Kent, in the year 1725, which he received from Mr. Auſten of Canterbury, who was a very great planter, and an accurate obſerver.

“ In mid April, not half the ſhoots appeared above ground; ſo that the planters knew not how to pole them to the beſt advantage.

“ Upon opening the hills, this defect of the ſhoot was found to be owing to the multitude and variety of vermin that lay preying upon the roots, and of which the increaſe was imputed to a long and almoſt uninterrupted ſeries of dry weather for three months before. Towards the end of April, many of the hop vines were infeſted with flies.

“ About the 20th of May there was a very unequal appearance, ſome vines being run ſeven feet, others not above three or four, ſome juſt tied to poles, and ſome not viſible; and this diſproportionate inequality in their ſize continued through the whole time of their growth.

“ The flies now appeared upon the leaves of the forwardeſt vines, but not in ſuch numbers here as they did in moſt other places. About the middle of June the flies increaſed, yet not ſo as to endanger the crop; but in diſtant plantations they were exceedingly multiplied, ſo as to ſwarm towards the end of the month.

“ On the 27th of June ſome ſpecks of fen appeared. From this day to the 9th of July the weather was very dry. At this time, when it was ſaid that the hops in moſt parts of the kingdom looked black and ſickly, and ſeemed paſt recovery, ours held out pretty well, in the opinion of the moſt ſkilful planters. The great leaves were indeed diſcoloured, and a little withered, and the fen was ſomewhat increaſed.

“ From the 9th of July to the 23d, the fen increaſed a great deal; but the flies and lice decreaſed, it raining much daily. In a week more, the fen, which ſeemed to be almoſt at a ſtand, was conſiderably increaſed, eſpecially in thoſe lands where it firſt appeared.

“ About the middle of Auguſt the vines had done growing both in ſtem and branch, and the forwardeſt began to be in hop, the reſt in bloom: the fen continued ſpreading where it was not before perceived; and not only the leaves, but many of the burs alſo were tainted with it.

“ About the 20th of Auguſt ſome of the hops were infected with the fen, and the whole branches were corrupted by it. Half the plantations had eſcaped pretty well hitherto, and from this time the fen increaſed but little: but ſeveral days of wind and rain in the following

ing week diſtorted the plants ſo that many of them began to dwindle, and at laſt came to nothing; and of thoſe which then remained in bloom ſome never turned to hops, whilſt many of thoſe which did were ſo ſmall, that they ſcarcely exceeded the ſize of a good large bur.

"We did not begin to pick till the 8th of September, which is eighteen days later than we began before. The crop was little above two hundred on an acre of ground, and not good. The beſt hops ſold this year at Way-hill, for ſixteen pounds the hundred."

As a farther means of inveſtigating of the cauſe of this pernicious diſtemper, Dr. Hales relates the following experiment, which he himſelf made on hops. In the month of July, he cut off two thriving hop vines, near to the ground, in a thick ſhady part of the garden, and left the pole ſtill ſtanding. He ſtripped the leaves from off one of theſe vines, and left them on the other, and then ſet their ſtems in known quantities of water in little bottles. That with leaves imbibed in a twelve hours day, four ounces, and that without leaves only three fourths of one ounce.

He took another hop-pole with its vines on it, and having carried it out of the hop-ground into a free and open expoſure, theſe plants imbibed and perſpired there double the quantity of the before-mentioned which had leaves on it, in the hop-ground. This ſeems to indicate that the reaſon why the hop-vines on the outſide of gardens, where they are moſt expoſed to the air, are ſhort and poor, in compariſon of thoſe in the middle of the ground, is, becauſe, being much drier there, their fibres harden ſooner, and therefore they cannot grow ſo kindly as thoſe in the middle of the ground, which, by the ſhade and ſhelter they afford each other, are always kept moiſter and more ductile.

From this perſpiration of their fluid, the ſame attentive obſerver of nature forms the following calculation. There being a thouſand hills in an acre of hop-ground, and each hill having three poles, and each pole three vines, the number of vines will be 9000, each of which perſpiring four ounces, the ſum of all the ounces perſpired by an acre in twelve hours of day will be 36000, equal 15750000 grains, equal 62007 cubic inches, or 220 gallons, which being divided by 6272640, the number of ſquare inches in an acre, it will be found, that the quantity of liquor perſpired by all the hop-vines will be equal to an area of liquor as broad as an acre, and $\frac{1}{101}$ part of an inch deep, beſides what is evaporated from the earth.

Now this quantity of moiſture, in a kindly ſtate of the air, if daily carried off, is ſufficient to keep the hops in a healthy ſtate: but in a rainy moiſt ſtate of air, without a due mixture of dry weather, too much moiſture hovers about the hops, ſo as to hinder, in ſome meaſure, the kindly perſpiration of the leaves, whereby the ſtagnating ſap corrupts, and breeds mouldy fen, which often ſpoils whole tracts of, till then, flouriſhing hop-grounds.

This was the caſe in the year 1723, when, for twelve or fourteen days, almoſt continual rains fell, about the latter half of July, after four months of dry weather; upon which the moſt flouriſhing and promiſing hops were all infected with mould, or fen, in their leaves and fruit, while the then poor and unpromiſing hops eſcaped, and produced plenty, becauſe they, being ſmall, did not perſpire ſo great a quantity as others, nor did they confine the perſpired vapour ſo much as the large thriving vines did in their ſhady thickets.

The planters of hops remark, that when a mould, or fen, has once got poſſeſſion of any part of the ground, it ſoon over-runs the whole, and that even the graſs, and other herbs under the hops, are infected with it. The reaſon probably is, that the exceeding ſmall ſeeds of this quick growing mould, or moſs (for ſuch in fact it is) coming ſoon to maturity, are eaſily blown over the whole ground; and it is undoubtedly owing to the ſame cauſe, viz. to the remaining diſperſed ſeeds of the preceding year's fen, that ſome grounds are infeſted with this diſtemper for ſeveral years running. The means before pointed out for curing the moſs on fruit-trees ſhould therefore be aſſiduouſly recurred to here, at leaſt ſo far as they can be applied to hops; and, at all events, particular care ſhould be taken to keep the land always in fine tilth, conſtantly free from weeds, and to burn all the fenny hop-vines, in a place remote from the garden, as ſoon as they are picked. We have already ſeen inſtances of the cure of moſs upon fruit-trees, by the uſe of hog's dung; and there is no room to doubt the efficacy of the ſame remedy when applied to mouldy, or moſſy hops.

Mr. Auſten, of Canterbury, obſerves that the fen is more fatal to thoſe grounds which lie low, and are cloſely ſheltered, than to ſuch as have a high, and open ſituation; to thoſe that lie ſhelving to the north, more than to thoſe whoſe ſlope is towards the ſouth; to the middle of hop-grounds, more than to their outſides, and to dry and light grounds more than to moiſt and ſtiff ſoils. This was very apparent throughout his plantations, where the land was prepared and planted in the ſame manner, and at the ſame time.

The mildew, which lights upon hops, is a white dew, that falls in ſummer at ſun-riſe, chiefly when the hops are in flower. Its fall is ſo unequal, that it ſometimes embraces a whole diſtrict, and ſometimes only parts of it. This dew dries up the hops, withers and conſumes their leaves, and conſequently ruins the crop. "There is," ſay the authors of the Journal Oeconomique, whoſe account of this diſtemper, to which hops are extremely liable, we ſhall copy here, "no other remedy from nature againſt this miſchance, except rain ſufficient to waſh the plant, and clear it entirely from this fatal dew: but as rain ſeldom comes quite ſeaſonably to the relief of the plant thus affected, artificial means have been ſought, for inſuring it againſt this accident. Some have ſurrounded their hop-grounds with hogs-dung; others have employed perſons to go through the ground with veſſels full of beech-aſhes, and to throw them upon the hops while the mildew was falling; and both ſides, profiting by their experience, pretend to have found a ſpecific preſervative againſt the bad effects of the mildew. They have even proceeded ſo far, as that each ſide affirm their's to be the only remedy. Thoſe who uſe hog-dung ſay, that the aſhes may probably hinder the action of the dew upon the plant; but that they muſt, at the ſame time, ſtop up its pores, and deprive the ſoil of its humidity; a circumſtance equally ruinous to the plant: and that, beſides, beech is not to be found every where, and if it muſt be brought from afar, the remedy would in ſome meaſure become impracticable, by the ſcarcity and difficulty of procuring it. The partiſans of the aſhes ſay, that they cannot comprehend how hog-dung laid round the hop-ground in the ſpring, ſhould preſerve ſuch virtue as to deſtroy the bad quality of this mildew in the ſummer. In ſhort, to render this diſcuſſion complete, each ſide alledges, that the trials which they have made of the other's remedy did not ſucceed.

"This diſpute, the ſubject of which is highly intereſting to all countries where beer is the common drink, excited a naturaliſt to examine the nature of this mildew; and with the aſſiſtance of a microſcope he perceived it to be full of the eggs of little inſects, which fly in vaſt numbers in the air while the hop is in bloſſom. Theſe inſects gnaw the leaves even of trees, and, like others of their ſpecies, undergo various metamorphoſes. This diſcovery induced him to believe, that, as inſects are not apt to attack perfectly healthy trees, or vigorous plants, but only ſuch as are feeble and ſickly (they being indued with ſuch nice ſenſations as to diſtinguiſh by the outſide only, perhaps by the ſmell, a plant which is vitiated within, though it may appear to us to be quite fair and ſound) hog-dung might probably give ſuch vigour to the hop, as to render theſe little animals afraid to attack it: for it has been remarked, that the inſects which nip a leaf, leave it as ſoon as they find in it an abundant juice, the ſalts of which, it may be preſumed, are too ſtrong for them; and that they fix on thoſe only which begin to decay and loſe their ſap. Aſhes may likewiſe have the power of hurting them, and its ſalts may be capable of giving them diſturbance. But late experience hinders us from giving entire credit to theſe two remedies, and ſhews, that if they have ſometimes preſerved hops from the effects of the mildew, we are not to conclude that they will always anſwer this deſirable end.

"A very good huſbandman ſaw his hops ſpoiled by the mildew, notwithſtanding the dung with which they were ſurrounded, and the aſhes that were thrown upon them: in a little time the leaves of the plants were covered with millions long winded. Nor will this appear ſtrange, if it be conſidered, that in hot countries the bones of animals are harder than in the cold; and for this reaſon it is, that though their ſhank bones are ſmaller than the horſes of this country, yet their legs are ſtronger.

The Spaniſh horſes, which are placed next to the Barb in rank, have a long thick neck, with a large mane; the head full large, and ſometimes the fore-top large; the ears long, but well placed; the eyes full of fire, and the air noble and ſpirited; the ſhoulders thick, and the cheſt broad; the back often ſomething low; the ribs round, but the belly often too large; the croup generally round and large, though in ſome longiſh; the legs beautiful and without hair; the ſinew well detached; the paſtern ſometimes longiſh like the Barbs; the foot a little lengthened like that of a mule; and the heel often too high. The fine bred Spaniſh horſes are plump, well-ſet, and place the legs well on the ground; they have alſo a great deal of motion in their paces; great agility, fire, and ſtatelineſs. Their coat is generally black, or a light cheſnut; though there are ſome of all the uſual colours. But it is very ſeldom that any are ſeen with white legs or muzzles; the Spaniards having ſuch a diſlike of theſe marks, that they never breed from horſes which have them. A ſtar in the forehead is all they require; but they value horſes of one intire dark colour as much as we deſpiſe them: both theſe prejudices, though oppoſite, are perhaps equally ill founded, there being very good horſes with all kinds of marks; and ſome excellent among thoſe which are all of one colour. This minute difference in the coat does not proceed from the nature or conſtitution of the horſe; but from an external, and at the ſame time ſo ſuperficial a quality, that a ſlight wound in the ſkin is ſufficient to produce a white ſpot: further, the Spaniſh horſes, whether intirely of one colour, or not, are all marked on the off-thigh with the mark of the ſtud where they were bred. They are not uſually large ſized; though ſome riſe to fourteen hands and one or two inches. Thoſe of Upper Andaluſia are eſteemed the beſt of all, though they are apt to have the head too long; but this blemiſh is overlooked in conſideration of their excellent qualities; as courage, gracefulneſs, obedience, ambition; and, in activity, they even exceed the Barbs. Theſe advantages recommend them above all other horſes in the world, whether for war, ſtate, or the manage.

The fineſt Engliſh horſes greatly reſemble the Arabians and Barbs in ſhape; indeed they owe their origin to them; but the head is much larger, though well made, and has a fine fore-top; the ears longer, but properly placed. By the ears alone an Engliſh horſe may be diſtinguiſhed from the Barb: but the greater difference is in the ſize; the Engliſh horſes are much larger and well-ſet. Their common height is fourteen hands two inches, and even fifteen hands is not very extraordinary. They are all colours, and all marks; are generally ſtrong, mettleſome, bold, bearing great fatigue, excellent for hunting and racing, but want air and agility; they are ſtiff, and have little freedom in their ſhoulders.

The Italian horſes were formerly much finer than at preſent, the ſtuds having been neglected there for ſome time paſt paſt: the kingdom of Naples, however, ſtill affords fine horſes, eſpecially for carriages; but they have, in general, large heads and thick necks: they are alſo untractable, conſequently are difficult to be trained. Theſe defects are, however, in ſome meaſure, compenſated by the largeneſs of their ſize, their ſpirit, and the beauty of their motions. They are excellent for parade, and very much affect ſtatelineſs.

The Daniſh horſes are of ſuch a large ſize, and ſo well ſet, that they are preferred to all others for coach horſes: ſome are perfectly well moulded, though in general their formation is not very regular; moſt of them having a thick neck, broad ſhoulders, the back a little too long and low; and the croup too contracted for the breadth of the cheſt; but they all move well, and are in general excellent for war and ſtate. They are of all colours, even the moſt uncommon; the pye and ſpotted being ſeldom ſeen but in Daniſh horſes.

Germany affords ſome fine horſes, but the generality are heavy and thick winded; though moſt of them come from Turkiſh and Barbary horſes, of which there are many ſtuds; as alſo of Spaniſh and Italian horſes: thus they make no figure in hunting and racing; whereas the horſes of Hungary, Tranſylvania, &c. are very light and fleet: the Huſſars and Hungarians ſlit their noſtrils, with a view, it is ſaid, to mend their wind, and, at the ſame time, to prevent their neighing in the field; it being affirmed that horſes, whoſe noſtrils have been ſlit, cannot neigh. It has not indeed been in my power to examine this particular; but it ſeems natural to think, that the operation can only weaken their neighing. The Hungarian, Croatian, and Poliſh horſes are noted for having what iscalled the mark in all their fore teeth, which continues to old age.

The Dutch horſes are very good for coaches, and are moſt commonly uſed in France. The beſt come from Friezland. The countries of Bergue and Juliers alſo breed very good ones. The Flemiſh horſes are far inferior to thoſe of Holland; they have generally large heads, broad feet, and their legs ſubject to dropſical ſwellings. The two latter are capital faults in coach horſes.

France produces horſes of all kinds, but not many which may be called fine. The beſt ſaddle horſes come from the Limoſin, being ſomething like the Barb, and excellent hunters, but of a ſlow growth. They muſt not be broke young, nor put to any ſervice till they are eight years old. Auvergne, Poitou, and the territory of Morvant, in Burgundy, alſo produces very good ponies. But Normandy, next to Limoſin, affords the fineſt horſes; and if not ſuch excellent hunters, they are preferable to the reſt for war, are better ſet, and ſooner trained. Lower Normandy and Cotentin, are famous for very fine coach horſes; they are lighter, and more ſprightly than the Dutch horſes: Franche-compté, and the Boulonnois furniſh very good draught horſes; but a general fault in the French horſes, is the width of their ſhoulders; whereas thoſe of the Barbs are too much contracted. *Buffon.*

Though the moſt experienced horſemen are not always agreed in ſome points relating to the ſhape, make, and goings of a horſe, yet they almoſt always accord in this, that there ought to be a juſt proportion in all his parts. That even when he is taken to pieces, and examined ſingly in his particular members, though ſome defects may appear, yet when they all bear a juſt correſpondence one to another, and concur in ſuch a manner as to render his action eaſy, juſt, and regular; ſuch a horſe cannot be greatly diſagreeable, but will, for the moſt part, move well, and with a tolerable good grace. On the other hand, ſuppoſe a horſe has ſome parts exquiſitely fine, and others indifferent, which frequently happens, it will mar his beauty, and cauſe him to look diſagreeable, and for the moſt part affect his gait and action.

In order to have a horſe beautiful and finely made, it has been agreed, on all hands, that his head ſhould not be long nor too large, rather lean than fleſhy; his ears thin and narrow, and of a becoming length, well ſet on, pointing inwards; his brow or forehead not too broad and flat; his noſe ſomewhat riſing, and of a good turn; his noſtrils wide and thin; his muzzle ſmall; his mouth neither deep nor too ſhallow, with a ſtar or ſnip down his forehead, or a blaze, which is no way unbecoming, unleſs it be too large and diſproportioned.

Horſes that are thus marked have generally one or more of their feet white, which is alſo very beautiful, and looks lively. His jaws ſhould be thin and ſufficiently wide, not approaching too near together, nor too high upwards towards the onſet, that he may have ſufficient room to carry his head eaſy, and in good place. His eyes well formed, ſprightly, and of a middle ſize. His neck ſhould be arched towards the middle, ariſing by a beautiful gradation out of his breaſt and ſhoulders, the muſcles thereof diſtinct, but no where overcharged with fleſh, growing ſmaller and thinner, as it approaches towards his head. His ſhoulders ſhould be thin from the withers, with a gradual enlargement downwards, that his boſom or breaſt be not too narrow nor too groſs. His fore-legs ſtraight and well placed; his joints lean and bony; his knees not bending, and his paſterns not too long; his feet round and ſmooth, and his ſinews firm and well braced; his carcaſe rather round than flat; his back not too low, and for ſtrength and durableneſs pretty even and ſtraight. His ribs rather home than open, as they approach towards his haunches; his buttocks round, and the muſcles not too fleſhy but diſtinct; his hocks or gambrels neither ſtanding too wide, nor too near together; his hocks ſhould be lean and no ways puffed or fleſhy; his paſterns ſhort, his legs flat and thin, and his tail ſet in a good place, rather high than low, riſing upon every motion of his body. The more theſe properties concur in any horſe, the more beautiful he muſt be, eſpecially when they correſpond and agree in due proportion, one to another; and the more a horſe is wanting in theſe, the more plain and ordinary he will appear.

HORSE-HOE, *ſee the articles* CULTIVATOR *and* HOE.

HORSE-HOEING, the operation of cultivating plants according to the principles of the New Huſbandry; viz. by hoeing the intervals or alley between the rows of corn, and by that means ſupplying the plants with freſh nouriſhment.

" I have tried, ſays M. de Valliers, to hoe my alleys after M. de Chateauvieux's method, which I look upon as the beſt and moſt expeditious; notwithſtanding that ſeveral difficulties which I have met with in the practice of it, have obliged me to give it up. For example, the great furrow in the middle of the alley is, according to his directions, to be filled up by two turns of the plough, one on the right-hand, and the other on the left, after which it is to be opened again by one turn of the cultivator with two mould-boards, or two or three turns of the common plough.

" When I ſet about this work, the firſt turn of the plough, if the ſhare went to any depth worth ſpeaking of, always filled up the furrow in ſuch manner, that to prevent its being poached by the horſes, I tried to make them walk on one ſide, upon the upper-ground, and conſequently very near to the rows of corn: but then, in the firſt place, I could not avoid the deſtruction of a great number of plants, without giving ſuch attention as was not only exceſſively troubleſome, but almoſt impracticable: and ſecondly, I could plough only the ſurface; becauſe, as the furrow was filled, the plough could turn up but very little earth, without being choaked, and becoming extremely heavy.

" If, to ſave the plants, I made the horſes tread partly upon the mould turned over into the furrow, the plough choaked equally, and for the ſame reaſon, whenever the furrow was cut deep. All I could do in this caſe, was to give only a ſuperficial ploughing: and with that it was impoſſible to uſe the cultivator with two mould-boards, to form the furrow, becauſe that inſtrument cannot work in any but a looſe well-tilled ground.

" All theſe inconveniencies may not happen in a ſoil different from mine. I am the more inclined to think this, as M. de Chateauvieux certainly does not experience them: but at the ſame time I muſt likewiſe obſerve, that this juſtly celebrated gentleman has inſtruments ſo perfect, and directs his ſervants with ſuch ſuperior judgment, that few can expect eaſily to equal him in the practice of the New Huſbandry.

" Not being able, for the above reaſons, to do with one turn of the cultivator with two mould-boards, what, as M. de Chateauvieux himſelf obſerves, can frequently not be done with leſs than three or four turns of the common plough, which, added to the two turns that are given to fill up the furrow, make in all five or ſix bouts, I purſued, and with great advantage, nearly the method before deſcribed. I ſay nearly that method, becauſe I have made ſome few alterations, by which I think it is rendered both eaſier and better.

" 1. I make the mould-board twelve or thirteen inches deep, inſtead of nine or ten that it was before. The furrows are by this means made wider, and the plough is more eaſily drawn, becauſe it finds more room to diſcharge its load of earth in, and ſuffers leſs preſſure.

" 2. To give the ſecond hoeing with the plough, inſtead of continuing to turn the earth over towards that ſide of the alley where only one furrow was turned up at the ending of the firſt ploughing, I, on the contrary, begin this ſecond at that furrow, approaching, if poſſible, to within two or three inches of the row of corn, and then I make a furrow in the contrary direction, which turns the earth up againſt that row.

" My reaſon for ploughing ſo near the rows, when I give this ſecond hoeing, is, that I have obſerved that the rains which fall pretty frequently in the ſpring, between the firſt ploughing and the ſecond, harden the earth greatly, and that drought afterwards hardens it ſtill more, ſo that the roots of plants can no longer pierce or ſpread in it with eaſe: and yet nothing is more neceſſary, in order to their being benefited by every culture of the earth, than that they ſhould find an eaſy paſſage into the mould which lies next to the rows. It is therefore highly proper to ſtir that mould, when the ſecond hoeing with the plough is given, which, with me, is when the corn has begun to ſpindle; that being the time when the plants ſhoot with the greateſt vigour, and when their roots ought conſequently to begin to extend to ſome diſtance.

" I have not perceived that the plants have been at all damaged by the plough's coming ſo near them. They ought to be ſo much the leſs hurt thereby, as the rows are placed over a furrow which has been cut deep; a ſituation which, alone, is capable of making the corn tiller, and puſh ſtrongly: though the aſſiſtance of culture is likewiſe neceſſary, to ſupply the ſtalks and ears with plentiful nouriſhment.

" I am the better pleaſed with this method of bringing the hoe-plough almoſt cloſe to the rows, as it facilitates a very important operation ſtrongly recommended by M. Duhamel, and which I never before thought practicable: I mean, the raiſing up of the earth about the bottom of the plants; as well to give them greater nouriſhment, as to prevent their being lodged. The following is my method on this occaſion.

" When I fill up the furrow which I have cut as cloſe as poſſible to the row, I hold the plough ſloping, in ſuch manner that the earth is forced away from it, and is raiſed up about the plants. If this ſlope is not ſufficient, which may ſometimes depend on the condition of the ground, or the dexterity of the ploughman, I, in that caſe, make the mould-board two or three inches wider, when I uſed to fill the furrow, than it was when I made that furrow: and to this end I ſcrew on to the extremity of the mould-board, a thin plate of iron about four or five inches wide. Thoſe who practiſe the New Huſbandry in ſo extenſive a manner as to employ ſeveral ploughs, will find no inconvenience in having one, larger than the reſt, purpoſely for this important operation. As I do not give this ſecond hoeing with the plough, till after the corn has begun to ſpindle, it is eaſy for me to avoid burying the plants, eſpecially if there are no great clods in the ground: but, at all events, I always earth the plants up as much as poſſible, when there is no other danger than that of burying here and there a few of them, becauſe that accident is eaſily remedied afterwards, if it be worth while.

" When I am to give the third hoeing with the plough, I conſider the condition of the ground. If it is in good tilth, well looſened, and free from weeds, I uſe only the cultivator: otherwiſe I uſe the plough, three or four turns of which are ſufficient to perform this operation in the following manner:

" The firſt cut turns the earth over into the middle furrow: the ſecond and third are in a contrray direction; and the fourth takes up what was looſened by the third, whereby the furrow is replaced in the middle of the alley. Some time after this, and eſpecially if a ſhower of rain has fallen, I cut that furrow ſtill deeper, by one turn of the ſingle or double cultivator, as M. de Chateauvieux directs.

" But as, even after all theſe ploughings, the great furrow may chance to be neither deep enough, nor ſufficiently cleared of mould, owing either to the imperfection of the inſtruments made uſe of, or to the inaptitude of the ploughman, that defect may eaſily be remedied after harveſt, by giving one ploughing more, which is to be begun by throwing up the earth to the right and left towards the ſummit of the beds; that is to ſay, over the ſtubble. This practice is alſo confirmed by M. de Chateauvieux's inſtructions.

" The one ploughing extraordinary which this operation requires, ought not to be thought much of; becauſe the moſt important point in the New Huſbandry certainly is, the providing of a good depth of well ſtirred mould, for the plants to extend their roots in."

HOT-BEDS, beds of earth enriched with manure, in order to forward vegetation, when the ſeaſon or climate is not warm enough for the purpoſe.

By means of hot-beds, ſkilfully managed, the ſeeds of plants, brought from any country between the tropics, may be made to flouriſh even under the poles.

Heat and humidity being the great inſtruments of vegetation, to promote the growth of any plants, theſe muſt be duly proportioned, ſo as neither to exceed nor come ſhort of the bounds nature has allotted for it.

The uſual way of making hot-beds, is of horſe litter and graſs mixed together, and left on a heap for eight or ten days to putrify, and then removed into a bed, and covered up with glaſſes.

For raiſing cauliflowers, cucumbers, melons, radiſhes, and other tender plants and flowers in January or February, Mortimer directs to provide a warm place, defended from all the winds, by being incloſed with a pale or hedge of reeds or ſtraw, about ſix or ſeven feet high. Within this raiſe a bed two or three feet high, and three feet over, of freſh horſe dung, about ſeven or eight days old; then tread it down very hard, make it level, and, if you will, edge it round with boards or brick, laying fine rich mould about three or four inches thick on it. When you find by your finger, that the extreme heat of the bed is over, plant your ſeeds at pleaſure, and ſet your forks four or five inches above the bed, to ſupport the frame, and cover with ſtraw or mat, to ſecure the ſeeds and plants from cold and wet; only uncover them in a warm day, an hour before noon, and cover them again an hour after. Obſerve to earth up your plants, as they ſhoot up, and, when able to bear the cold, tranſplant them.

In Holland they uſe hot-beds made of ſand; and likewiſe of tanners bark, which, when once rightly prepared, will maintain an equable heat for ſix months.

Bradley propoſes very juſtly a thermometer to be uſed to regulate the heat of the hot-beds. Thus, a hot-bed for cucumbers muſt be kept ſo hot as to raiſe the ſpirit in a glaſs to the ſame height as the natural temperature of the weather will raiſe it about the end of May and June, when cucumbers will grow without artificial heat or ſhelter.

HOVEL, a ſhed open on the ſides, and covered overhead.

HOVEN, a diſeaſe common to cattle, on eating too greedily of green clover. It conſiſts in the paunch of the creature being ſwelled to a very great degree, which often, if not prevented, puts an end to the creature's life. The ſureſt method of curing this terrible diſeaſe, is that of making an inciſion into the paunch of the beaſt, and by that means the wind, which cauſed the ſwelling, will eſcape through the orifice, and the creature recover.

A correſpondent of the editors of the Muſeum Ruſticum has given the following account of his performing this operation.

"I took, ſays he, a ſharp-pointed pen-knife, and fixing my eye on the moſt prominent part of his belly, thruſt the blade through the integuments quite into the abdomen: there iſſued out a great guſt of wind very fetid, with ſome water of a rediſh colour: the bullock ſeemed eaſier, but far from well; for the wound preſently cloſed up, and admitted no more air to eſcape; ſo that I was under the neceſſity of ſtabbing him twice more in different parts of the belly before he was thoroughly relieved, which, by the help of a clyſter after the laſt ſtab, was preſently brought about: and here give me leave, gentlemen, before I leave this ſubject, to give a few cautions to thoſe who may be under the neceſſity, one time or other, of performing this very uſeful operation: reflection and experience warrant me in them, therefore I ſhall freely proceed.

"Firſt then, if it be performed with a pen-knife, not to be fearful in puſhing in the blade a proper length, till you find wind iſſue out; for if the wind be in the cavity of the belly, you cannot poſſibly hurt the gut, the whole body of the wind being between you and it, which no reaſonable bladed pen-knife can touch; and if the wind ſhould be pent up in the inteſtine, you muſt penetrate it before the beaſt can be relieved. To this laſt, perhaps, it may be objected, that we run the hazard of killing the beaſt by wounding the gut; but I am far from thinking ſo, as I have ſeen many wounds of the inteſtine, both in man and beaſt, very happily cured: yet granting there might be ſome danger in it, ſtill we are certain, if the poor beaſt can get no relief, it muſt die; and ſo circumſtanced, ſurely, gentlemen, a doubtful remedy is better than none at all.

"Another caution is, that where theſe wounds are made in the belly with a proper pen-knife, it is not adviſeable to have them ſown up; for where there is a continual motion or action, as there is in the muſcles of the belly and parts adjacent, ſuch a practice is not only unwarrantable, but cruel; and why ſhould we not behave with humanity to the brute ſpecies, as well as any other?

"My laſt caution and advice is, that upon all theſe occaſions, when the beaſt is relieved of his wind, a proper clyſter ſhould be thrown up immediately, as hot as he can bear it: theſe clyſters ſtrangely relieve them, by acting as a warm, comforting bath to their diſtempered bowels, and emptying the ſame of the load of muck within them."

HOVER-GROUND, light ground.

HOUSE-BOTE, an allowance of timber out of the lord's woods, for the repairs of a houſe.

HULLS, the chaff, or huſks of corn.

HURDLES, are certain frames made either of ſplit timber, or of hazel-rods, wattled together, to ſerve for gates in incloſures, or to make ſheep-folds, &c.

HURDS, or *Hords* of flax or hemp, the coarſer parts ſeparated in the dreſſings from the tear or fine ſtuff.

HURLE-BONE, in a horſe, a bone near the middle of the buttock, very apt to go out of its ſockets with a hurt or ſtrain.

HUSBANDRY, the buſineſs or employment of a farmer, or perſon who cultivates land, &c.

Huſbandry is divided into two kinds, and diſtinguiſhed by the epithets old and new. The former is that which has been practiſed in all countries from the moſt early times; and the latter that introduced by the ingenious Mr. Tull, and often called the horſe-hoeing huſbandry.

Experience ſhews, that land, though ever ſo well tilled in the autumn, when wheat, for example, is ſown, hardens and ſoddens in the winter; its particles, beaten down by heavy rains, and ſunk by their own weight, approach each other daily more and more; the roots of the plants cultivated have conſequently leſs and leſs room to extend themſelves in queſt of their neceſſary food; and their interſtices in the earth become of courſe ſo few and cloſe, that they are not able to pierce through them, whilſt weeds ſpring up, and rob them of their nouriſhment. By this means the earth, reduced to nearly the ſame condition as if it had not been ploughed at all, is unable to aſſiſt the plants ſown in it in the ſpring, when they ought to ſhoot with the greateſt vigour. They conſequently then ſtand moſt of all in need of the plough to deſtroy the weeds, to lay freſh earth to their roots in the room of that earth which they have exhauſted, to break the particles of the ground anew, ſo as to enable their roots to ſpread, in order to their gathering an ample proviſion of food, which then does them the greateſt ſervice.

In the common huſbandry, the whole attention is to provide a great ſtore of nouriſhment for the wheat, at a time when it ſcarcely conſumes any, as it then produces only a few blades, after which it is left to itſelf, at a ſeaſon when it might, and ſhould be moſt aſſiſted by proper culture; a management as prepoſterous as it would be to give a child a great deal of food, and diminiſh it gradually as he grows bigger; or, to uſe Mr. Tull's compariſon, to give ſilk-worms, before they are hatched, treble the full ſtock of leaves neceſſary to maintain them, till they have finiſhed their ſpinning, and not to allow them any when they really want being fed.

The great advantage of having land in fine tilth before it is ſowed, is univerſally acknowledged: but we muſt not ſtop at thoſe firſt preparations. Plants require a continuation of culture while they grow, and muſt not be forſaken till they have attained their full maturity.

Thoſe who are againſt the frequent ploughings uſed in the New Huſbandry, are afraid of drying the earth too much; becauſe, ſay they, the moiſture eſcapes more eaſily from a well looſened ſoil, than from a hard and cloſe earth.

In anſwer to this it will appear from many of the following experiments, that, even in the drieſt weather, land cultivated according to the new method, continues conſtantly moiſter than that which is managed in the old way. Inſtead of a ſtagnant wet, more hurtful, perhaps, than beneficial, to plants; earth made fine to a good depth, is prepared, as the reverend Dr. Elliot expreſſes it, "with open mouth, to drink and retain the dew, which, when it falls upon the land that is untilled, or but poorly tilled, does not ſink far, but is carried off by the next ſun's heat." That dew is one of the greateſt fertilizers of the earth, has been repeatedly proved; and that it will penetrate ſo deep in a fine looſe ſoil, as to keep that moiſt, while the ground badly tilled is parched up, appears, among many demonſtrations, from Mr. Evelyn's experiment of digging a hole, and filling it up with its former mould well pulverized: or, as Mr. Tull obſerves, till a field in lands; make one land very fine by frequent deep ploughings, and let another be rough, by inſufficient tillage, alternately: then plough the whole field croſs-wiſe in the drieſt weather, which has continued long; and you will perceive, by the colour of the earth, that every fine land will be turned up moiſt; but every rough land will be as dry as powder, from top to bottom.

Another proof of the benefits which ariſe from ſtirring the ground well and often between plants, while they grow, and conſequently a confirmation of the fundamental principle of the horſe-hoeing huſbandry, is thus drawn by Dr. Elliot, from the common manner of raiſing Indian corn.

"The land, ſays he, being previouſly prepared, planted, and the corn come up, we plough a furrow off from the corn on each ſide, then hoe it, and the next time plough up to the corn; ſo that this tillage is nearly the ſame as is now propoſed for wheat, or whatever we would plant: only by the way, I would obſerve, that the ploughings between the rows, for Indian corn, is ſo ſhallow, that one would be apt to think it intended for nothing more than merely to kill the graſs and weeds; whereas it is found by experience, that, though there be neither graſs nor weeds, the ploughing and hoeing will make the corn grow, and that the more the land is ploughed and hoed, the better and longer it will reſiſt drought, and yield the better crop: nay, what is ſtill more remarkable, if the Indian corn be well tilled, the next crop, whether it be oats or flax, will be proportionably greater aud better; ſo that the land muſt have gained ſtrength and richneſs. If it were not ſo, why did not the Indian crop exhauſt and ſpend the ſtrength of the land, eſpecially when we conſider how large that corn is made to grow by good tillage? But we find the contrary; the better the crop of Indian corn, the better the crop will be of oats. There is no ſort of huſbandry, wherein the ſuperior force and virtue of tillage doth ſo evidently appear, as in the raiſing of Indian corn: for if you ſhould plough and harrow the beſt of land, and ſow or plant the corn, and never do any thing more to it, there will be leſs corn than if you ſhould plant poor land, and tend it well: the poor land well ploughed and hoed, ſhall bring a greater crop than the rich land. We hereby ſee the efficacy and advantage of this repeated tillage, which falls in ſucceſſively, according to the exigency and want of the plant in its ſeveral degrees of growth, and keeps the land in a proper ſtate. Why ſhould it not have the ſame effect upon wheat, and every other plant that is ſuſceptible of the like culture?"

If ſeveral rows of wheat are ſown in a poor but well ploughed land, the blades of the corn will turn yellow in the ſpring, eſpecially in dry weather. Let the earth bordering upon theſe rows be ploughed deep, in ſome places near, and in others farther from the rows, and the plants will reſume their proper colour; firſt in the places neareſt to the new ploughed ground, and afterwards gradually in the others, according to their diſtance; which proves that they recover their verdure, in proportion as their roots reach the looſe mould. This holds equally true in all plants; for Mr. Tull declares, that he does not remember ever to have ſeen a poor one contiguous to a well-hoed interval, unleſs overpowered by a too great multitude of other plants, an exception which muſt be equally made if it were a plant that required more or leſs heat or moiſture than the ſoil or climate afforded; and that, on the contrary, he has ſeen plants grow to an amazing ſize, when the earth around them has been frequently tilled. He mentions, among others, a plant of ray-graſs, which chanced to ſtand in a turnip field, where, being hoed as the turnips were, it acquired a bulk at leaſt equal to a thouſand plants of the ſame ſpecies; and a plant of muſtard, which grew higher than he could reach, ſo as to be more like a tree than an herb.

The ſtirring of the earth about the plants whilſt they grow, is productive of ſuch excellent effects, that, in ſome parts of Berkſhire, and in many places in France, they hand-hoe their corn, particularly wheat, and find that the crops amply repay all the charge and trouble of this expenſive operation; which, however, cannot be performed but in well-peopled countries. Every huſbandman will immediately ſee, how much a hoe-plough is preferable for this work, and that, to uſe it rightly, the corn muſt neceſſarily be planted in regular rows, as it is in the new huſbandry.

Our reaſon tells us, that the longeſt lived plants ſtand moſt in need of this culture. Perennials require it more than annuals, and wheat which is ſown in autumn, and does not ripen till nine months after, want it more than ſpring-corn, which occupies the ground only for a few months. The former has to conquer a ſoil rendered hard during the courſe of the winter; but the other has not that difficulty to ſurmount, though both of them, and indeed all ſorts of plants, are greatly invigorated by the repeated laying of fine freſh earth to their roots. Every one knows the vaſt efficacy of wood land, before its native ſtrength and vigour are exhauſted; and ſuch, in ſome degree, is that which this tillage furniſhes; beſides being conſtantly attended with the advantage of deſtroying weeds. How far this laſt important part of agriculture was well executed by the ſarcling, or farriſon, as Mr. Tull calls it, of the ancients, we ſhall not pretend to ſay, becauſe we have no clear account of the manner in which it was performed; but it does not ſeem to have been in any way equal to the horſe-hoeing huſbandry, which likewiſe, among its many other excellencies, keeps the land from going out of tilth.

We ſhall here add Mr. Duhamel's obſervations on the uſe of dung, as given by that gentleman in his Elements of Agriculture.

"It is often, ſays he, more advantageous to increaſe the fertility of land by ploughing, than by dung: 1. Becauſe, in general, only a certain quantity of dung can be had, the product of twenty acres being ſcarcely ſufficient to produce enough for four or five; whereas the particles of the earth may be divided and ſubdivided almoſt to infinity. The help derived from dung is therefore limited; whilſt no bounds can be ſet to the benefits that may accrue from ploughing.

"2. Few plants raiſed in dung ever have the fine flavour of thoſe which grow in a good ſoil moderately dunged. Our kitchen gardens and our other grounds afford daily inſtances of this truth. Pulſe, pot-herbs, and fruit, are ſeldom ſo good in the neighbourhood of great cities, where dung abounds, as in country gardens, where but little of it is uſed. The corn raiſed in thoſe exceſſively dunged lands, yields a great deal of bran, and not much fine flour, and is difficult to keep. Nice horſes will not eat oats of the growth of fields manured with human ordure. But nothing is ſo ſtriking as the difference between the wine of an undunged vineyard, and that of vines which have been greatly dunged.

"3. Dung, which is ſuppoſed to act by fermentation, cauſes indeed an inward diviſion of the particles of the earth, which muſt be very uſeful, as well as the food which it furniſhes to plants: but the plough, beſides dividing thoſe particles, changes their ſituation, and turns the ground upſide down, ſo that the part which was expoſed to the influences of the air and dews, takes the place of another part which is brought from within the earth, up to its ſurface. The conſequence of this is, that well ploughed land is not exhauſted by weeds, and that it admits the moiſture of rains and dews, together with the rays of the ſun, all of which contribute greatly to render it fertile, as has been proved by very many experiments.

“ 4. Dung attracts inſects, and thoſe inſects gnaw plants. It is well known that the roots of trees planted in dunged ground, are very liable to be damaged by inſects: and this is one of the chief reaſons why floriſts baniſh dung from their gardens. Worms, grubs, and other ſuch like vermin, make dreadful havock in their beds of flowers; and I have ſeen meadows where the graſs has been entirely deſtroyed, by their eating its roots.

“ I muſt add, that moſt ſorts of dung contain a great many ſeeds which fill the land with weeds.

“ 5. It is true that dung is equally ſerviceable to light lands, and to ſtrong; but the ſame may be ſaid of ploughing.

“ Land is too ſtrong when its particles lie ſo cloſe together, that the roots of plants cannot extend between them, without great difficulty in queſt of their neceſſary food; for want of which they will remain poor and ſickly: but when the ground has been well looſened by repeated ploughings, and its plants are ſet at greater diſtances from each other, thoſe roots will be able to ſpread freely on all ſides, to pervade every minute chaſm, and to collect ſuch quantities of food as will make the plants grow ſtrong and vigorous. The friendly influences of the atmoſphere will then penetrate to them. What plainly proves the good effects of looſening ſuch ſoils, is, that their fertility is ſometimes increaſed by a mixture of ſand, inſtead of dung. Now ſand does not afford any nutritive ſubſtance; but only hinders the particles of the earth from re-uniting too cloſely.

“ Ploughing is equally beneficial to light lands, for the very contrary reaſon; though theſe do not require ſo much of it as the other. There is no danger of their being exhauſted by any expoſure to the ſun; but, on the contrary, they acquire an additional degree of fertility by the ſtirring and grinding of their particles, and are thereby the better fitted to receive the moiſture of rains and dews, and the ſalutary influences of the air and ſun; whilſt their inward pores are at the ſame time better adapted to the proper extenſions of the roots of plants, by their being leſſened.

“ But let the benefits ariſing from dung be ever ſo great, let the means of obtaining enough of it be ever ſo eaſy, and let even its defects be corrected as much as can be, ſtill it will not be the leſs true, that frequent ploughing is of infinite ſervice to land.

“ For this reaſon it is, that land intended for wheat is ploughed three or four times before the grain is ſowed. Some farmers, who could not dung all their lands, ploughed part of them double the uſual number of times, and reaped greater crops from theſe, than from thoſe which were dunged. The expence of the ploughings extraordinary will be much leſs than the price of the dung neceſſary for the land, if the farmer is obliged to purchaſe it.

“ In 1759, M. Delu gave three ploughings to ſome of his fields intended for oats; and though that year was very dry and unfavourable to ſpring corn, his oats kept up well till they were perfectly ripe, and yielded a full crop of excellent grain.

“ He gave five ploughings to a piece of wheat-land, which had not been dunged, and at harveſt, had taller and finer corn there, than in the neighbouring grounds which had been dunged and cultivated in the uſual way. In ſhort, the advantage of thorough tillage, while the plants are growing, is ſo great, that, in many places, it has been found amply to repay even the expence of digging between the rows of corn.

“ The farmer muſt not think of practiſing the New Huſbandry in land which cannot be brought to a fine tilth: for as no remedies are proper for all diſeaſes, ſo no one culture can ſuit every kind of ſoil.

“ I have met with very zealous huſbandmen, who have been in a great hurry to procure all the inſtruments proper for the horſe-hoeing huſbandry, before they had examined whether their ground was fit for uſing them. In walking over the fields, I have found them in ſo bad order as to be full of clods, ſtones, and all ſorts of weeds: only the bare ſurface of the land had been ſcratched, by what they called ploughing; and indeed their common inſtruments of tillage were ſo imperfect, that it was hardly poſſible for them to do more. I adviſed them to deſtroy thoſe weeds by good and frequent ploughing, to procure good inſtruments, to looſen the ground to a proper depth, to collect good manures, to drain their land well by trenches and ditches, and, in ſhort, to practice the Old Huſbandry completely, before they attempted the new; for, in fact, all the requiſites in the former muſt be the foundation of the latter.

“ To anſwer the ends of this huſbandry, the ſeeds muſt be diſtributed ſo ſparingly, that each plant may have room to extend its roots in ſuch manner that they may be able to collect an abundant quantity of food; each plant muſt be enabled to tiller greatly, ſo as to produce a conſiderable number of ſtalks; and each ſtalk muſt be enabled to bear a fine long ear, well filled with grains to its very point.

“ To effect the firſt of theſe qualities, the field, after being thoroughly ploughed and well harrowed, muſt be divided by furrows, the ſpaces between which may be of ſuch breadth as ſhall be judged moſt proper; for neither their preciſe width, nor the diſtance between the rows of corn, is yet fully determined. In the middle of theſe ſpaces, which will be diſtinguiſhed by the name of beds, the wheat, or other grain, is to be ſown in one, two, or more rows. An inch will be ſufficient for the diſtance between the grains, lengthwiſe of the row; though that may be ſomewhat leſs, if the ground be not very good for wheat; or, on the contrary, ſomewhat more if it be excellent for that grain. By this diſtribution, each plant will find, in the intermediate ſpaces between the beds, and in the beds themſelves, a ſufficient extent of earth wherein to collect its neceſſary food; for thoſe intermediate ſpaces, which I ſhall call alleys, muſt be wide enough to admit of ſtirring the ground in them while the plants grow: but to anſwer the ſecond and third intentions, it is of conſequence that theſe ſtirrings be performed at proper ſeaſons, becauſe each of them is to produce its particular effect.

“ It is eſſentially neceſſary that the rows of corn be ſown very ſtraight; a circumſtance which, though it be attended with ſome trouble, ought not to diſcourage the huſbandman, becauſe the great difficulty will be only the firſt time. After the ground has been once rightly ſown, it will be eaſy to continue in the ſame regular tract every following year, without taking the precautions I am now going to obſerve.

“ If the field be not very large, a furrow traced with a ſpade or pickaxe, directed by a line ſtretched acroſs the ground, will enable the ploughman to guide the horſe that draws the drill; and he will take care to leave a proper interval between one furrow and another, if three rows are to be ſown.

“ If the extent of ground be too great for the above method, poles or ſtakes may be ſtuck, five feet aſunder, at each end of the field, to guide the ploughman, who, with a common plough, will trace ſmall furrows, by the help of which the horſe and drill may be properly directed.

“ It will be right, if poſſible, to ſuit the direction of the furrows to the declivity of the land, that the water may drain down to the loweſt part of the field, where a ditch ſhould be dug to carry it off: and it will alſo be neceſſary, to make them lengthwiſe of the field, if convenient, that the leſs ground may be loſt by the ſpace which muſt be left for the plough to turn in.

“ After the ſeed is put into the hoppers of the drill, the horſe which draws this inſtrument muſt be made to walk ſlowly in the furrow before traced by way of guide: and in order to drop as nearly as poſſible the intended quantity of ſeed, the outlet of the hopper muſt be proportioned to the ſize of the grain.

“ As it will be ſomewhat difficult to manage the drill rightly at firſt, till the huſbandman becomes uſed to it, he ſhould look over his field as ſoon as the corn has ſprouted, and then drop by hand a few grains in the places where it may have failed.

“ The land ſhould be ſown about the middle of September, or, at fartheſt, by the end of that month: and it will be right always to try the goodneſs of the ſeed beforehand, by ſowing fifty or an hundred grains of it in a fine mould, or moiſt ground, where it will ſoon appear whether they all riſe.

“ Land which retains water ſhould be ploughed once in October, when the weather is fine. In doing this, a furrow ſhould be firſt cut in the middle of the alleys, and then it ſhould be filled with the earth on each ſide, even ſo far as to arch it up, and leave only a ſmall furrow on either ſide, cloſe to the beds, to drain off the wet, which would prove very prejudicial to the plants if it were to remain long near their roots. This looſening of the earth will alſo fit it for being mellowed by the winter's froſts; to which, however, care muſt be taken not to expoſe the roots of the corn, by leaving them too bare of mould. The moſt proper time for this ſtirring of the ground is when the plants have ſhot out ſome blades.

“ The ſecond horſe-hoeing, which ſhould be given as ſoon as the hard froſts are paſt, that is to ſay, by the end of March, is intended to make the plants tiller; and will have this effect, if, after the earth near the rows has been ſtirred a little, that which was before laid up in the middle of the alleys be returned back to the furrows at their ſides. This earth, having been mellowed during the winter, will afford excellent nouriſhment to the plants now beginning to vegetate apace, and they will ſoon put forth their multiplied ſtalks.

“ The third hoeing, which is the ſecond after winter, and is intended to ſtrengthen the ſtalks, ſhould be performed when the ears of the corn begin to appear. This culture, which is looked upon as the leaſt important of all, and is ſometimes even omitted without any great inconvenience, need not be any thing more than a ſlight ſtirring of the earth, in which it will however be right to begin to hollow the alleys.

“ The laſt ſtirring of the earth between the rows of corn is one of the moſt important, being that which makes the grains ſwell, and grow full bodied to the very point of the ear. The moſt proper time for this is when the ears begin to bloom: but as the corn is then high, only one furrow can be cut in the middle of the alleys, the earth of which ſhould be laid up to the ſtems of the plants on each ſide. The plough will hardly be able to paſs more than twice in this furrow, which ſhould, however, be made as deep as poſſible, in order to bank up the greater quantity of earth. By this operation, the now fallow alleys are prepared for the next ſowing; for it is in the middle of them that the corn is to be planted the following year; and the now eared wheat is earthed up, to prevent its being lodged; though in general corn thus cultivated is leſs apt to be beaten down, than that which is raiſed in the common way, becauſe the ſtraw of this, being more expoſed to the air, becomes harder, and acquires a firmer texture, eſpecially toward its bottom. It is for this reaſon that a tuft of corn, which ſtands quite ſingle, is ſcarcely ever beaten down by the weather.

“ Theſe repeated hoeings of the earth will certainly be rewarded with a very plentiful crop, unleſs the ſeaſons prove extremely bad.

“ When the corn is reaped, all poſſible care ſhould be taken not to trample upon the adjoining ploughed ground.

“ It is well known, that vigorous plants do not ripen their ſeeds ſo ſoon as thoſe which have been ſtinted in their growth: for this reaſon the corn cultivated according to the principles of the new huſbandry, ripens later than in the common way, and ſhould therefore be ſown ſomewhat earlier.

“ We will now ſuppoſe that the crop is reaped, and that the ſame field is to be ſown again with wheat the next year, and every year after, as it may be, becauſe the rows of corn are placed each time in the middle of the former alleys, which have been ploughed during the whole year, without producing any thing. Thus, the only difference between this new method and the old huſbandry is, that inſtead of reſting, or fallowing, a whole field, whilſt another whole field is under corn, and each of them is ſeparate from the other; the fallow here is in the ſame field as the corn, being interpoſed by means of alleys, which are the part reſted between the beds, which are the part cultivated: but there is this great advantage here, that the ſtirring of the earth in the alleys, which are not planted, not only prepares the ſoil admirably for being ſown the next year, but invigorates the plants actually growing in the beds.

“ If it be thought proper to dung the alleys, in order prepare them for the reception of the ſeed, the dung, which ſhould be thoroughly rotten, muſt be laid in the bottom of the deep furrow before made in the middle of them, and there covered with the earth which was thrown up towards the rows of wheat. If the land does not want dunging, this deep furrow is filled up without it; and this ſhould be done immediately after harveſt, that there may be time to give the ground another ſtirring, which need only be a ſlight one, before the ſowing of the rows, which are now to be in the middle of the former alleys; and the alleys of this year will be in the place of the laſt year's ſtubble.

“ Though land, cultivated according to the principles of the new huſbandry, does not require ſo much dunging as that which is managed in the old way, yet this manure will always help to enrich the ſoil, eſpecially if it be uſed in the manner here directed. By being thoroughly rotten when it is laid in the furrow, and there covered over immediately after harveſt, it will have time to mellow and diffuſe its influence, and not be apt afterwards to choak up the ſhares of the drill; an inconvenience which does not happen with pigeons dung, which therefore need not be ſtrewed till the ground is ploughed for ſowing.

“ It is farther obſerved:

“ 1. That if dung be uſed for the ſecond year's crop, very little of it will ſuffice, becauſe it need only be laid in the bottom of the furrows.

“ 2. That there can hardly be any occaſion for dung this ſecond year, becauſe, if the earth of the beds in which the wheat grew was good, that of the alleys, of the ſame ſoil, muſt be ſtill better, by reaſon of its having been fallowed and well tilled.

“ 3. That the ſecond year's wheat is placed in a moſt advantageous ſituation, its roots having a depth of twelve or fifteen inches to extend themſelves in, by means of the furrow which was in the middle of the alley. For this reaſon, corn ought to thrive beſt in thoſe lands which have been longeſt cultivated according to the new huſbandry.

“ The earth in the alleys is to be horſe-hoed during the ſecond year, in the ſame manner, and at the ſame ſeaſons, as in the firſt.

“ This frequency of hoeing ought not to be objected to; for the labour of the firſt hoeing, to make the furrows on each ſide of the rows, and lay the earth up in the middle of the alleys, cannot be great; and the ſecond only returns that earth into thoſe furrows: the third is only to ſtir the ſurface of the ſoil: the fourth and laſt is to make the deep furrow in the middle of the alleys, and bank up the rows of corn on each ſide, with the earth taken out of it; ſo that neither of theſe operations ever extends to above a third part of the ground, at any one time.

“ The whole field might indeed be ploughed up after harveſt: but I would adviſe the huſbandman not to touch the ſtubble then, becauſe the rows of that will help him to guide the drill in ſtraight lines, and the yet unrotten ſtraw might be apt to clog the ſhares of the drill, ſo as to prevent their working properly. However, if the ſtubble be very ſhort, this caution becomes the leſs material, and the whole field may then be ploughed; though ſtill it will be neceſſary to plough it again in October, in order to make drains to carry off the wet.

“ It is almoſt needleſs to obſerve, that all the operations of which I have been ſpeaking, muſt often be performed either a little earlier, or ſomewhat later, according as the year is more or leſs forward; and that it will always be neceſſary to wait till the ground is dry enough to be ploughed without danger of its clodding; a circumſtance which varies greatly, according to the nature of the ſoil.”

The editors of the laſt edition of Mr. Tull's Horſe-hoeing Huſbandry, give, in their preface to that work, the following comparative calculation of the expence and profit of the old method of culture and the new, drawn up by a gentleman who has practiſed both for ſome years, and who has no attachment to the new huſbandry, farther than he has found it anſwer in his trials. They candidly appeal to experience, “ whether every article in this calculation is not eſtimated in favour of the common huſbandry; whether the expence be not rated lower than moſt farmers find it; and whether the crop be not ſuch as they would rejoice to ſee, but ſeldom do.

“ In the new huſbandry, every article is put at its full value, and the crop of each year is computed four buſhels ſhort of the other, though, in ſeveral years experience, it has equalled, and generally exceeded, thoſe of the neighbourhood in the old way.”

An Eſtimate of the Expence and Profit of Ten Acres of Land, in Twenty Years.

I. In the Old Way.

First year for wheat coſts 33l. 5s. viz.	l.	s.	d.	l.	s.	d.
Firſt ploughing at 6s. per acre —	3	0	0			
Second and third ditto, at 8s. per acre	4	0	0			
Manure, 30s. per acre — — —	15	0	0			
				22	0	0
Two harrowings and ſowings, at 2s. 6d. per acre — — — —	1	5	0			
Seed, three buſhels per acre, at 4s. per buſhel — — — — —	6	0	0			
Weeding, at 2s. per acre — —	1	0	0			
Reaping, binding, and carrying in, at 6s. per acre — — — — —	3	0	0			
				11	5	0
Second year for barley coſts 11l. 6s. 8d.						
Once ploughing, at 6s. per acre —	3	0	0			
Harrowing and ſowing, at 1s. 6d. per acre — — — — — — —	0	15	0			
Seed, four buſhels per acre, at 2s. —	4	0	0			
Weeding, at 1s. per acre — —	0	10	0			
Cutting, raking, and carrying, at 3s. 2d. per acre — — — —	1	11	8			
Graſs-ſeeds, at 3s. per acre — —	1	10	0			
				11	6	8
Third and fourth years lying in graſs coſt nothing.				44	11	8
So that the expence of ten acres in four years comes to 44l. 11s. 8d. and in twenty years to				222	18	4
Firſt year's produce is half a load of wheat per acre, at 7l. per acre — — — — —				35	0	0
Second year's produce is two quarters of barley per acre, at 1l. per acre — — —				20	0	0
Third and fourth year's graſs is valued at 1l. 10s. per acre — — — — — —				15	0	0
So that the produce of ten acres in four years is				70	0	0
And in twenty years it will be — — —				350	0	0
Deduct the expences — — — — —				222	18	4
And there remains clear profit on ten acres in twenty years by the old way — — —				127	1	8

II. In the New Way.

	l.	s.	d.	l.	s.	d.
Firſt year's extraordinary expence is For ploughing and manuring the land, the ſame as in the old way —				22	0	0
Ploughing once more, at 4s. per acre	2	0	0			
Seed, nine gallons per acre, at 4s. per buſhel — — — — —	2	5	0			
Drilling, at 7d. per acre — —	0	5	10			
Hand-hoeing and weeding, at 2s. 6d. per acre — — — — —	1	5	0			
Horſe-hoeing, ſix times, at 10s. per acre — — — — — —	5	0	0			
Reaping, binding, and carrying in, at 6s. per acre — — — —	3	0	0			
The ſtanding annual charge on ten acres is — — — — —	13	15	10			
Therefore the expence on ten acres in twenty years is — — —				275	16	8
Add the extraordinaries of the firſt year, and the ſum is — — — — — — —				297	16	8
The yearly produce is at leaſt two quarters of wheat per acre, at 1s. 8d. per quarter, which on ten acres in twenty years amounts to				560	0	0
Therefore, all things paid, there remains clear profit on ten acres in twenty years, by the new way — — — — — — —				262	3	4

“ So that the profit on ten acres of land in twenty years, in the new way, exceeds that in the old by one hundred and thirty-five pounds one ſhilling and eightpence, and conſequently is conſiderably more than double thereof: an ample encouragement to practiſe a method whereby ſo great advantage will ariſe from ſo ſmall a quantity of land, in the compaſs of twenty-one years leaſe; one year being allowed, both in the old and new way, of preparing the ground.

“ It ought withal to be obſerved, that Mr. Tull's huſbandry requires no manure at all, though we have here, to prevent objections, allowed the charge thereof for the firſt year; and moreover, that though the crop of wheat from the drill-plough is here put only at two quuarters on an acre, yet Mr. Tull himſelf, by actual experiment and meaſure, found the produce of his drilled wheat crop amount to almoſt four quarters on an acre: and, as he has delivered this fact upon his own knowledge, ſo there is no reaſon to doubt of his veracity, which has never yet been called in queſtion. But that we might not be ſuppoſed to have any prejudice in favour of his ſcheme, we have choſen to take the calculations of others rather than his, having no other view in what we have ſaid, than to promote the cauſe of truth, and the public welfare.”

The following account of the advantage of the drilling and horſe-hoeing tillage, above the broad-caſt tillage, is extracted from the account of the Experiments ſent to the Society of Arts, &c.

The manner and expence of cultivating lands for corn in ſeveral counties in England, being materially different, it is thought proper to prefix to theſe calculations of the comparative profits ariſing from the broad-caſt, and from the drilling and horſe-hoeing tillage in Cumberland and Yorkſhire, an account as well of the prices of labour, &c. as of the manner in which each kind of tillage is practiſed in theſe ſeveral counties: to the end that farmers, who are the perſons more immediately intereſted, may have every circumſtance expoſed to their view, that may the better enable them to form their judgments on the following eſtimate:

The Prices of Labour, &c. in Cumberland.

	s.	d.
Ploughing per acre —— ——	3	6
Manure, per one horſe cart load ——	0	4
Lime per buſhel (Wincheſter) —— ——	0	2
Hire of man and one horſe cart per day ——	1	10
Ditto of a labourer per day —— ——	0	10
Horſe-hoeing per acre drilled —— ——	1	2
Rent of land per acre —— ——	8	0
Harrowing per acre —— ——	0	6
Wheat per buſhel —— ——	4	0

The Kind of Soil on which the Experiments were made, in Cumberland.

A heavy moiſt ſoil on a clay bottom, rather too ſtiff for barley.

The Broad-caſt Tillage of one Acre of Land, in Cumberland.

N. B. The land on which the experiments were made in this county, were ploughed out of lea, and bore a crop of oats.

The firſt Year for Turnips.	Expences. l.	s.	d.
Three ploughings with two horſes, the firſt in March, ſecond in May, third in June —	0	10	6
60 one horſe cart loads of manure ——	1	0	0
90 buſhels (Wincheſter) of lime ——	0	15	0
Six days work of man and horſe leading the manure, and two ditto the lime ——	0	14	8
Two days work of a labourer ſpreading the manure —— ——	0	1	8
Seed and ſowing —— ——	0	2	0
Three harrowings —— ——	0	1	6
Total expence the firſt year	3	5	4

N. B. In the above, as well as in all the following calculations, the expence of reaping, threſhing, and ſending

ing to market, is omitted, it being countervailed by the price or value of the ſtraw (according to general eſtimation) which laſt is likewiſe omitted in the computation of the value of the crops.

The value of the crop of turnips computed 3l.

The Prices of Labour, &c. in Yorkſhire.

	s.	d.
Ploughing per acre	4	0
Manure per load	2	6
Hoeing an acre of turnips in broad-caſt, during a ſeaſon	6	0
Hand-hoeing per acre drilled	2	6
Horſe-hoeing ditto	1	0
Drilling per acre	0	6
Rent of land	15	0

The Kind of Soil on which the Experiments were made, in Yorkſhire.

Inclining to a hazle mould, but light and dry.

The Broad-caſt Tillage of one Acre of Land, in Yorkſhire.

The firſt Year for Turnips.	Expences. l.	s.	d.
Four ploughings	0	16	0
Harrowing and ſeed	0	2	0
Hoeing the turnips	0	6	0
15 load of dung	1	17	6
Total expence	3	6	0

Value of the crop of turnips, 2l.

The Broad-caſt Tillage of one Acre of Land, in Cumberland.

The ſecond Year for fallow, and the third Year for Wheat.

	Expences. l.	s.	d.
Four ploughings	0	14	0
Four harrowings and ſowing	0	2	6
Seed-wheat	0	12	0
Total expence	1	8	6

The value of the crop, viz.
3 quarters of wheat, at 4s. per buſhel, 4l. 16s.

N. B. In this country the broad-caſt tillage does not admit a fourth year's crop without a conſiderable loſs: therefore after the third year the land is again manured, and the ſame proceſs repeated for three years more, and ſo on from three years to three years.

The Broad-caſt Tillage of one Acre of Land, in Yorkſhire.

The ſecond Year for Barley.	Expences. l.	s.	d.
Two ploughings and harrowings	0	10	0
Three buſhels of ſeed-barley and weeding	0	8	0
Total expences	0	18	0

Value of the crop of barley, viz
Four quarters at 18s. per quarter, 3l. 12s.

The third Year for Clover.	l.	s.	d.
14 pounds weight of clover-ſeed	0	4	0

Value of two crops clover, 1l. 10s.

The fourth Year for Wheat.	l.	s.	d.
One Ploughing and Harrowing	0	7	0
Three buſhels of ſeed and weeding	0	16	0
Total expence	1	3	0

Value of the crop of wheat, viz.
Three quarters at 1l. 16s. per quarter 5l. 8s.

N. B. In this kind of tillage the land never lies fallow: and after the fourth year, the ſame proceſs is repeated for four years more, and ſo on.

The Drilling and Horſe-hoeing Tillage of one acre of Land in Cumberland.

N. B. The land on which the experiments were made in this county were firſt ploughed out of lea, and bore a crop of oats.

The firſt Year for Turnips.	Expences. l.	s.	d.
Three ploughings with two horſes, viz. the firſt in March, ſecond in May, third in June	0	10	6
30 one horſe cart loads of manure	0	10	0
45 buſhels (Wincheſter) of lime	0	7	6
Three days work of a man and horſe leading the manure, and one ditto the lime	0	7	4
One day's work of a labourer ſpreading ditto	0	0	10
Seed	0	0	6
Harrowing and drilling	0	1	6
Three horſe-hoeings, each equal to one-third of an acre	0	3	6
Total expence	2	1	8

Value of the crop of turnips 2l. 10s.

The ſecond Year for Barley.	l.	s.	d.
Two ploughings, viz. the firſt in March, and the ſecond in April or May	0	7	0
Seed-barley, viz. one buſhel (Wincheſter)	0	2	0
Harrowing and drilling	0	1	6
Three horſe-hoeings	0	3	6
Total expence	0	14	0

Value of the crop of barley, 1l. 16s.

The third Year for Wheat.	l.	s.	d.
One ploughing before Michaelmas	0	3	6
Seed-wheat	0	3	6
Harrowing and drilling	0	1	0
Five horſe-hoeings	0	5	10
Total expence	0	13	10

Value of the crop of wheat, viz. 15 buſh. 3l.

N. B. The fourth year a ſecond crop of barley, and the fifth year a ſecond crop of wheat at the like expence, and with like profit, and then after the fifth year, the whole proceſs is repeated. The ridges are formed five feet and half wide, and a treble row of drills ſeven inches aſunder, on the top of each ridge.

The Drilling and Horſe-hoeing Tillage of one Acre of Land, in Yorkſhire.

For Barley.	Expences. l.	s.	d.
Two ploughings, viz. the firſt in autumn, and the ſecond in ſpring	0	8	0
Seed-barley, viz. one buſhel, or four pecks	0	2	1½
Three horſe-hoeings, viz. on the 30th of May, 7th of June, and the beginning of July	0	3	0
One hand-hoeing on the 8th of June	0	2	6
Total expence annually	0	15	7½

Value of the crop, viz. 3 qrs. 6 buſh.
2 pecks, at 18 s. per qr. 3l. 8s. 7½d.

For Wheat.	l.	s.	d.
Two ploughings	0	8	0
Seed-wheat, viz. one buſhel, or four pecks	0	4	4
Three horſe-hoeings	0	3	0
One hand-hoeing	0	2	6
Total annual expence	0	17	10

Value of the crop of wheat, viz. 2 qrs.
at 1l. 16s. per qr. 3l. 12s.

N. B. The ridges are here formed four feet and a half wide; and a double row of ſeed, ten inches aſunder, drilled on the top of each ridge: the intervals for horſe-hoeing being thus three feet eight inches. The ſame proceſs, and the ſame expence, is repeated annually: and a piece of ground in Yorkſhire, under this method of tillage, had yielded the eighth ſucceſſive crop, viz. four of barley, and four of wheat, at the time the account was ſent to the Society, of the values above ſpecified, without ever having had any manure beſtowed upon it, and without ſhewing any ſign of impoveriſhment, being then, to all appearance, in full heart.

An Eſtimate of the Advantage of the Drilling and Horſe-hoeing Tillage, above the Broad-caſt Tillage, as both are practiſed in Cumberland and Yorkſhire.

In order to aſcertain the proper method of calculation, whereby to arrive at a deciſive eſtimate of the comparative profits from the two kinds of tillage; it becomes, in ſome meaſure, expedient here to inſert an abſtract of two experiments, contained in the accounts mentioned in the title page: and the rather that experiments of this kind, coming ſo properly authorized to the Society, ought not to remain in obſcurity. Theſe experiments were made to prove the difference of the acreable produce, and the difference of the rate of increaſe from the ſeed ſown as well in broad-caſt, as in various forms of drilling

In Yorkſhire.

Quantity of ſeed ſown on one acre.

		Pecks.	Prod	Rate of increaſe.
A. D. 1763.	In broad-caſt - -	10	178	Seventeen-fold.
	In equidiſtant drills -	6	194	Thirty-two-fold.
	In double drills, 11 inch. aſunder, and 4 feet 10 inches interval -	3	102	Thirty-four-fold.
	In treble drills, 7 inches aſunder, and 4 feet 3 inches interval -	2	100	Fifty-fold.

Quantity of ſeed ſown on one acre.

		Pecks.	Pro	Rate of increaſe.
A. D. 1765.	In broad-caſt (barley) -	9	137	Fifteen-fold.
	In equidiſtant drills -	8	144	Eighteen-fold.
	In double drills, 10 inch. diſtant, and 3 feet 8 inches interval - -	4	136	Thirty-four-fold.

N. B. This laſt is that preferred in the Yorkſhire drilling-tillage before ſpecified.

Now firſt, That the rate of increaſe alone is not the proper ſtandard to form a judgment of the profits of either kind of tillage, will be evident from a ſlight attention to the foregoing experiment. The quantity of ſeed requiſite to ſow an acre of land is in itſelf ſo ſmall, viz. at the utmoſt but eight or ten pecks, that it is of very little conſequence to a farmer, whether he ſows ten pecks (as in the common broad-caſt) or only two pecks (as in the treble drill method) on an acre. But when he conſiders that from the firſt, his acre will produce him 178 pecks, and from the ſecond but 100 pecks; there appears ſuch a difference in the acreable produce as muſt engage his attention: ſo that taking nothing into the account beſides the quantity of ſeed ſown the acreable produce, and the rate of increaſe, he muſt neceſſarily prefer the method which gives him the 178 pecks on an acre, to that which gives him only 100 pecks, notwithſtanding that the latter is an increaſe fifty-fold, and the former only ſeventeen-fold.

But, ſecondly, That neither is the acreable produce the proper foundation for our calculations, is evident from this, that the expence of cultivating for the 178 pecks per acre, may happen to be proportionably greater than that of cultivating for the 100 pecks per acre, ſo that the profit upon each may be equal; in which caſe the farmer muſt prefer the 100 pecks per acre as affording him an equal profit at a leſs expence, though in fact it be the leſſer acreable produce. And if the expence of the 178 pecks per acre were any thing greater than proportionable, there would then be a double reaſon for preferring the leſſer acreable produce, viz. as giving a greater profit at a leſs expence.

Laſtly, It is plain from what has been ſaid, that the proper ground for calculating the comparative profits of each kind of tillage will be found in conſidering the expences and the returns made in each, in any given time, and when corn is at any given price. For thus it will eaſily and plainly appear, in which of theſe two kinds of tillage a farmer can turn his ſtock of money to beſt account; which is the only material queſtion. Nor can the inſtability of the price of corn, any wiſe impeach the certainty of this method of calculation, ſince to whatever price it riſes or falls, the returns from each kind of tillage muſt riſe or fall in like manner; ſo that the difference of profit muſt always remain proportionally the ſame.

This then is the method of calculation obſerved in the following eſtimate.

In Cumberland.

Broadcaſt tillage of one acre.

	Seed ſown.	Expence. l.	s.	d.	Value of the crop l.	s.	d.
1ſt Year —	Turnips	3	5	4	3	0	0
2d Year —	Fallow }	1	8	6	4	16	0
3d Year —	Wheat }						
Total — —		4	13	10	7	16	0
Deduct expences					4	13	6
					3	2	10
Deduct three years rent —					1	4	3
Neat profit for one acre in broadcaſt for threo years					1	18	2

Drilling tillage of one acre.

	Seed ſown.	Expence. l.	s.	d.	Value of the crop l.	s.	d.
1ſt Year —	Turnips	2	1	8	2	10	0
2d Year —	Barley	0	14	0	1	16	0
3d Year —	Wheat	0	14	10	3	0	0
Total —		3	9	6	7	6	0
Deduct expences					3	9	6
					3	16	6
Deduct three years rent —					1	4	0
Neat profits from one acre in drilling for three years — —					2	12	6

In Yorkſhire.

Broadcaſt tillage of one acre.

	Seed ſown.	Expence. l.	s.	d.	Value of the crop l.	s.	d.
1ſt Year —	Turnips	3	1	6	2	0	0
2d Year —	Barley	0	18	0	3	12	0
3d Year —	Clover	0	4	0	1	10	0
4th Year —	Wheat	1	3	0	5	8	0
Total —		5	6	6	12	10	0
Deduct expence					5	6	6
					7	3	6
Deduct four years rent —					3	0	0
Neat profit in four years —					4	3	6

Drilling tillage of one acre.

	Expence. Barley. l.	s.	d.	Expence. Wheat. l.	s.	d	Value of the crop. Barley. l.	s.	d.	Value of the crop. Weat. l.	s.	d.
1ſt Year	0	15	7½	0	17	10	3	8	7½	3	12	0
2d Year	0	15	7½	0	17	10	3	8	7½	3	12	0
3d Year	0	15	7½	0	17	10	3	8	7½	3	12	0
4th Year	0	15	7½	0	17	10	3	8	7½	3	12	0
Tot.	3	2	6	3	11	4	13	14	6	14	8	0
Deduct expences							3	2	6	3	11	4
							10	12	0	10	16	8
Deduct four years rent							3	0	0	3	0	0
Neat profit in four years							7	12	0	7	16	8
							Barley.			Wheat.		

Calculation in Cumberland.

	l.	s.	d.
The neceſſary expences for three years tillage of one acre in broadcaſt, viz. 4 l. 13 s. 10 d. producing neat profit only	1	18	2
Will, from the above accounts, be ſufficient to till 1 Acr. 1 R. 16 P. for the ſame number of years in drilling, and will produce neat profit - -	3	10	9
Difference of profit from 4 l. 13 s. 10 d. in three years in favour of drilling	1	12	7
But ſince this method of drilling tillage requires a renewal of manure only every five years, whereas the broadcaſt method requires it every three years; therefore, taking the profits in each kind of tillage for fifteen years together, will give the true proportions.			
Thus the ſaid ſum of 4 l. 13 s. 10 d. in broadcaſt tillage for fifteen years, will produce a neat profit of - -	9	10	10
But the ſame expended in drilling and horſe-hoeing tillage, will, in the ſame number of years, produce a neat profit of -	22	1	2½

And whatever price corn, &c. bears, the returns made by each kind of tillage will bear a price proportional to theſe two ſums; or the profits on the drilling tillage in this county for fifteen years together, will always be to that on the broadcaſt tillage, for the ſame time as 22 l. 1 s. 2½ d. is to 9 l. 10 s. 10 d. that is as 23 is to 10 nearly.

Calculation in Yorkſhire.

	l.	s.	d.
The neceſſary expences for four years tillage of one acre in the improved broadcaſt tillage, viz. 5 l. 6 s. 6 d. producing neat profit only - - -	4	3	6
Will be ſufficient to till 1 acre 2 R. 22 P. 6. for the ſame number of years in the drilling method, and will produce a neat profit			
In barley - -	12	19	0
In wheat - -	12	17	1½
Which is more than three times the profit that is yielded by the broadcaſt method.			

A comparative Calculation of Expence and Profit between the Drill and the Common Huſbandry, taken from Mr. Baker's Report to the Dublin Society of his Experiments in Agriculture, for the Year 1765. Publiſhed by Order of that Society.

An Eſtimate of the Expence upon a Plantation * Acre of Wheat, in the Common Huſbandry.

	l.	s.	d.
To the firſt ploughing, commonly called breaking for fallow, 8 horſes, 8 s. 2 ploughmen, 1 s. 4 d. 2 drivers, 1 s. -	0	10	4
To the firſt harrowing, 4 horſes, 4 s. a driver, 6 d. - - -	0	4	6
To the ſecond ploughing, commonly called gaurowing - - -	0	10	4
To the ſecond harrowing - -	0	4	6
To the third ploughing, commonly called ſtretching - - -	0	10	4
To ſowing the ſeed, 8 horſes, 8 s. 2 ploughmen, 1 s. 4 d. 2 drivers, 1 s. the ſeedman, 8 d. - - -	0	11	0
To ſeed wheat, one barrel -	1	0	0
To rent for the year of fallow -	0	18	0
To ditto, the year the crop is growing	0	18	0
	5	7	0

In this account 40 s. are charged for 40 horſes, imployed in the culture of one acre for wheat, in the common huſbandry; a charge which ought to be conſidered by the farmer; for he actually buys and maintains his horſes for this buſineſs.

The crop which follows wheat is generally oats; but ſometimes peas are ſown inſtead of oats; with ſome, the practice is to let the peas follow oats; in which caſe they fallow only every fourth year; but where land receives no other aſſiſtance than what ariſes from fallow, it is a bad practice not to fallow every third year. It is the general practice to plough but once for oats; and therefore it ſhall be ſtated ſo; but it is a much better practice to plough the wheat ſtubble once before winter, and again in the ſpring.

An eſtimate of expence upon an acre of oats.

	l.	s.	d.
To ploughing once - -	0	10	4
To ſeed oats, 2 barrels - -	0	12	0
To harrowing 4 s. 6 d. ſeed-man 4 d.	0	4	10
To one year's rent - -	0	18	0
	2	5	2

Theſe two crops conſume three years; after which the farmer is to begin again, and to incur every article of expence ſtated in the above accounts, in order to obtain two crops more.

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* An Iriſh acre contains 7840 ſquare yards.

An Eſtimate of Expence upon a Plantation Acre of Wheat in the Drill Huſbandry, the firſt Year.

To ploughing 4 times, to prepare the fallow	2	1	4	This is the ſame charge as in preparing for the common [huſbandry.
To harrowing twice for ditto -	0	9	0	This is the ſame alſo.
To rent for the year of fallow -	0	18	0	This charge is ſaved after the firſt year.
To harrowing with the drill harrows	0	0	6½	Four acres a day may be harrowed with one horſe.
To ſowing with the drill plough -	0	1	1	From three to five acres may be ſown in a day.
To ſeed wheat generally 5 ſtone, but ſuppoſe 6	0	6	0	
To the firſt, or winter hoeing - -	0	1	7	Two acres may be hoed in a day, two horſes, plough-man and driver: the deſign of this hoeing is to leave the plants dry, and to meliorate the earth.
To the ſpring hoeing with the cultivator	0	1	1	To deepen the ſoil, one horſe, plough-man, and driver.
To the third hoeing, i. e. to return the meliorated earth to the corn - -	0	1	7	To make the corn tiller, i. e. to increaſe its branches.
To the fourth and final hoeing -	0	1	1	To fill the grain, and render it large.
To rent, the year the corn is growing	0	18	0	
	4	19	3½	

☞ Although the drill culture for the firſt year is very near as expenſive as the common, yet after taking the crop, the expence and labour of fallow, and the loſs of time, is not to be incurred again, as is unavoidable in the common huſbandry.

An Eſtimate of Expence upon an Acre of Drilled-Wheat after the firſt crop.

	l.	s.	d.	
To ploughing the land once ——	0	10	4	One ploughing is all that is neceſſary.
To harrowing with the drill harrow —	0	0	6½	
To ſowing with the drill-plough ——	0	1	1	
To ſeed-wheat ——— ———	0	6	0	Be it remembered, five ſtone is enough.
	0	17	11½	
To four times horſe-hoeing, as before ſtated	0	5	4	
To one year's rent ——— ———	0	18	0	
	2	1	3½	

Thus the land is ſown again with wheat every year, and inſtead of 4 l. 9 s. which is the farmer's expence in the common huſbandry, excluſive of one year's rent of the land: in the drill method it is no more than 17 s. 11½ d. and the total expence, inſtead of 5 l. 7 s. is no more than 2 l. 1 s. 3½ d. rent included; whereby there is a ſaving of 3 l. 5 s. 8½ d. an acre.

Before the account of profit and loſs upon theſe different methods of culture be ſtated, it will be neceſſary to take notice of an objection, which may perhaps be made to the above charge of ploughing in the common huſbandry.

It is pretended, that three quarters of an acre may be ploughed in a day, with one plough: but can it be done effectually? The land may, indeed, be ſcratched, but cannot really be ploughed as it ought to be.

The farmer ought to be cautioned againſt a trick too frequently practiſed in ploughing.

When a ploughman enters his plough and paſſes acroſs the field, he turns a ſod about a foot broad; when he is to return, he enters his plough about four feet diſtant from the outſide of the former furrow, and ſo turns another ſod of the ſame breadth, which, when turned, juſt meets the former ſod; thus four feet of the land appear to be ploughed, whereas the fact is, that the two feet lying under the ſods is not touched with the plough at all.

This deception, added to the practice of juſt ſkimming the ground, enables hirelings to undertake ploughing at ſix and ſeven ſhillings an acre.

But if a plantation acre of land be well and effectually ploughed, ten ſhillings and four-pence as charged above, will not appear too much; and it is, in fact, ſupported by the common courſe of buſineſs.

When wheat is to be ſown, it is the general cuſtom to ſend a barrel of ſeed into the field with two ploughs, which is to ſow an acre of land, and that is the uſual day's work for two ploughs in the general courſe of buſineſs.

Let us ſee then, what the expence will amount to: eight cattle will be eight ſhillings, two ploughmen one ſhilling and four-pence; two drivers one ſhilling, and the ſeed-man eight-pence, which in all makes eleven ſhillings, and correſponds with the above charge.

One Acre of Wheat and Oats in the Common Huſbandry, for fifteen Years.

Dr. *Per Contra*, Cr.

	l.	s.	d.		l.	s.	d.
To the expence on a wheat crop, 2d year	5	7	0	By the produce of wheat, 9 barrels, at 20s.	9	0	0
To the expence on an oat crop, 3d year	2	5	2	By the produce of oats, 14 ——— at 6s.	4	4	0
To the expence on a wheat crop, 5th year	5	7	0	By the produce of wheat, 9 ——— at 20s.	9	0	0
To the expence on an oat crop, 6th year	2	5	2	By the produce of oats, 14 ——— at 6s.	4	4	0
To the expence on a wheat crop, 8th year	5	7	0	By the produce of wheat, 9 ——— at 20s.	9	0	0
To the expence on an oat crop, 9th year	2	5	2	By the produce of oats, 14 ——— at 6s.	4	4	0
To the expence on a wheat crop, 11th year	5	7	0	By the produce of wheat, 9 ——— at 20s.	9	0	0
To the expence on an oat crop, 12th year	2	5	2	By the produce of oats, 14 ——— at 6s.	4	4	0
To the expence on a wheat crop, 14th year	5	7	0	By the produce of wheat, 9 ——— at 20s.	9	0	0
To the expence on an oat crop, 15th year	2	5	2	By the produce of oats, 14 ——— at 6s.	4	4	0
	38	0	10		66	0	0
To clear profit in fifteen years ——	27	19	0				
	66	0	0				

One Acre of Drilled-Wheat, for fifteen Years.

Dr. *Per Contra*, Cr.

	l.	s.	d.		l.	s.	d.
To the 1ſt and 2d year's expence ——	4	19	3½	By the produce of wheat, 2d year, 6 barrels	6	0	0
To the —— 3d year's expence ——	2	1	3½	By the produce of ditto, 3d year, 6 ——	6	0	0
To the —— 4th year's expence ——	2	1	3½	By the produce of ditto, 4th year, 6 ——	6	0	0
To the —— 5th year's expence ——	2	1	3½	By the produce of ditto, 5th year, 6 ——	6	0	0
To the —— 6th year's expence ——	2	1	3½	By the produce of ditto, 6th year, 6 ——	6	0	0
To the —— 7th year's expence ——	2	1	3½	By the produce of ditto, 7th year, 6 ——	6	0	0
To the —— 8th year's expence ——	2	1	3½	By the produce of ditto, 8th year, 6 ——	6	0	0
To the —— 9th year's expence ——	2	1	3½	By the produce of ditto, 9th year, 6 ——	6	0	0
To the —— 10th year's expence ——	2	1	3½	By the produce of ditto, 10th year, 6 ——	6	0	0
To the —— 11th year's expence ——	2	1	3½	By the produce of ditto, 11th year, 6 ——	6	0	0
To the —— 12th year's expence ——	2	1	3½	By the produce of ditto, 12th year, 6 ——	6	0	0
To the —— 13th year's expence ——	2	1	3½	By the produce of ditto, 13th year, 6 ——	6	0	0
To the —— 14th year's expence ——	2	1	3½	By the produce of ditto, 14th year, 6 ——	6	0	0
To the —— 15th year's expence ——	2	1	3½	By the produce of ditto, 15th year, 6 ——	6	0	0
	31	16	1		84	0	0
To clear profit in fifteen years ——	52	3	11				
	84	0	0				

To clear profit ariſing upon an acre of land in fifteen years in the Drill-Huſbandry ——	52	3	11
To clear profit ariſing upon an acre of land in fifteen years in the common huſbandry ——	27	19	2
Greater profit on the drilled acre in fifteen years —— —— ——	24	4	9

Which amounts to 1l. 12s. 3¾d. *per annum*, for fifteen years on the acre, more than by the common huſbandry.

In the drill-huſbandry the crops are ſtated at three barrels of wheat leſs upon an acre than in the common huſbandry, that it may not be ſuppoſed to be over-rated; but in the common huſbandry, the crops are rated at the higheſt; fourteen barrels of oats an acre, are alſo allowed in the common huſbandry, which every farmer muſt admit to be great allowance upon the general produce.

That the drill culture will produce ſix barrels an acre, is fully proved in Mr. Baker's report at large, which will ſhortly be publiſhed, where it will be ſhewn, that much more has been produced.

Doubtleſs it will be obſerved, that in fifteen years fourteen wheat crops are obtained in the drill-huſbandry; in the common huſbandry only five wheat and five oat crops; the five other years are not only loſt, but are an heavy expence to the farmer.

A farmer having forty acres of tillage, ſuppoſing him to direct his attention to bringing it to the drill culture, would make in fifteen years 969l. 10 s. more than he can in the common huſbandry: which is ſuch an advantage, that the greater profit in the drilled acre in fifteen years will purchaſe the fee ſimple of that in the common huſbandry, at twenty-ſeven years purchaſe, valuing the land eighteen ſhillings an acre.

Thus it appears, that in every fifteen years the fee ſimple of all the tillage lands of the kingdom, is loſt to the community by the common courſe of tillage.

In ſtating theſe accounts, no mention is made of fences, water cutting the land, weeding and reaping, as theſe articles of expence depend upon a variety of circumſtances: but will, in general, be more upon the common huſbandry than the drill.

We ſhall conclude this article with the following experiments made by that accurate and intelligent huſbandman M. de Chateauvieux.

Experiments made in the Year 1751, *by* M. Lullin de Chateauvieux, *firſt Syndic of the City and Republic of* Geneva.

"In October 1750, ſays M. de Chateauvieux, I began my experiments on a ſpot of ground, of a rich ſtrong ſoil, one hundred and ſixty feet long and forty-two feet wide. Not being then provided with proper inſtruments for the horſe-hoeing huſbandry, I ordered it to be dug with the ſpade, and laid it out in ſeven beds of equal ſize. Great care was taken to break the clods thoroughly, and to dig the earth very deep. The beds, which were in a looſe ſtate, were raiſed high in the middle.

"On the fourteenth of October, I ſowed three of theſe beds with wheat, two with barley, and two with oats. I muſt obſerve that, in this country, it would have been better to have ſowed a fortnight earlier.

"I made three furrows in each bed, ſo ſhallow, that the ſeed was not buried above half an inch deep. The wheat was dropped by hand in ſingle grains, at the diſtance of ſix inches from each other. The barley was dropped at the diſtance of nine inches, becauſe it branches more than wheat. Though oats branch more than either, yet, as they are a tender plant, and apt to be killed by the winter's cold, I ſowed them at the diſtance of three inches one grain from another.

"I uſed 2880 grains of wheat, weighing three ounces fifteen penny-weights, to ſow the three beds. In one of the beds of barley I ſowed four rows. I employed 1491 grains, weighing two ounces, in the ſowing of two beds; and four ounces of oats were ſufficient to ſow the two other beds. I neglected to count the grains of the oats.

"Theſe ſeeds came up very well, and though they grew but little before winter, yet ſome of them put forth their ſecond blade. They ſoon ſuſtained a conſiderable loſs. Numbers of ſmall ſnails eat many of the plants cloſe to the earth. I judged it neceſſary to ſupply this loſs by ſowing freſh ſeed.

"The winter was very unfavourable to corn. We had almoſt continual rains, with little ſnow or froſt. The corn in general ſuffered greatly, and the crops were very inconſiderable in this country.

"Early in the ſpring, theſe plants made ſtrong ſhoots, and had much the better of the corn in the common way. Their blades were very large, and of a deep green, and the number of ſtalks increaſed greatly. The alleys were hoed in good time, and the advantage reſulting from this operation was very manifeſt. I viſited my plants towards the latter end of April, and found their numbers greatly diminiſhed. The miſchief which the ſnails had done them was almoſt the only cauſe. The inclemency of the winter likewiſe deſtroyed ſome: ſo that I found I had loſt 1068 plants of wheat, and had but 1812 remaining. My plants of barley fell ſhort by 412, their number being reduced to 1079. The winter deſtroyed ſo many plants of the oats, that very few were left.

"From this time, all the plants grew exceedingly: they branched ſo much, that, as far as I could judge, every plant of wheat, taking them one with another, produced twenty-eight ſtalks, the barley above forty, and the oats ſtill more. Each plant formed a large tuft, ſome of ſixty, eighty, and above a third part of the plants of about 150 ſtalks: ſo that, though they were at firſt at a great diſtance from each other, in June and July they entirely covered the ſurface of the alleys. All theſe ſpindled, and produced, each in its kind, very long and large ears, full of grain from end to end. They ripened kindly, but had not yet got over all their miſchances. Theſe fine ears became a prey to birds, which could not be kept off. This is an inconvenience to which all ſmall experiments are liable. That I might ſave ſomething, I was obliged to cut my corn down before it was quite ripe. But before I did that, I examined perſonally, with all poſſible care, what might be the amount of the loſs which I had ſuſtained by the birds: and beſides this, I ſent for four farmers, in quality of appraiſers, to eſtimate the damage. They all agreed, that it was above half the crop, and aſſured me I ſhould not miſtake if I reckoned it as ſuch. I had formed the ſame judgment myſelf. We found the loſs ſomewhat leſs conſiderable in the barley. As to the oats, it could not be ſo well aſcertained; but we believed it could not be leſs than a third part of the crop.

"While the wheat ripened, I diſcovered that ſome of the plants were blighted. All theſe, whether blighted totally or only in part, were plucked up by my direction, before I cut down the reſt of the crop. They amounted to 297; ſo that I was reduced to 1515 plants, the ſeed of which, after deducting that which produced the 297 blighted plants, is reduced to two ounces and ſix penny-weights. The 1515 plants were the whole produce of the crop, and theſe yielded fifty-five pounds of eighteen ounces to the pound. But the ſame ground and plants produced likewiſe what was eaten by the birds; for which it is but juſt to make an allowance. The whole produce will then have been in reality 110 pounds, which to me ſeemed very conſiderable.

"I made another enquiry, which I judged to be of ſome importance: this was, to know whether the number of the fineſt and largeſt ears, was greater than that of the middling and ſmalleſt. I examined them with the utmoſt attention, and found almoſt all the ears of equal beauty; at leaſt nineteen out of twenty, I am confident, were ſo.

"I was likewiſe willing to know what number of grains might be contained in each ear. To this end, without regarding the proportion I had found between the number of the fineſt ears and that of the ſmalleſt, I took twelve middle ſized ears, twelve of the ſmalleſt, and twelve of the fineſt.

"The twelve middling ears contained one with another thirty-ſeven grains;

"The twelve ſmalleſt ears, thirty grains; and

"The twelve fineſt ears, fifty grains apiece.

"The 1079 plants of barley, produced ſeventy-five pounds of eighteen ounces to the pound. What was eaten by the birds ſhould likewiſe be added here.

"My oats produced one hundred and three pounds of eighteen ounces, excluſive of what was deſtroyed by the birds.

"This little experiment ſhews, that the new huſbandry will be equally profitable for all ſorts of grain.

Obſervations on the foregoing Experiment, *by* M. De Chateauvieux.

"The quantity of wheat gathered from the three beds, ſeems to me as great as could be expected. Though I had but fifty-five pounds, yet adding thereto the fifty-five eaten by the birds, this little ſpot yielded one hundred and ten pounds. In large fields we are not ſo ſenſible of what the birds deſtroy.

" If we likewiſe take into this account, the 1068 plants deſtroyed by the ſnails, and the 297 blighted plants, making together 1365, theſe would have yielded 100 pounds of wheat, and the whole crop would have been 210 pounds; for it cannot be doubted but they would have yielded in the ſame proportion as the 1515. What proves it is, that in a ſpace about thirty feet long, at the end of the beds, which eſcaped the ſnails, very few plants failed; and the reſt were very thriving, and branched greatly; ſo that it is evident, the whole ground could eaſily have nouriſhed all the plants that were intended to grow on it, and which were at the diſtance of ſix inches from each other. I make this remark, in order ro ſhew what may be expected from the following experiments, it being an eaſy matter to ſow the ground ſo as to have the deſired number of plants.

" I ſuppoſe then, and I think juſtly, that this ſmall ſpot of ground can produce 210 pounds of wheat at one crop: but the ineſtimable advantage of the new huſbandry is, that it keeps the earth in a ſtate fit for ſowing every year; ſo that in two years it can yield 420 pounds; whereas, in the common huſbandry of this country, the farmer can have but one crop in that time, being obliged to ſow his land only every ſecond year; and that one crop will fall greatly ſhort of the two which the new huſbandry will produce. A vaſt advantage in favour of this laſt.

" Without being too partial to the new huſbandry, we may expect that the ſecond and following crops will be more plentiful, the earth being in finer tilth. Accordingly, the wheat with which I have ſowed theſe three beds a ſecond time, is already viſibly benefited by the looſer ſtate of the mould, which was ſo frequently ſtirred in the ſummer. I have provided againſt the accidents which deſtroyed ſo many of my plants, by ſowing thicker. Inſtead of three ounces, fifteen penny weights of wheat, which I ſowed laſt year, I have now ſowed nine ounces, and twelve penny-weights; and though the ſnails have again eaten many of the plants this year, cloſe to the ground, a ſufficient number ſtill remains, by means of the additional ſeed, to fill the beds, and they are equally diſtributed.

" I ſhall now compare the crop I have been ſpeaking of, with that of the experiment which I made on the ſame ſpot of ground in the year 1729, in order to ſee whether I could not obtain a more plentiful return, by ſowing thinner than is uſually practiſed. The ground was ploughed and ſowed in the common way. I employed ſix pounds of wheat to ſow it, being ſomewhat leſs than half the uſual quantity. The plants looked extremely well during the whole time of their growth, and produced above double the quantity that wheat did in the common fields. They yielded me 105 pounds of wheat. Even in this way I could have but one crop in two years: and it appears that I have not exaggerated the produce of the new huſbandry, in making it 420 pounds in the ſame ſpace of time, which is a clear gain of 315 pounds.

" I afterwards tried ſome other experiments; one of which, made in the year 1746, I muſt now mention. I tried two things at the ſame time: firſt, whether wheat would grow after it had been kept ſeveral years; and, ſecondly, whether ſowing each grain at ſix inches diſtance, would turn to account. As I did not intend to make the experiment on a large field, I choſe for it a ſpot of ſtrong earth, in bad condition, fit for making bricks. I ſowed in it three quarters of an ounce of wheat, which I had preſerved carefully for eight years. It roſe pretty well; but about one fourth of the grains did not ſprout at all. After the winter, theſe plants grew very ſtrong. I delayed ſeeing them too long, for I found them quite choaked with weeds. I ſent a woman to weed them, who, unluckily, at the ſame time pulled up almoſt all the plants of wheat: the fineſt ſuffered moſt, ſhe not imagining that they could be wheat. There were but about forty plants left, and thoſe at very great and unequal diſtances. Theſe produced tufts of upwards of fifty ſtalks, with ears five or ſix inches long, containing a great deal of grain, which became the prey of birds. This experiment, if it anſwered no other end, is at leaſt a proof of the goodneſs of the new huſbandry.

" The good ſucceſs of theſe little experiments, was a ſtrong inducement to me to make more conſiderable ones: but in order to this, it was neceſſary to be provided with a proper hoe and drill-plough; for I muſt confeſs, that Mr. Tull's did not appear to me to be ſuch. Its great fault is, that it is too complex.

" Being provided with a proper hoe-plough, I ſoon became ſenſible of the advantages of it. Numbers of ſuch ploughs are already uſed in this country; and, which is ſaying a great deal, even our farmers make uſe of them.

" This is the plough which I uſed all this ſummer in preparing my ground. It did admirably well in the alleys of my experiment, after the corn was above four feet high. No plant was hurt by it, and I could bring the plough as near to them as I pleaſed. Thus it fully and conveniently performs this hoeing, in which I have ſeldom uſed more than one horſe. I have likewiſe prepared with it the ground ſowed with wheat this autumn.

" My new hoe and drill-plough have made it eaſy for me to enlarge my experiments this year. However, I thought it moſt adviſeable to proceed by degrees; and have therefore reſtricted myſelf to the culture of about ten acres, according to the new huſbandry, part of which is in a very ſtrong ſoil, part in a very light ſoil, and part in a middling and ſtony ſoil.

" What I have had chiefly in view in my experiments this year is, " to know exactly what quantity of ſeed will produce the moſt plentiful crop." To this end, I have ſowed wheat in different degrees of thickneſs, dropping the grains ſome at one inch, and ſome at two, and ſo on, to the diſtance of ſix inches from each other.

" All this wheat has at preſent a fine appearance, and the plants are infinitely ſtronger than thoſe in the common fields: their blades are much larger, and of a very deep green colour. What is more, they have already branched, and promiſe a great number of ſtalks. I have counted on ſome plants twenty, and on others twenty-five. Upon the whole, there is great reaſon to expect a plentiful crop.

" I have made another experiment with the drill-plough, with which I have ſowed ſome of my common fields. Inſtead of diſtributing the ſeed by hand, in the broadcaſt way, as in the old huſbandry, I have ſowed the whole field with this inſtument, without leaving any alleys. This has ſaved a great deal of ſeed, having employed only twelve pounds of eighteen ounces, to ſow the ſame extent of ground as uſed to be ſowed with 110 pounds. Yet I think this ſufficiently thick: the plants are very fine, and of a deep green. They have already begun to branch, and promiſe many ſtalks. Hitherto my wheat gives me reaſon to be pleaſed with the experiment I am making. I have ſowed about thirty acres in this manner."

Experiments made by M. Lullin de Chateauvieux, *in the Year* 1752.

" My experiments this year are of three kinds. The firſt was made on the ſame ſpot as the laſt year's experiment: the ſecond, on a piece of ground which was made into beds for the firſt time; and the third, on a field ploughed in broad lands in the common way, but ſowed with the drill-plough, in equally diſtant rows, without any intermediate alleys.

Firſt Experiment, Numb. I.

" I have already mentioned, that this ſpot was ſowed with wheat, the beds being now made in the middle of the former alleys. The ſummer hoeings had brought this ground to ſo fine and looſe a ſtate, that, after one ploughing, I ſowed the three beds with the drill-plough, on the twenty-fifth of September; and to prevent the accidents I before met with, I increaſed the quantity of ſeed to nine ounces fifteen penny-weights.

" The wheat roſe extremely well, and the rows were full of plants, which became very ſtrong and thriving before the winter. Though ſnails deſtroyed a great number of them, as they had done the year before, yet I judged the rows ſufficiently ſtored with plants, and thought that this accident would do no great damage to the crop.

“ The winter was pretty favourable to corn in general. My plants made very ſtrong ſhoots in the ſpring; but I found ſome chaſms in the rows which I had not perceived in the autumn. I imputed this in ſome meaſure to the inclemency of the winter, which had undoubtedly deſtroyed ſeveral weak plants. Theſe chaſms were but few, and the worſt of them had about two plants in fifteen inches.

“ I horſe-hoed the alleys for the firſt time on the ninth of March, and a ſecond time on the twenty-fifth of May. The ground was in ſo looſe a ſtate, that I thought it needleſs to hoe it afterwards, eſpecially as the wheat was in an exceeding good way. It continued of a very deep green till it ripened; the blades were extremely large; and the plants branched much more than they had done the year before. It was a common thing to find plants with between ſixty and ſeventy ſtalks, which, in general, grew to above five feet and ſome inches high, and were crowned with large ears quite full of grain.

“ As ſoon as the wheat had done bloſſoming, I found it neceſſary to defend it againſt the birds. Thanks to the care that was now taken, they did it leſs hurt this year than the laſt: but ſtill they eat a great deal of it, though I cannot preciſely determine the quantity.

“ As ſoon as the wheat appeared to be near ripe, in order to preſerve it from the farther plunder of thoſe robbers, I reaped it, on the twentieth of July, though I would rather have choſen to let it ſtand five or ſix days longer. It remained in the field four days, to dry, and was threſhed towards the latter end of Auguſt. It yielded an hundred and forty-two pounds of wheat, at eighteen ounces to the pound.

“ This wheat was very fine, perfectly clean, and the grain much larger than in the common way.

“ This experiment gives juſt riſe to the following remarks:

“ Firſt, The earth of theſe three beds having been pulverized and brought to a very looſe ſtate by the horſe-hoeings in 1751, the plants were ſtronger, and more thriving than thoſe of the year before; a circumſtance which contributed to the increaſe of the crop.

“ Secondly, This crop juſtifies my eſtimate, that this ſpot of ground could yield 210 pounds of wheat in one ſeaſon, if cultivated according the principles of the New Huſbandry: for if we add to the 142 pounds reaped this year, the loſs occaſioned by the birds and ſnails, it is pretty evident that the whole produce would have nearly amounted to 210 pounds.

“ Luckily, that I might be more thoroughly ſatisfied what loſs I ſuffered by the birds, I counted in two different places how many ſtalks the plants in the three rows had yielded. On a length of ten feet, I found 1600 in one place, and 2030 in another. As I would always avoid over-ſtraining my calculations, I ſhall only ſuppoſe that every ten feet in length produces 1600 ſtalks: the beds, being 160 feet long, will conſequently contain at leaſt 25600 ſtalks, and the three beds together 76800 ſtalks, or ears.

“ To know, in the next place, how many pounds of wheat might be contained in that number of ears, I had as many of them threſhed, a month after harveſt, as yielded a pound of eighteen ounces. They were taken at random, without culling them, out of a ſheaf which ſeemed to have been but little damaged by the birds.

“ Three hundred and ſixty ears yielded thoſe eighteen ounces of wheat: ſo that, dividing 76800, the whole number of ears, by 360, the produce of the crop would be 213 pounds ſix ounces, at eighteen ounces to the pound, or 240 pounds of ſixteen ounces. Hence it appears, that my firſt eſtimate was pretty juſt, and that the produce may be even more conſiderable hereafter.

“ Thirdly, This ſpot was clear of weeds; though it uſed to be over-run with them. It appears by this, that the New Huſbandry deſtroys them effectually; though this advantage will be leſs felt the firſt year, than in other ſubſequent years.

“ From the obſervation which I made, that the plants were in a more thriving ſtate this year, than in 1751, it follows, that the earth, far from having been exhauſted by the nouriſhment it had yielded the plants during that year, became more fruitful in this: which can be imputed only to the new culture; the land having received no other aſſiſtance, either by dung or manure.

“ The wheat was this year, upon a very exact ſearch, free from ſmut or blight. I found but one blighted ear, though there were numbers of ſuch in the fields contiguous to mine. I cannot however impute this favourable circumſtance to the new culture alone: it may have contributed thereto, and may leſſen the quantity; but to be ſure of that requires the experience of ſome years.”

EXPERIMENT, Numb. II.

“ This experiment was made on a larger piece of ground, formed into beds ſix feet wide. The diſtance from the middle of one bed to the middle of the next, was alſo ſix feet; and the whole extent of the ſpot was about an acre and a quarter. Each bed was ſowed with three rows of wheat.

“ The ſmall quantity of ſeed with which this ground was ſowed, certainly required that every grain ſhould grow: but the intended number of plants fell greatly ſhort, ſeveral of the grains not riſing at all, and many of thoſe which did riſe, being deſtroyed by inſects. The greateſt damage was done by ſnails. There were great chaſms in the rows, without any plants. As far as I could judge, between a third and fourth part of the rows did not produce any thing.

“ The hoeings were performed this year at proper ſeaſons, and rather more frequently to make up for the neglect of the former year: for the ground was not in ſufficiently fine tilth when the wheat was ſowed.

“ On the fourteenth and fifteenth of October 1751, the alleys were ploughed for the firſt time before winter.

“ On the ninth and tenth of March 1752, they were ploughed again for the firſt time after winter.

“ From the eighteenth to the twenty-fourth of April, the ground was weeded.

“ On the twenty-ninth of April, the alleys were ſtirred with the cultivator; which was again repeated on the twenty-fifth of May and the ſeventh of June.

“ This wheat made a fine appearance; the length of the ſtalks, and the largeneſs of the ears, ſhewed how much the new culture promoted the growth of theſe plants, which branched nearly as much as thoſe of Num. I. This field was reaped on the twenty-fifth of July.

“ I ſhall join to the account of what this crop produced, an eſtimate of what might have been expected if the ſame ground had been cultivated in the common way.”

Compariſon of the Produce of the ſame Field, cultivated according to the Old, and according to the New Huſbandry.

“ This field, which is of a very good and ſtrong ſoil, was very badly ploughed laſt year by reaſon of the frequent and heavy rains, and had not been dunged for ſeveral years. In the common way, it uſed to be ſowed with 318 pounds of wheat. This year, it was made into beds ſix feet wide, and was ſowed on the twenty-fifth of September, with only ten pounds of wheat.

Produce of this field under the new culture in 1752.

“ This field, laid out in beds, produced, of very fine large grained wheat		926 lb.
To be deducted.		
“ Though this wheat was very clean, yet four parts in a hundred were ſifted from it, as ſmall corn; valued at — — — —	37 lb.	47 lb.
“ For the ſeed ſown — —	10 lb.	
Neat produce -		879 lb.

" In this huſbandry, the ſame field is ſowed every year; ſo that, ſuppoſing the crop of 1753 to be only equal to this of 1752, (and there is no doubt but it will be greater) it will again produce — — — — —	879 lb.
Amount of the two crops —	1758 lb.

Produce of the old Culture.

" If we judge of it by the beſt crops of former years, it will be three times the quantity of the ſeed, viz. — — — — — —	954 lb.

To be deducted.

" Loſs by ſifting, fifteen per cent. It has often been twenty-five and thirty per cent. and even more. Every time this field was ſowed, the corn was lodged, which prevented the ears from filling, and rendered the grains ſmall and ſhrivelled — — —	143 lb.	461 lb.
For the ſeed — — — —	318 lb.	
Neat produce —		493 lb.
" Conſequently the balance, in favour of the New Huſbandry, is — — — —		386 lb.
		879 lb.

" As this field yields but one crop in two years, in the common huſbandry, it would produce in that ſpace only — — — —	493 lb.
" From whence it follows, that the neat profit of the new culture in the ſame ſpace of time, exceeds the other by — — — —	1265 lb.
	1758 lb.

" Suppoſing this field never to produce a greater crop than that of this year, it is evident that it is beſt to follow the new method. But we can already promiſe, that the ſucceeding crops will be more plentiful. The field is now ſown in the new way; it has not yet ſuffered any damage by inſects; and the rows are well ſtored with plants, whoſe more thriving ſtate promiſes a better crop than that of the laſt year.

" It may perhaps be thought odd, that I ſhould limit the produce of the field ſowed in the common way, to three times the ſeed. I know there are lands in this country which yield more, viz. four or five times the ſeed, and ſometimes upwards: but then it muſt be granted, that there are but few ſuch lands; and that they are fields in extraordinary fine tilth, and enriched with manure. I therefore ſpeak of our lands in general, taking good and bad together. In this caſe, I ſay, the produce, one year with another, will not exceed three for one.

" My fields have always been as well cultivated as any in the country. I have computed the amount of my crops for ſixteen years running, viz. from 1730 to 1745, incluſively. Theſe accounts were carefully kept by a ſteward who died a few years ago, and I do not find that the produce ever was greater than what I have been ſaying, one year with another."

Experiment, Numb. III.

" About an acre and ſeventeen poles of ground, in another field, was laid out in beds like the former. This land, which is very ſtrong, was but in bad tilth, notwithſtanding the care I took to break the earth thoroughly, and reduce it into ſmall particles. Frequent rains were the cauſe of this. It was ſowed with the drill-plough on the twenty-fourth of September. Only ſeven pounds of wheat were uſed. The plants roſe pretty well: but towards the end of autumn, they were deſtroyed daily by inſects, and thereby reduced to a very ſmall number, which greatly diminiſhed the crop.

" On the ſixteenth of October 1751, the alleys were ploughed for the firſt time before winter.

" On the tenth and eleventh of March 1752, they received their firſt ploughing after winter.

" On the firſt of May the ground was weeded.

" On the twenty-third of May the alleys received their ſecond ſtirring with the cultivator, and on the twelfth of June they were ploughed.

" The plants which came up were very fine, and branched greatly: the ears were like thoſe of the experiments I have already mentioned, and the grain equally large. Though the produce was but 392 pounds, yet it is a fine crop for the ſmall number of plants that eſcaped unhurt.

" As I know the cauſes to which the ſcantineſs of this crop was owing, I make no doubt but it will equal that of any of the other fields next year. It is now ſowed for the ſecond time in the new way. The rows are well ſtored with plants, and the corn is in as good condition as can be deſired."

Experiment, Numb. IV.

" This experiment was made at the diſtance of ſix miles from my houſe, on a light poor ſoil, which induced me to dung it. The beds were about ſix feet wide, and were ſowed on the twenty-firſt of September with three pounds and three quarters of wheat, which produced fine plants and large ears, and yielded 196 pounds. Though the earth had not been well ſtirred, nor at proper ſeaſons, yet the corn ſowed in it produced greatly. The dung undoubtedly helped to make up for the want of due culture."

Experiments

Made on Fields ſown in equally diſtant Rows with the Drill-Plough.

Numb. V.

" I have ſowed fields cultivated in every reſpect in the common way, except in the manner of diſtributing the ſeed, which was done with the drill-plough. The whole field was covered with rows of wheat, diſtant from each other ſeven inches and a half.

" The advantages which I propoſed to myſelf by ſowing in this manner, were, firſt, the ſaving of ſeed, and preventing the earth from being over-ſtocked with plants; ſecondly, burying the ſeed at a proper depth; thirdly, having the plants at equal diſtances: and, laſtly, the little ſtirring of the ground, and breaking of the clods, which the drill-plough effects at the ſame time that it ſows. Theſe things ſeemed to me more likely to be attended with ſucceſs than the common way of ſowing.

" The plants of this wheat were very fine; their deep green colour ſhewed their ſtrength: the largeneſs of their blades, and the number of their ſtalks, ſhewed likewiſe that they found greater plenty of nouriſhment than wheat in the common way. The plants had in general four, ſix, eight, ten, or more ſtalks; ſo that theſe fields, which, till the month of April, ſeemed ſcarcely to have been ſown, changed then ſo as hardly to be known again, by the number of ſtalks which ſhot forth at that time. The wheat was taller than that in the common way, and the ears larger and better filled with grain.

" An account of the produce will ſhew what may be expected from this manner of ſowing.

" *Account of the Produce of the ſame Field ſowed Part in the old Way, and Part with the Drill plough, on the fourteenth, fifteenth, and ſixteenth of September,* 1751.

" The whole of this field uſed commonly to be ſowed with twenty meaſures of wheat, each meaſure containing 106 pounds of eighteen ounces. Three meaſures, or 318 pounds of wheat, were ſown in the uſual way in the richeſt part of the field. The remaining part, which would have required 1802 pounds in the common way, was ſowed with the drill-plough with only 265 pounds.

" The ſoil was middling, neither too ſtrong nor too light, and pretty ſtony. The land was poor, becauſe it had not been dunged, which indeed it ſeldom was, the owner not having more than was neceſſary for his vines.

Produce of the new huſbandry.

The 265 pounds of wheat produced		5450 lb.

To be deducted.

For ſmall and bad grain ſifted out, 4 per cent.	218	483 lb.
For the ſeed	265	
Neat produce		4967 lb.

“ If the other part of the field, which was ſowed with the three meaſures in the old way, had been ſown with the drill-plough, it would have yielded	960 lb.

To be deducted.

Loſs by ſifting, 4 per cent.	38 lb.	84 lb
For the ſeed	46 lb.	
Neat produce to be added to the above		876 lb.
Neat produce of the whole		5843 lb.

Produce of the old huſbandry.

“ That part of the field which was ſowed with the three meaſures of 106 pounds each, produced thrice the quantity of the ſeed, mixed with bad grain. The ſame meaſure of this grain weighed but 103 pounds. This field yields no more even in the beſt years. If the whole of it had been ſowed in the old way, it would have produced 6180 lb.

To be deducted.

Loſs by ſifting, 15 per cent. It has often been 25 and 30 per cent.	927 lb.	3047 lb.
For the ſeed	2120 lb.	
Neat produce - - -		3133 lb.
Balance in favour of the new method		2710 lb.
		5843 lb.

Experiment, Numb. VI.

“ I ſowed, continues M. de Chateauvieux, another field of about three roods and fifteen poles in the ſame manner, with thirty pounds of wheat, reckoning 18 ounces to the pound, on the twenty-fourth of September. The ſoil was ſtrong, and in fine tilth. The wheat grew in every reſpect like that of the preceding article, with this only perceptible difference, that the ſtraw was ſomewhat longer, and the ears larger. It was not threſhed till the beginning of December, and yielded 809 pounds of very fine wheat (the pound 18 ounces.) The produce of this field was greater than that of the former, in proportion to the quantity of ſeed. But the ſoil of this was better, and in finer tilth.”

Experiment, Numb. VII.

“ This experiment was made about three miles from me, on a piece of ground of the extent of about two roods and twenty-ſeven poles. This land is neither too ſtrong nor too light, and may be called a pretty rich ſoil. It was ploughed three times, like other lands, and had not been dunged for many years. It uſed to be ſowed with 165, or 170 pounds of wheat. It was now ſowed on the fifth of October with only twenty-four pounds. Though the ſeaſon was ſo far advanced, this ſeed came up pretty well before winter. The plants throve greatly in the ſpring, and the field became covered with ſtrong ſtalks, and very large ears, full of fine plump grain.

“ The crop yielded 800 pounds of clean wheat, without mixture of any other ſeeds. Deducting from this the twenty-four pounds of ſeed, the neat produce is 776 pounds. This field, when ſowed in the common way, produces in the beſt years about 875 pounds, from which if we deduct 165 pounds for the ſeed, the neat produce will be 710 pounds. Thus we ſee that the ſame ground ſowed with the drill-plough, produced 66 pounds more than when ſown in the common way. But as wheat raiſed in this laſt way is always mixed with abundance of ſeeds of weeds, which muſt be ſeparated by ſifting, an allowance muſt likewiſe be made for that; and the profit will then not be limited to the 66 pounds only, which the owner reaped more than in the common way.

“ I omit ſeveral experiments of wheat ſowed in beds, and with the drill-plough, in equally diſtant rows, the ſucceſs of which has been nearly equal to that of thoſe I have already ſpoken of. I ſhall mention only one more, and that on account of a circumſtance which deſerves to be known. I made it on a light ſoil, the worſt I knew of, full of pretty large ſtones, and which had not been dunged in the memory of man. The ſtones did not hinder the drill-plough from dropping the ſeeds very gradually. I choſe this bad ſoil on purpoſe to ſee how wheat would thrive in it. I allowed too little ſeed, conſidering the badneſs of the ground. The ſtones prevented many plants from riſing, and many more were deſtroyed by inſects; ſo that the corn was very thin, and the crop ſmall. I was however pleaſed with it, becauſe I found the plants grew almoſt as ſtrong as in a good ſoil, and the ears were as large, and as full of grain.

“ A little before harveſt, the wheat of all theſe experiments ſuſtained many heavy rains, accompanied with very high winds; and though the ſtraw was much longer than that of the wheat which had been ſowed in the common way, the corn was not lodged, whilſt a great deal was laid flat in the neighbouring fields. Some indeed was bent, but that is different from being lodged. This laſt ſituation is very hurtful to the filling of the grain; but its being bent is attended with no inconvenience. I am even inclined to think that it may be of ſervice to the wheat not to remain in a perpendicular direction, and I intend next year to be particularly attentive to this.

“ It is not at all to be wondered at, that plants ſown in the common way ſhould not thrive ſo well as thoſe which grow in beds. The former, not having been aſſiſted by the ſtirring of the mould, cannot draw ſo much nouriſhment from the earth as thoſe in beds. The ſize of theſe laſt has indeed exceeded my expectation. There is reaſon to be ſatisfied with this manner of ſowing, even if it were attended with no greater advantage than this year's crops afforded. But if the quantity of ſeed is increaſed, ſo that the field he ſtocked with as many plants as it can nouriſh, the profit will be ſo much the more conſiderable.

“ It is time to return to our experiments on fields laid out in beds, which are the more immediate object of the new huſbandry.

“ Thoſe which I have made this year have not brought the produce of the new culture to near what it will be hereafter, as will appear from what I ſhall next obſerve.”

Reflections of M. de Chateauvieux, which prove the Truth of the Principles on which the New Huſbandry is founded.

“ We ſee by the experiment, Numb. I. that the earth, by being in a looſer or more divided ſtate the ſecond year, is fitter to afford a greater quantity of nouriſhment to plants, whoſe productions will always be proportioned to the eaſe with which they can reach that nouriſhment.

“ I was in hopes that the experiments of this year would have enabled me to determine what quantity of ſeed it is beſt to ſow, in order to obtain the greateſt crop. The lands on which I ſowed the moſt ſeed laſt year, ſhewed me plainly, that it would be right to increaſe the quantity, in order to provide againſt the accidents by which the plants had been thinned too much.

“ But this increaſe of ſeed ſhould be regulated with great diſcretion, regard being had both to the circumſtances of the ſeaſon in which the ſeed is ſowed, and to the condition of the ground in which it is planted. If the ſoil is in very fine tilth, leſs ſeed will be ſufficient.

“ The experiments of this year ſhew, that there are but three principal means by which we can obtain the utmoſt production that plants are capable of affording. Theſe means are practicable only in the new huſbandry; for in that alone each bed has the number of plants it can properly nouriſh, which is the ſource of plenty.

“ The firſt means is, to make the plants produce a great number of ſtalks.

“ The ſecond is, to make each ſtalk bear a large ear.

“ The third is, to make each ear be quite full of plump grain.

“ Theſe effects cannot be obtained in the old huſbandry, becauſe they can only be procured by frequently ſtirring the earth.

“ All my experiments this year ſhew the truth of this, but eſpecially the experiments Numb. I. and II.

“ It is therefore by ſtirring the alleys while the plants are yet young and growing, that we can make them produce a number of ſtalks, cauſe thoſe ſtalks to bear large ears, and fill each ear with large plump grain. But to obtain theſe advantages, it is of great conſequence, that the hoeings be performed at proper ſeaſons, each having its peculiar effects.

“ The ploughing before winter, is intended to drain off the water, which, if it ſhould remain long near the plants, would chill and greatly hurt them; and to lay up the earth to be mouldered by the winter's froſt. It is hereby enabled the better to ſupply the plants with their neceſſary food in the ſpring. This may be done at the farmer's conveniency, from the time that the plants have three or four blades, till the froſt ſets in: and even in the winter, if it does not freeze, ploughing will always be of ſervice.

“ The firſt ploughing after winter is of great importance. It is to this that we owe the number of ſtalks which the plants produce. That it may have this effect, it muſt be performed as ſoon as the ſevere colds are paſt; and, at lateſt, as ſoon as the plants begin to ſhoot. If it be delayed longer, it will contribute very little towards their branching. It will ſerve only to make the ſtalks grow longer. If any new ones ſhoot out, they will not thrive ſo well as the firſt; and therefore it is of great conſequence that they ſhoot out all together.

“ The hoeings which are performed from this time, till the wheat has done bloſſoming, ſtrengthen the plants, lengthen their ſtalks, and enlarge their ears. The ſeaſon of theſe hoeings is not ſo exactly limited as that of the former, and the frequency of them will depend greatly on the ſtate of the ground; for it muſt not be touched when it is too moiſt. If the ſeaſon is kindly, they may be repeated two, three, or four times: but I think one hoeing highly neceſſary juſt before the ears break forth. They certainly grow longer and larger by it.

“ The laſt hoeing is the moſt important of all, and that which can leaſt be diſpenſed with. It muſt be performed as ſoon as the bloſſom is gone off the wheat. This fills the whole ear, and ſwells the grain.

“ When farmers become ſenſible of the good effects of theſe frequent ſtirrings, they will not neglect to repeat them at proper ſeaſons. It is by a ſucceſſion of them, that, in my opinion, crops may be brought to their higheſt perfection: and if unfavourable ſeaſons prevent their being given at their proper times, a diminution of the crop will moſt aſſuredly enſue.

“ No one who conſiders the produce of the ears of corn on lands cultivated according to the New, and the Old Huſbandry, will, I believe, doubt which of theſe is to be preferred. I ſhall beſtow a few moments, to point out the difference which I have found between the one and the other.

“ I ſaid before, that 360 ears yielded me eighteen ounces of wheat. Here is a determined fact; and I am certain that I have not enlarged it; becauſe the birds had eaten ſome of the grain; otherwiſe fewer ears would have produced thoſe eighteen ounces.

“ When, in the year 1750, I firſt began to inquire into the principles of the New Huſbandry, I judged that it might be of ſome importance to know what is the uſual produce of a plant of wheat when cultivated in the common way. That year was reckoned a very good one for wheat, which appeared clean and good as it ſtood upon the ground. I took this method to come at the knowledge I wanted.

“ I took part of a ſheaf which appeared to me very good, and which was the produce of a very rich field. I divided it into three parcels. In the firſt parcel were all the good ears: the middling and ſmall ears were in the ſecond, and the ears in which there was no grain, or where the grain was faulty, compoſed the third.

“ The wheat being thus divided, I counted the number of ears in each parcel. I found 400 in the firſt, which conſiſted of the beſt ears; 1600 in the ſecond, which contained the middling and ſmalleſt ears; and in the third, 750 ears, or plants whoſe grain was faulty. I made no account of a great number of imperfect ſhoots, which were not ſix inches long.

“ The fields did not look ſo poor to the eye, as this ſeparation proved them to be. This firſt operation was therefore neceſſary to come at the truth.

“ When the grain was cleared from the ears, I found, that the 400 ears contained five ounces and a half of wheat, and that the 1600 contained ſeven ounces.

“ My curioſity did not lead me to inquire into the contents of the third parcel; knowing that there was no good grain in it.

“ In the purſuit of this inquiry, I found that taking one ear with another, of the 400, there were but eleven grains of wheat in each; and that in the 1600, taking one ear with another, there were but three grains and a half to an ear. Eight hundred of theſe grains weighed but an ounce.

“ If we add theſe parcels together, we ſhall find that 2000 ears yielded but twelve ounces and a half of wheat, and that it would require 2890 ears of the ſame goodneſs to yield eighteen ounces.

“ I confeſs that I was aſtoniſhed at the reſult of my inquiry; which I could not have believed, if I had not ſeen it. But at the ſame time, how greatly was my expectation raiſed, of the advantages of the new culture!

“ I have this year formed a greater extent of ground into beds. Too frequent rains have prevented my laying down more than thirty acres in this manner: but I have ſowed all the reſt of my farm with the drill-plough in equally diſtant rows. I have increaſed the quantity of ſeed; regard being had to each circumſtance neceſſary to be attended to; ſo that in ſome fields I have ſown double the quantity of ſeed that was employed in the year 1751: in others ſomewhat more, and in others again leſs.

“ All my fields look extremely well, and make a much better appearance than they did laſt year. They are abundantly ſtocked with very ſtrong plants, of a deep green colour: the blades are long and large, and cover the earth better than the common wheat.

“ Hitherto, theſe plants have not ſuſtained any loſs, except in one ſpot of about half an acre, where they were gnawed aſunder, juſt under the ſurface of the earth, by inſects. I immediately ſowed it again, and by this means have quite repaired the damage. The inſects have not appeared ſince.

“ One of the moſt happy effects of my experiments, is, that they have created a deſire in many perſons in theſe parts, to begin the practice of the New Huſbandry, with trials of conſiderable extent. One perſon, convinced of its excellency, has laid out and ſowed at leaſt twenty-eight acres in beds: another has ſowed with the drill-plough, an hundred and fifty acres ploughed in broad lands. All the land that has been ſowed in beds amounts to about fifty acres: and upwards of two hundred acres, in broad lands, have been ſown with the drill-plough. Every one who has ſeen theſe fields, even the very ploughmen not excepted, agree that they look extremely well, and that they never ſaw, in this country, plants of ſuch ſtrength and vigour as the wheat that was firſt ſown.

“ I am extremely happy that my drill-plough has been of ſo general uſe. It has performed regularly every where: people having ſowed with it exactly the intended quantities of grain.”

EXPERIMENTS *made by* M. Lullin de Chateauvieux, *in the Year* 1753.

“ I am the better pleaſed with being able to give a ſatisfactory account of the ſucceſs of my experiments this year, as the ſeaſons have not been favourable, and extraordinary accidents have greatly diminiſhed the produce of the crops.

“ I ſhall divide this account into ſeveral articles.

“ The firſt will contain the experiments made on lands laid out in beds, which have borne their ſecond and third crop. To this will be added ſome obſervations relative thereto.

“ The ſubject of the ſecond will be a detail of experiments made on lands formed into beds, which have yielded only their firſt crop. This too will be followed by ſome remarks.

“ The third will conſiſt of the experiments of two perſons on lands made into beds, of which the firſt crop was reaped this year: to which will be ſubjoined ſome neceſſary reflections.

“ The fourth article will contain an account of ſeveral experiments made by divers lovers of agriculture, on lands ſown in equally diſtant rows, but with the drill-plough.

“ As we think it will be extremely uſeful to ſhew, by the experiments which have been made this year, that lands produce more corn in the New Huſbandry than in the old, we ſhall give an account, in the fifth article, of the crops of fields ſown in the common way for ſixteen years together; and of thoſe of the ſame fields cultivated according to the New Huſbandry, ſuppoſing them not to yield better crops in future years, than they have done in this; a ſuppoſition the leaſt favourable that can be to the new culture, ſince we calculate only upon the produce of the firſt year's crop, and that too diminiſhed by the extraordinary accidents which we ſhall mention.

“ To ſhew the truth of this article more fully, it will be proved in the ſixth, that the beſt field in the country, though it had been well dunged, yielded leſs wheat than thoſe on which the experiments were made, and on which no dung was uſed.

“ The ſeventh article will conſiſt of reflections and obſervations on our practice of the New Huſbandry; and the eighth will ſhew the diſpoſition of our lands for the crop in 1754.

“ To avoid repetitions, we ſhall obſerve here, once for all, that no dung or other manure was uſed in any of our fields, and that our pound conſiſts of ſixteen ounces.

Experiments made on Lands laid out in Beds, which have borne a ſecond and third Crop, with ſome Obſervations particularly relating thereto.

EXPERIMENT, Numb. I.

N. B. This experiment is marked with the ſame number in the year 1752.

“ I ſhould have known the full produce of this third ſucceſſive crop on the beds of this field, continues M. de Chateauvieux, if the hail which fell on the third of June had not damaged it greatly. The abundance of rain which fell at the ſame time, and immediately after the hail, did ſtill greater hurt; for the earth of part of the beds was waſhed away by the torrent of water, ſome of the plants were forced out of their places, others were entirely covered with earth, and many were torn up by the roots; ſo that it was not poſſible to judge what this year's produce would have been by the few plants that were left.

“ I am very ſorry that this accident deprived me of a certain proof, that this year's crop would have been more plentiful than that of 1752: for it would have been evident, that the earth becomes more and more fruitful by the New Huſbandry: a truth which it is of conſequence to eſtabliſh. I can therefore only affirm by conjecture, that this crop would have been greater. My conjectures are indeed ſo ſtrong, that they amount almoſt to a demonſtration.

“ I draw them from hence, that the corn had a very fine appearance before winter; that the plants grew with great ſtrength in the ſpring; that they branched more than formerly; that the ears were certainly larger; that they bloſſomed extremely well (they were in full bloom by the thirtieth of May;) and, laſtly, that they have yielded more ſtraw than in 1752.

“ It neceſſarily follows from hence, that had it not been for the hail and torrents of water, the crop would have been greater than in 1752.

“ Though the following experiment ſuffered the ſame accidents (except that the beds were not broken up by the water) it will ſupply the want of that information which we were deprived of in the other, and ſtrengthen our conjectures.

EXPERIMENT, Numb. II.

N. B. This experiment is marked with the ſame number in the year 1752.

“ As I hope this experiment will be found very inſtructive, I ſhall relate it with the ſame care as it was executed. I therefore beg it may be particularly attended to; for it will confirm the advantages of the New Huſbandry. But before I enter into a detail, of which I ſhall endeavour not to omit any eſſential circumſtance, it is neceſſary to repeat here, that in the journal of 1751, I ſaid, firſt, that the ploughings which had been given in order to prepare the ground for being ſown in 1752, had not looſened it ſufficiently, and that I tried to remedy this defect by ſubſequent culture. Secondly, That this field was ſowed on the twenty-fifth of September with 11 pounds and 4 ounces of wheat. Thirdly, That the crop yielded a thouſand and forty-two pounds twelve ounces; and, laſtly, That the appearance of the young plants promiſed a much greater crop in 1753.

“ The culture beſtowed upon theſe lands in 1752, rendered them more and more looſe and well divided; ſo that with only one ploughing after harveſt, which was performed with eaſe, I formed new beds, the ridge of which was now in the place where the furrow in the middle of the alley was before. But the earth was ſtirred deeper and made much looſer than in 1752. I had already attained almoſt a perfect tilth, and eaſily foreſaw that I might quite complete it in 1753.

“ Whilſt I laboured aſſiduouſly in the culture of wheat, from which I would not ſuffer any thing to divert my attention too much, till I ſhould arrive at a good and certain practice of the New Huſbandry; I nevertheleſs determined to begin experiments on lucerne and ſaintfoin, to cultivate them nearly in the ſame manner as wheat. What prompted me to this was, the ſucceſs of a ſmall experiment the year before. Accordingly, taking this object likewiſe into ſerious conſideration, I reſolved to leave a part of this field for lucerne, and to ſow the reſt with wheat. It contained in all one acre, one rood, and eighteen poles, formed into forty-five beds. I left for the lucerne nine beds, the extent of which was about a quarter of an acre, and deſtined the ſurplus to be ſowed with wheat as before. I am now very attentive to the experiments on lucerne and ſaintfoin, and ſhall begin next year to give an account of them, and of my manner of proceeding. My practice in this will be found different, in many reſpects, from the method which is commonly purſued. I will venture to affirm, that there will be room to be ſatisfied with the ſucceſs of this branch of huſbandry, than which none can be more intereſting, plenty of fodder being as neceſſary as plenty of corn.

“ I muſt therefore beg leave to give the produce of this field, as if the whole of it had been ſowed with wheat. This I do, in order to compare the produce of 1753 with that of 1752, as it cannot be doubted but that the nine beds now under lucerne, would each of them have yielded as much wheat, as any of the beds did that were ſown with it: nay, perhaps ſome pounds more, the lucerne being ſown in what I thought the richeſt part of the ground. This field was ſowed on the firſt of September. I increaſed the quantity of ſeed, ſowing this time thirty-four pounds fourteen ounces of wheat; whereas in 1751, I ſowed but eleven pounds four ounces. Though I ſowed this year more than thrice the weight of ſeed that I did in 1751, it muſt not be inferred, that I tripled the number of grains capable of producing plants, becauſe this year's ſowing was made with wheat of the produce of the new culture, the grains of which are much larger than thoſe of the common wheat which I uſed in 1751, and of which a greater number is conſequently required to make up an equal weight.

“ This wheat having been ſown pretty early, its plants had time to grow very ſtrong before winter, the cold of which they bore very well: and the ploughing I gave them on the fifteenth of October, by cutting a very deep furrow within about three inches of the rows, ſecured them from the damage which corn frequently ſuffers from rain and the melting of ſnow.

“ In the ſpring they made ſtrong ſhoots, grew apace, and branched very abundantly. I aſſiſted them, as I am going to relate, at proper ſeaſons, both with reſpect to the condition of the plants and earth, and to the temperature of the weather.

“ On the fifteenth of March, 1753, I gave them the firſt ploughing after winter.

“ On the twenty-ſixth the beds were weeded.

“ On the eleventh of April, I ſtirred the alleys with the cultivator.

“ On the twenty-ſixth, the thiſtles were plucked up.

“ On the fourteenth of May, the ſtirring was repeated with the plough.

“ On the fifteenth, the ears began to appear.

“ On the twenty-ninth, the fourth ſtirring was given with the cultivator with mould-boards.

“ On the thirtieth, the wheat was in full bloom.

“ On the third of June, the wheat ſuſtained a violent ſtorm of hail and rain.

“ On the thirteenth, the fifth ſtirring was given with the new plough with two ſhares, or double cultivator.

“ I beg leave to obſerve, that there needs no better proof that wheat, cultivated according to the New Huſbandry, will be little apt to be lodged, than the eaſe with which I performed the fifth culture, after the accidents which happened on the third of June, when the corn had attained its greateſt height. So far was it from being laid thereby, that the whole extent of the plough found free admittance into the alleys, and this laſt culture could be given without damaging the ſtalks.

“ Though the whole of our ploughing and hoeing may be performed extremely well with my plough, and the inſtrument which I call the *cultivator*, yet I have thought of making this taſk ſtill more eaſy. Two new inſtruments (not indeed abſolutely neceſſary) will anſwer this end. I propoſe them only as very uſeful, and proper to be employed only the ſecond or third year, when the earth has acquired part of that minute diviſion, of which it is ſuſceptible.

“ The cultivator with mould-boards, and the plough with two ſhares, are inſtruments which I have invented this year. I have found them extremely uſeful to give the two laſt ſtirrings, better, and in leſs time than our other inſtruments. The reader may not be diſpleaſed to know what firſt ſet me upon contriving them.

“ One cannot enter properly into the ſpirit of the New Huſbandry, without being thoroughly convinced, that the earth cannot be too minutely divided: I will even ſay, till it is reduced to a perfect powder; and that, when one has been ſo happy as to attain this point, it muſt be kept in that ſtate. This will always be done beſt, by uſing the moſt proper inſtruments.

“ I obſerved one day, whilſt I was horſe-hoeing my wheat, my plough being then at work, and the earth in a very looſe ſtate, that every time the alleys were ſtirred, they were thrown into a different form; for it is neceſſary ſometimes to make a deep furrow in the middle of the alleys, and at other times to raiſe a ridge in them; and yet, in whatever form the alleys were to be, I had only my plough to perform theſe different operations. It did not ſeem to me reaſonable to ſuppoſe, that two ſo different works could be done equally well with one and the ſame inſtrument; from whence I concluded, that it was neceſſary to have an inſtrument for each of theſe purpoſes.

“ I ſoon found what I wanted. The cultivator with mould-boards opens a large furrow in the middle of the alley, by turning over the earth at the ſame time to both ſides. The plough with two ſhares, on the contrary, at the ſame time takes up the earth on both ſides, and turns it into the furrow, which it fills, and thereby lays the foundation of a new bed.

“ Theſe inſtruments have this farther advantage, that, without requiring a greater number of cattle, they perform as much work at once going over the ground, as the plough can do in two, and ſometimes three operations. I return to my experiment.

“ On the twenty-third of June, the wheat ſuſtained a violent hurricane, which laſted an hour. Several great pear trees were blown down in my orchards, and many large branches were broke off from other trees.

“ On the eighth of July, a ſcorching wind blew, which ſhed a great deal of the ripe corn.

“ On the ninth the wheat was reaped.

“ A month after harveſt, it was threſhed.

“ This field yielded 1575 pounds of wheat, deducting from which the thirty-four pounds fourteen ounces uſed for ſeed, the neat produce remaining is 1540 pounds two ounces. Conſequently, in 1753, this field produced 533 pounds four ounces more than in 1752, including what was ſaved in the ſeed.

“ The grain of this wheat was very large, and ſo clean, that it did not want ſifting. It yielded plenty of very fine flour, which made exceeding white and well taſted bread.

Experiment, Numb. III.

N. B. This field is marked with the ſame number in the year 1752.

“ This field contains one acre and ſixteen poles, and was but in poor tilth. It was ſowed on the twenty-fourth of September, 1751, with ſeven pounds fourteen ounces of wheat, and yielded 441 pounds.

“ It was brought into better tilth in 1752, but the beds were not raiſed high enough: I would have given them another ploughing, if the rainy ſeaſon had not prevented it. They were ſown on the eighth of September, with twenty-four pounds twelve ounces of very large grained wheat. The plants were extremely fine before winter, and the rows were well filled. In the ſpring, I found that there were fewer plants than in autumn: inſects had deſtroyed ſeveral of them. I likewiſe imputed the loſs of many to the flatneſs of the beds. The plants acquired freſh vigour after the winter, made ſtrong ſhoots, and branched extremely well. I treated this field in the ſame manner as the former. The plants made nearly the ſame progreſs. They were reaped on the fourteenth of July, and yielded 724 pounds eight ounces. Thus we ſee, that this field yielded 283 pounds eight ounces more in 1753 than in 1752.

Obſervations on theſe Experiments.

“ I obſerved in my former experiments, that, as the mould was not ſufficiently looſened, the fields, which were laid out in beds, could not produce ſo plentiful a crop the firſt year, as they would the ſecond or third year, when the earth ſhould be more thoroughly divided. It is evident, that whoever ſhould have given up the New Huſbandry, upon the bad ſucceſs of the firſt year, would have deceived himſelf. Theſe experiments plainly ſhew, that the charge of the firſt year is fully recompenced by the profit of the ſecond, and that this profit will increaſe from year to year.

“ Whoever now tries the New Huſbandry, may reaſonably expect better crops than mine, even the firſt year; becauſe, 1. They now know how the earth ſhould be prepared: 2. They may be provided with inſtruments, already experienced to anſwer the deſired purpoſe with conveniency and eaſe. The different circumſtances to be attended to, are likewiſe known. From the knowledge I have acquired in theſe matters, I can ſay, that the preſent appearance of the corn, which I have ſowed this year in beds, promiſes a very great crop. I ſhall likewiſe have occaſion, in the courſe of theſe obſervations, to ſhew, that though the firſt crop may ſeem very ſmall, yet it is in fact more profitable than that of lands cultivated in the common way.

“ Let us now proceed to the preſent ſtate of the lands cultivated for two years according to the New Huſbandry, and obſerve what the effects have already been.

When the corn was ſowed, the beds were in a much looſer ſtate than before, and the ſeed was conſequently covered with a fine mould. It came up better: the roots extended themſelves more eaſily, and increaſed in number,

ber, in a ſoil which ſcarcely reſiſted them: the plants were ſtronger, and better able to bear the ſeverity of the winter; and, by a ſmall increaſe of the ſeed, the earth was better filled with plants, and thereby better able to ſuſtain the accidents which had thinned them before. After the winter froſts were over, the mould was in ſo looſe a ſtate, that it looked as if it had been newly ploughed; a very different ſtate from that of land in the common huſbandry, which, at this ſeaſon, is hard, compact, and very little fitted to afford an eaſy paſſage to the tender roots of plants. How eaſy too did this render all the ſubſequent culture! The weeds, already greatly diminiſhed, did little damage to the corn; and we may readily conceive that the earth, in this looſe ſtate, was eaſily penetrated by the rains, dews, and moiſture of the atmoſphere.

"The effects were, that the plants grew ſtronger and taller than before; that they branched into a greater number of ſtalks; that the ears were very large, and well filled with grain, if we may judge by thoſe which eſcaped the hail: that the wheat was very clean; and laſtly, that the crop was greater than that of the preceding year, though it had been conſiderably diminiſhed by the hail, the hurricane, and the ſcorching wind which made many of the ears ſhed their corn. I tried every poſſible means of aſcertaining the loſs occaſioned by theſe accidents; but in vain. I have therefore given up an uncertain calculation; and can only ſay, that I am ſure the loſs was very great.

EXPERIMENTS *made on Lands which had borne a firſt Crop, with Remarks on theſe Experiments.*

"We did not expect that the fields we are now going to ſpeak of, would yield a crop near equal to that of the fields treated of in the foregoing article. We knew, that the mould is never ſufficiently broken and divided the firſt year that a field is laid out in beds. Beſides, during almoſt all the laſt year, the earth was too moiſt to be cultivated properly. The wet mould could not be divided into ſmall particles, nor could it be ploughed ſo frequently as to admit of ſowing it ſo early as it ſhould have been.

"But every year will not be ſo unfavourable to this huſbandry: and when there are alternate changes, ſuch as we have had this year, of wet weather and of fair, which will afford time for the different ploughings, we may, with ſome certainty, promiſe ourſelves a greater crop; ſince, as we have ſeen, this depends chiefly upon the good or bad ſtate of the earth.

"The whole management of theſe fields having been nearly the ſame as that of the ſecond experiment, it would be needleſs to give a particular detail of it in our account of the other experiments.

EXPERIMENTS, Numb. IV.

"This field is a very ſtrong good ſoil. In the Old Huſbandry, great ſtrength was required to plough it, and it was neceſſary to catch the ſeaſons when they were neither too wet nor too dry. It contains thirteen acres, two roods, and twenty poles. I laid near one half of it out in beds, which, with the alleys, were each about ſix feet wide. Part of theſe beds were ſown on the thirtieth of Auguſt. Conſtant rains hindered the ſowing of the reſt till the twenty-ſixth of September. An hundred and eighty-one pounds of wheat were employed in ſowing the whole. What was firſt ſowed, came up well, and the plants were very ſtrong before winter: but in one place, almoſt all of them were deſtroyed by inſects. I ſowed this ſpot a ſecond time. The freſh ſeed was ſcarcely able to riſe before winter, and yielded much leſs than the beds which had not met with the like accident. The wheat of the beds which were ſown on the twenty-ſixth of September, was a long time before it ſprung up; owing to the dryneſs of the earth, which continued almoſt the whole month of October. The froſt in November ſtopt the farther progreſs of the plants. Their produce was much ſhort of what was ſowed firſt; which ſhews plainly how eſſentially neceſſary it is to ſow early.

"This wheat muſt of courſe grow very unequally. Some beds were extremely beautiful, others middling, and the reſt very poor: yet, throughout the whole, the ears were very large, and well filled with grain; and the crop would ſtill have been a good one, had it *not* ſuffered by the hail which fell on the third of June, and by the other accidents mentioned in the ſecond experiment.

"The wheat, being perfectly ripe, was reaped on the 13th and 17th of July. It was threſhed two months after, and the whole produce of this half of the field was 3370 pounds of very fine and perfectly clean large-grained wheat, which yielded a great deal of flour.

"The other half of this field was ſowed in equally diſtant rows, with the drill-plough, by which means a great deal was ſaved in the ſeed: for only 479 pounds of wheat were employed to ſow this ground, which, in the common way, would have required about 2016 pounds.

"It was ſowed on the 23d, 24th, 26th, 27th and 29th of Auguſt. We could work only a few hours each day, on account of the frequent ſhowers of rain.

"This wheat roſe perfectly well, grew very ſtrong before winter; and was of a deep green colour, which it retained till it began to ripen. The number of ſtalks increaſed in the ſpring. They grew very long, and bore large ears. In ſhort, they promiſed a fine harveſt. But the hail on the 3d of June ſoon changed the face of the field. It cut off a great number of the ears, broke down many ſtalks, and damaged all thoſe ears whoſe ſtalks were ſtrong enough to remain upright. This misfortune was common to all my wheat.

"This wheat, being ripe, was reaped on the 9th, 10th, and 11th of July, in very hot, dry weather. It was threſhed a month after harveſt, and yielded 5386 pounds of excellent grain.

"Here is an experiment made upon a large extent of ground, cultivated two different ways, and divided into two almoſt equal portions, both of which ſuffered the ſame accidents as equally as could be, according to the beſt of my judgment. This experiment offers us a very intereſting inſtruction.

"The deſign of our experiments is, to know which of the different methods of huſbandry is moſt uſeful; which will beſt promote the public welfare, be moſt beneficial to the owners of land, and bid faireſt to ſecure their productions.

"Let us now compare the produce of each half of this field. It will convince us of a truth of great conſequence to be known, viz. that land will produce much more corn when cultivated in beds according to the New Huſbandry, than when it is only ſowed in equally diſtant rows with the drill-plough; though this laſt method is, indiſputably, better than the Old Huſbandry.

"We have ſeen that the part of this field which was ſowed in equally diſtant rows with the drill-plough, produced 5386 pounds of wheat. If it is continued to be cultivated in the ſame manner, it will be in fallow in 1754, and yield no produce: and thus it will bring a crop only every other year.

"The other part of this field, which we formed into beds, produced 3370 pounds of wheat, and is already ſown again for a crop to be reaped in 1754. Suppoſing this crop to be only equal to that of 1753, the produce of the two years will be 6740 pounds of wheat. Hence it is evident, that, in two years, the produce of the beds will be 1354 pounds more than that of the rows. This difference is very conſiderable: and if we would ſee it in a yet ſtronger light, let us extend the ſame calculation to a longer time: for example, to ten years, during which the part ſowed in rows will yield only five crops, which, at 5386 pounds a crop, will amount in all to

	26930 lb.
"The part ſowed in beds will yield ten crops, which, at 3370 pounds a crop, make — — — — — — —	33700 lb.
"The difference in favour of the beds will therefore be, in ten years, — —	6770 lb.

"We here ſuppoſe the ſeaſons to be, in every reſpect, like the year 1753. But as our obſervations have conſtantly ſhewn that the crops are always greater after the firſt year, which is likewiſe juſtified by the firſt, ſecond, and third experiments, we may even now venture to pronounce, that the part of our field, which is ſowed in beds, in order to be reaped in the year 1754, and which now makes a promiſing appearance, will yield double the quantity it did in 1753. The profit will therefore be much more conſiderable than we have made it in the above calculation.

Experiment, Numb. V.

"This field is of a very ſtiff ſoil. It contains five acres and eight poles, and lies ſloping towards the weſt. The beds were well formed, but the earth could not be ſufficiently broken, nor could it be ſown early enough, on account of the frequent rains. It was ſowed on the 8th and 25th of September, with 139 pounds of wheat. The corn came up well, and made a fine appearance before winter. It throve well during the ſpring, and when ripe, I cut it down, viz. on the 14th and 28th of July, and the crop yielded 2205 pounds of very fine wheat.

Experiment, Numb. VI.

"This field was reaped in 1752, and immediately formed into beds, with a deſign to ſow it that ſame year. I could not expect that land in ſo bad tilth would produce much. My only aim then was, to form it into beds a year ſooner. It contained one acre, two roods, and fifteen poles, and was ſowed with forty-five pounds of wheat, which yielded 724 pounds.

Experiment, Numb. VII.

"My deſire to practiſe the New Huſbandry upon all my lands as ſoon as poſſible, made me plough another field, which had likewiſe been reaped in 1752. I could however lay only a part of it out in beds: the reſt was ſowed in equally diſtant rows with the drill-plough. This field could have but one ploughing: nor could that be completed, though ſeveral ploughs were employed till the 15th, 17th, and 18th of November. The earth was ſo moiſt, that it divided only into large clods. However, I ſowed it ſoon after ploughing, not expecting a great crop. The extent of this field is about ſix acres, three roods, and ſix poles. It was ſowed with 412 pounds of wheat, of which only a ſmall part roſe before winter. The number of plants increaſed greatly in the ſpring: they could not branch ſo much as thoſe of the foregoing experiments, and the grain beginning to look a little ſhrivelled, I reaped it on the 21ſt, 23d, and 24th of July. Though this wheat had ſuffered the ſame accidents as the other, yet it yielded 2646 pounds.

Experiments *made on Lands laid out in Beds, and of which the firſt Crop was reaped in* 1753; *with Reflections on theſe Experiments.*

"In our journal of 1752, we mentioned a perſon's having ſowed at leaſt twenty-eight acres in beds. Though theſe experiments did not anſwer well, we have thought proper to mention them, in order to ſhew the cauſes to which their want of ſucceſs ought to be imputed. They will ſerve to inſtruct us in ſome practices which are more neceſſary than might otherwiſe be imagined, and will fix our attention to circumſtances which ought not to be neglected by any one who deſires to make the moſt of his ground.

Experiment, Numb. VIII.

"Theſe twenty-eight acres were laid out in beds about ſix feet wide. The ſoil is ſtrong, and apt to grow very hard. Three rows were ſown in each bed.

"Only 460 pounds of wheat were uſed to ſow this field, which yielded but 3150 pounds of very clean grain.

"This is a very ſmall crop. Let us ſee to what it was owing.

"1. This land was very badly ploughed: it could only be divided into great clods, incapable of ſupplying the wants of the plants, and of letting them imbibe the nouriſhment neceſſary for their growth. That the bad ſtate of the land was the chief cauſe of the ſmuttineſs of this crop, appears from this circumſtance; that, in ſome ſmall parts of the ſame field, where the mould was better divided, the wheat was finer, branched tolerably well, and produced a greater number of flouriſhing plants.

"2. This field was ſowed too late, viz. not till the laſt week in November. Only part of the ſeeds ſprung up before winter; and theſe plants, not riſing in a good ſeaſon, could not make the progreſs that might have been expected.

"3. Too little ſeed was ſown. It was the more neceſſary to ſow a larger quantity, as numbers of grains cannot ſhoot at all in the ground badly prepared, and many of thoſe which do ſhoot, are ſo buried under the great clods, that they are not able to riſe. This field was therefore not ſufficiently ſtocked with plants.

"Laſtly, the hail mentioned before, greatly diminiſhed the crop: which, independent of that accident, would not have been plentiful.

"The owner of this field, after remarking theſe bad conſequences ariſing from the defect of culture, has endeavoured to remedy them, by giving, after harveſt, ſeveral ploughings, which have broken and divided the earth more thoroughly, and prepared the beds for being ſowed in good time: the quantity of ſeed has likewiſe been increaſed; the plants have had time to get ſtrength before winter, and their preſent ſtate promiſes that the next crop will be better. Far from being diſcouraged by the bad ſucceſs of a firſt trial, the perſon we are ſpeaking of, convinced of the excellence of the New Huſbandry, is but the more reſolved to purſue it. He juſtly aſcribes the ſcantineſs of this crop, not to any defect in the principles of the New Huſbandry, but ſolely to its having been badly executed the firſt year. He ſoon perceived that theſe faults might eaſily be remedied, the ſecond year; and therefore has not only continued to cultivate and ſow the ſame field, but has likewiſe ſowed at leaſt twenty-five acres more, laid out in beds, which have been much better ploughed than thoſe of the laſt year: every circumſtance of the new culture has been duly attended to, and the corn, even now, promiſes a more plentiful return.

Experiment, Numb. IX.

"Small experiments have led to much greater. As thoſe ſmall ones are neceſſary at firſt, not only to create a confidence in the New Huſbandry, but likewiſe to accuſtom people to the practices which it requires, I ſhall relate one of this kind, made by a perſon who has adopted the New Huſbandry from principle, and who is every way qualified to inſtruct us, and to execute well what he has once conceived to be right.

"A piece of ground, 270 feet long, and twenty-ſeven feet wide, was made into ſix beds, to be ſowed with only two rows. This ſpot could not be prepared till the firſt week in September, nor ſowed till the twenty-fourth of October. The earth was very dry, and the wheat roſe unequally, and made little progreſs before winter. By a negligence in the firſt hoeing, almoſt whole rows of the plants were torn up. In proportion to what was reaped, this little ſpot would have yielded 180 pounds of very fine wheat.

"A meaſure of oats, which was ſowed in beds in a proper ſeaſon, yielded 112 meaſures.

"Encouraged by this ſucceſs, the ſame perſon intends to practiſe the New Huſbandry in a larger way. He has already formed about ten acres into beds, which are now ſown: and he will continue in 1755, and the following years, to lay out twelve acres a year in beds, till he has diſpoſed all his lands in that manner.

"Another thing intended by this experiment, was, to know whether two rows would not produce a larger crop, in proportion, than three. The ſucceſs of this promiſes very fair; but it will be right to continue trying it, and likewiſe to ſee what multiplying the rows will do. We ſhall ſpeak of this hereafter, in order to determine, by real products, what number of rows will beſt ſuit this huſbandry.

Experiments *made on Fields ſowed in equally diſtant Rows with the Drill-Plough, by ſeveral Lovers of Agriculture; as related by* M. de Chateauvieux.

Experiment, Numb. X.

"This, and the following experiment, were made by the ſame perſon who made the ſeventh, mentioned in our journal of 1752, the reſult of which encouraged him to proceed to larger trials, and to prove the advantages of this huſbandry, by new examples. To be more exact in theſe experiments, he reſolved to try the Old and the New Huſbandry in the ſame field.

“ For this purpoſe he choſe a field, the ſoil of which is reckoned equally good in every part. Its whole extent is five acres, two roods, and fifteen poles, ſquare meaſure. Of this two acres, three roods, and 15 poles were deſtined to be ſown in the old way; and two acres, and three roods, to be ſown in equally diſtant rows with the drill-plough. The whole field was equally ploughed and dunged, and ſowed on the ſame day, viz. the 19th of September, with the ſame wheat. In ſhort, there was no other difference than in the quantity of ſeed, and the manner of ſowing it.

“ The part of this field which was ſowed in the old way took up 698 pounds ten ounces of wheat, which produced 2969 pounds of very fine grain. This is about four and a quarter for one.

“ The other part of the field was ſowed with the drill-plough, with 243 pounds, which yielded 3187 pounds two ounces of very fine large-grained wheat. The proportion here is as thirteen to one.

“ We find in favour of the drill-huſbandry; firſt, that, though the ſurface of this ground was fifteen poles leſs than that of the other, yet it produced 208 pounds two ounces of wheat more: and, ſecondly, that, deducting the ſeed of each crop, this neat produce is ſtill more conſiderable, as appears by the following account.

Produce of the part ſowed in the common way	2969 lb.	
To be deducted for the ſeed	698 lb.	
Remains	2271 lb	
	lb.	oz.
Produce of the part ſowed with the drill plough	3187	2
To be deducted for the ſeed	243	-
Remains	2944	2

“ Which is 663 pounds two ounces more than the produce of the Old Huſbandry.

“ The whole field was ſomewhat damaged by the hail on the third of June, which leſſened both the crops a little.

Experiment, Numb. XI.

“ Another field, the ſoil of which is better than that of the former, having been well ploughed, was ſowed in equally diſtant rows, with the drill-plough, on the tenth of October. It contains one acre, three roods, ſeven poles, and two yards of ground, was not dunged, and was ſowed with 121 pounds eight ounces of wheat, which yielded 2979 pounds of very fine clean corn; which is twenty-four for one.

“ This return is very conſiderable, and greatly ſurpaſſes that of the foregoing experiment. It ſhould be remembered, that the ſurface of this field is leſs. It did not, indeed, receive any damage from the hail.

Experiment, Numb. XII.

“ We mentioned in the journal of 1752, a perſon's having ſown about 150 acres in equally diſtant rows, with the drill-plough; and we obſerved, that a great part of the ground could not be well ploughed, and that the whole of it could not be ſowed till November and December. Theſe two circumſtances gave no room to hope for much ſucceſs. About forty acres, which were the laſt ſown, were dunged: but theſe yielded the leaſt crop of any.

“ This great extent of ground was ſowed with 9932 pounds of wheat. To have ſown it all in the common way, would have required 29524 pounds of wheat. Conſequently here is a ſaving of 19592 pounds of wheat, in the ſeed.

“ The ſoil of theſe fields being of different qualities, their produce was proportioned thereto, varying from exceeding good to very bad. The 150 acres yielded in all 86058 pounds of wheat. The crop would have been more conſiderable, if about thirty acres had not been greatly damaged by hail. The loſs which it occaſioned, ſhews plainly the great probability of having larger returns in other years, when we become more perfect in the practice of the New Huſbandry, to the want of which the bad ſucceſs of this firſt trial has certainly been owing in a great meaſure. All the lands of this farm are now ſowed again with the drill-plough. They conſiſt of about 200 acres, and afford a pleaſing proſpect for the enſuing harveſt.

Experiment, Numb. XIII.

“ A field of four acres, was ſowed in the middle of October with 243 pounds of wheat. It uſed generally to require about 850 pounds. It yielded 2268 pounds. This, adds the perſon who has ſent me this account, is as much as I have had from any other field ſown in the old way.

Experiment, Numb. XIV.

“ The ſame perſon who made the foregoing experiment, ſowed another field of about four acres and a half, of a poorer and colder ſoil, towards the middle of November, with 333 pounds of wheat. In the old way, it uſed to be ſowed with 972 pounds. It yielded 1260 pounds. The corn in this field remained thin. It did not branch ſo well as that of the former. The perſon who ſends me this account of theſe two experiments adds: “ It muſt be obſerved, that the drought, as well of the autumn as of the ſpring, was unfavourable, eſpecially to the late ſown wheat. Theſe experiments have encouraged me to purchaſe a drill-plough, and to ſow all my lands with it in equally diſtant rows, according to the new method, this year 1753: only I have obſerved to ſow earlier, viz. between the middle of Auguſt and the middle of September; and thicker, that is to ſay, forty-five pounds, on the ſame extent of ground where I ſowed but thirty-four pounds and an half, and forty-one pounds and an half in 1752. My plants, hitherto, make a fine appearance, and are very thick: their blades are large, and the whole is in great vigour.”

Experiment, Numb. XV. by M. de Chateauvieux.

“ I have extended my experiments to an eſtate where I have not time to make any long ſtay myſelf, ſo that what is done there is left to the diſcretion of ſervants, whoſe eye, as is well known, is not like that of the maſter.

“ The lands of this place are very poor: they produce but little corn, though that little is exceeding good. In 1752, they were very badly ploughed, and this ploughing was ſpoiled by heavy rains, juſt as we were going to ſow. I ordered the whole to be ſowed with the drill-plough, except two acres, which were ſown in the old way. Some few fields were a little better ploughed than the reſt. Theſe produced pretty good wheat, the others were very poor. However, I have reaſon to be pleaſed with my having ſowed in this manner. I judge of it by the produce of the two acres which were ſown in the common way, and which yielded me no more than exactly the quantity of the ſeed beſtowed upon them.

“ The true cauſe of this was the bad condition of the lands. They are in much better tilth this year. All of them have been ſown with the drill-plough, in a favourable ſeaſon, and my ſervants aſſure me that the corn riſes finely.

M. de Chateauvieux's *Account of the Crops produced during Sixteen ſucceſſive Years, by Fields cultivated and ſown in the common Way, and of which Part was conſtantly dunged; compared with a Crop of the ſame Fields cultivated without Dung, according to the New Huſbandry, even ſuppoſing them not to yield more than they did in* 1753, *which was their firſt Crop, and which was greatly diminiſhed by the unforeſeen and extraordinary Accidents already mentioned.*

“ The reſult of our experiments would be of little uſe, if it extended no farther than our private inſtruction. To render it of more general ſervice, we ſhall here give a comparifon of the produce of lands cultivated according to the Old Huſbandry, and according to the New, that every one may judge which of the two is moſt likely to anſwer beſt.

" This parallel will ſhew how much the New Huſbandry is ſuperior in point of advantage to the Old. We are to ſuppoſe all the circumſtances of the ſeaſons to be like thoſe of the years of which we have compared the products. But as the expence of culture is an object well worth conſidering, and as that expence may not be equal in both ways, I beg leave to lay down here as a fact, " That the charge of the new culture is leſs than that of the old." I have tried it, and find it ſo; as I ſhall, hereafter, prove beyond diſpute.

" By the old culture, in the farm which I now cultivate in the new way, I ſhould have had but two fields ſown in 1752; to be reaped in 1753, viz. that of the experiment Numb. IV. and that of the experiment Numb. V. Theſe two fields contain together eighteen acres, two roods, and twenty-eight poles. I have calculated their produce during ſixteen years, viz. from 1730, to 1745, incluſively. They have yielded, in that time, eight crops, the total produce of which has been 146863 pounds of wheat: deducting from which, 42130 pounds for the ſeed ſown in the eight years, the neat produce will be reduced to 104733 pounds.

" It is proper to obſerve that this wheat was meaſured every year in the barn, as ſoon as it was threſhed, and before it was ſifted: an operation which always occaſions a conſiderable diminution, though we do not make any allowance for it here.

" Let us now ſee what crops the preceding experiments give us room reaſonably to expect from the ſame two fields in ſixteen ſucceſſive years of the New Huſbandry; to judge only by that of this firſt year, 1753, unfavourable as it is.

" The field, Numb. IV. was ſowed, half in beds, and half in equally diſtant rows. I am obliged to ſuppoſe it to have been ſowed entirely in beds; for it cannot be doubted but that the part which was ſowed in rows, would have produced as much as the other: conſequently the whole crop of the two halves, at 3370 pounds each, would have been 6740 pounds.

" As the ſame fields yielded a crop every year, in the New Huſbandry, we ſhall have ſixteen crops inſtead of eight: ſo that, multiplying the firſt year's crop, 6740 pounds, by ſixteen, the total produce will be 107840 pounds; to which muſt be added that of the experiment Numb. V. which was 2205 pounds; which being alſo multiplied by ſixteen, will produce a farther quantity of 35280 pounds for the ſixteen crops. This, added to the amount of the experiment Numb. IV. will make in all 143120 pounds of wheat for the ſixteen years.

" If we afterwards deduct from this, the quantity of ſeed uſed in theſe two fields during the ſixteen years, which amounts to 8016 pounds, the neat produce will be — — — — —	135104 lb.
" In the old way, the ſame fields would produce, in ſixteen years, only — —	104733 lb.
" The difference in favour of the new culture is therefore — — — —	30371 lb.

" Beſides the advantage of reaping a much greater quantity of corn, there are others which highly merit our attention. This corn is not mixed with any ſeeds of weeds, and its quality is greatly improved by the abundance of nouriſhment which the plants are ſupplied with by the frequent ſtirrings of the earth in this huſbandry, more than in the old.

" But how fine a proſpect does the propoſition which we advanced before, afford us beyond all this! viz. " That the crops of the ſecond and following years, would be ſtill more plentiful than the firſt." What ſome might then think only an object of hope and ſpeculation, is already realized, and proved by experience. All this deſerves the moſt ſerious attention. The New Huſbandry will certainly, in time, acquire a ſuperiority over the Old, greater than we can now imagine.

Proofs that the beſt Field in the Country, though the greateſt Part of it was dunged, yielded leſs Wheat than thoſe of the Experiments, Numb. II. *and* XI. *in which no Dung was uſed. By* M. de Chateauvieux.

" The proofs of the advantages of the New Huſbandry cannot be too greatly multiplied; and all thoſe which are the reſult of experience, deſerve to be communicated to the public.

" The field we are going to ſpeak of, is generally, and juſtly, reckoned the beſt in the country. Its ſoil is excellent, very deep, and extremely fertile. This field is dunged very often. Its nearneſs to the farm-yards renders the carriage of manure extremely eaſy, and is the cauſe of its getting perhaps more of it than may be neceſſary. Its ſituation too is excellent, riſing on all ſides above the neighbouring grounds, and the highways which ſurround it; by which means it is leſs expoſed to be hurt by wet, the water finding an eaſy drain from off it.

" The extent of this field is 6087 fathoms (four acres and eight poles.) It was ſowed in 1752, for the harveſt of 1753, and the greateſt part of it was well dunged.

" It is not the cuſtom of the place I am ſpeaking of, to deſcribe the extent of a field by the number of acres contained in it, but by the number of meaſures of wheat with which it is ſowed. Eight meaſures uſed generally to be employed to ſow this: but the quantity of ſeed was leſſened this laſt time, and only ſeven meaſures were ſown. We have hitherto ſuppoſed the ſurface of this field to be equal to that of the other fields of the ſame country, in which eight meaſures of ſeed are ſown.

" But as I was deſirous to be more preciſely exact, in order to form the comparifon I purpoſed making, I had recourſe to the geometrical plans of the lands, and found the contents of this field to be, as I ſaid before, 6087 fathoms: now, the cuſtom of the village to which it belongs is always to ſow at leaſt eleven meaſures in a ſpace like this. One field, among others, very near to this, and which is but twenty-four fathoms and thirty-two feet larger, has always been ſown with twelve meaſures.

" A new cauſe of the fruitfulneſs of this field, unknown before my obſervations, is, that the farmer wiſely took care to ſow it with a leſs quantity of ſeed. The plants throve better, when the land was not over ſtocked with them. This field will therefore help to prove the truth of one of the firſt principles of the New Huſbandry, viz. that the quantity of ſeed generally uſed ought to be diminiſhed: a propoſition which deſerves our entire confidence, becauſe the ſeed here has, from time immemorial, been reduced to eight meaſures, and they have been ſufficient to produce very plentiful crops. The farther reduction made in 1752, to ſeven meaſures, muſt alſo be approved of, ſince the crop which theſe yielded was very fine.

" Theſe preliminary obſervations ſeemed neceſſary, before we proceeded in our detail. This field was ſowed with about 850 pounds of wheat. It was finer during the whole ſummer than any wheat in the common way. It was reaped at a proper time, and yielded about 6646 pounds, from which muſt be deducted, firſt, the 850 pounds of ſeed; and, ſecondly, the value of the dung, which is equal at leaſt to 1260 pounds of wheat, together with 2110 pounds; which deducted from 6646 pounds, the total produce, leave for the neat produce 4536 pounds.

" The crop of 1753 was diminiſhed by the hail on the third of June. The value of this loſs is not known; but we may fairly compare it with the experiment Numb. II. which likewiſe ſuffered by the ſame hail. We confeſs that this comparifon is not abſolutely exact, with reſpect to this accident; but it muſt alſo be granted, that this circumſtance cannot occaſion any very great error. We muſt likewiſe premiſe, that we ſhall not reckon the produce of a ſmall ſpot which is pretty commonly ſowed in March in the year of fallow, becauſe it hardly equals the expence of dung and ploughing.

" The neat produce of the experiment Numb. XI. on a field ſowed in equally diſtant rows, was 2857 pounds eight ounces. But the extent of that field being only one acre, three roods, ſeven poles, and two yards, we muſt calculate what the crop would have been in proportion, if that extent had been four acres and eight poles (6087 fathoms) ſuppoſing it of the ſame quality. We ſhall find, that the field on which our experiment was made, would have produced neat 8006 pounds of wheat; deducting from which 4536 pounds, for the neat produce of the field cultivated in the old way. The difference in favour of the New Huſbandry, without dung, will be 3470 pounds of wheat.

“ We have ſeen by the experiment Numb. II. that this field laid out in beds, and having borne its ſecond crop, yielded neat 1540 pounds of wheat. Its extent is but one acre, one rood, and eighteen poles; ſo that we are to ſee what crop it would have yielded if its extent had been four acres and eight poles, ſuppoſing the quality of the ſoil to be the ſame. The rule of three ſhews us again, that its neat produce would have been 5681 pounds of wheat, which we are to double for the amount of the next year's crop, every year yielding a crop in the New Huſbandry; whereas the field it is compared with would lie fallow this year. Thus two years will yield 11362 pounds of wheat; from which deducting 4536 pounds for the neat produce of the ſame field, cultivated in the old way, during the ſame ſpace of time, the difference will be 6826 pounds of wheat in favour of the New Huſbandry.

Reflections and Obſervations on the Practice of the New Huſbandry, by M. de Chateauvieux.

“ The chief object of our reflections laſt year was, the effect which ploughing and culture have upon plants. They ſeem to us to be confirmed by the following obſervations.

“ 1. The productions were greateſt in thoſe places where the earth had been moſt looſened, and brought to the fineſt tilth.

“ 2. We have ſeen plainly, that, in order to improve our tillage, it is neceſſary to make the great furrow in the middle of the alleys very deep, becauſe that furrow being afterwards filled up, and a new bed made over it, there is a greater depth of light well looſened mould immediately under the roots of the plants.

“ 3. We can affirm, that we have this year, without much trouble, ploughed our beds from fifteen to eighteen inches deep, which is very conſiderable; but we muſt not flatter ourſelves, that this depth can always be attained the firſt year; it is by continuing this ſame culture that we ſhall inſenſibly reach it.

“ 4. To have great ſucceſs, requires proper care and judgment in performing every part of the New Huſbandry. The culture which is well executed, will be of very great uſe; but that, on the contrary, which is badly done, will be of no ſervice to the plants, and may even prove very detrimental to the next year's crop.

“ 5. To perform this culture with advantage, it is therefore neceſſary to obſerve this important maxim of tillage, ſo little attended to by many farmers, “ never to ſet the plough to work, when the earth is too moiſt.” I have adhered to it ſtrictly, and have never ſuffered my lands to be touched till they were dry. We have tilled when the weather has been very dry and very hot, and then it was that our culture had the beſt effect; the ſtiffeſt land having been broken by the preceding ploughings, was provided with the moiſture neceſſary for plants, from its ſurface to the bottom of the furrows; and the plants were ſenſibly benefited by all our frequent ſtirrings.

“ 6. I was ſo ſtruck with this, that I marked ſeveral ſtalks, to ſee how much they grew each day. From the time that the ears began to appear, till they had done bloſſoming, I found that they grew an inch in four and twenty hours. The hotteſt days were thoſe in which the ſtalks grew moſt, whilſt all vegetation ſeemed almoſt ſuſpended in the wheat in the common way.

“ 7. This obſervation led me to another. I was greatly ſurpriſed one day to find my ſtalks juſt as I had left them the day before. The next day, and the day after, I found them ſtill the ſame. In ſhort, they grew no longer from that time.

“ So ſudden a change raiſed my curioſity greatly, and I reſolved to find out the cauſe of it. The time when they ceaſed to grow, was immediately after they had done bloſſoming. I judged that from that time all the ſap was conveyed to the ear, to form the grains, and that the reſt of the plant had only what was neceſſary to prevent its drying too ſoon. This diſpenſation of the nutritive juices ſeemed to me very remarkable: all their forces ſeem then to unite, in order to form, fill, and ripen the grain, which is the moſt uſeful part. I was afterwards confirmed in this, by obſerving, that it was from that very time that the ſtalks and blades began inſenſibly to loſe their deep green colour, and that this green grew lighter and lighter every day; a ſure ſign of a diminution of ſap in thoſe parts.

“ 8. It is likewiſe of very great importance to know, which is the moſt proper time for ſowing; for the growth of plants depends greatly on this circumſtance. Late ſowings have not anſwered; but the early ones have produced plants, whoſe vigour has enabled them the better to reſiſt the winter's cold, and to branch out the more abundantly. By attending to this circumſtance, the farmer will enjoy the deſirable advantage of having his corn ripen early, and of its being leſs expoſed to the dangers of the ſummer ſeaſon; for we have ſeen that the wheat which was ſowed firſt in the new method, ripened thoroughly as ſoon as that which was ſowed in the old way. It is proper to know this, in order to be ſenſible of the neceſſity of beginning to plough early, that the ſeed may be ſowed in due time.

“ 9. I muſt beg leave again to make a few reflections relative to the quantity of ſeed moſt proper to be ſown. It is of the utmoſt importance to know how to proportion the quantity of the ſeed to the ſtrength and richneſs of the ſoil, ſo that each may have its due proportion. The experiments already made, help to direct us; but I think others ſtill neceſſary, before we can truſt abſolutely to our knowledge in this point.

“ At preſent I ſhall only adviſe ſowing the ſame quantity of ſeed as I did in 1752. I fancy that proportion will not differ greatly from what a longer practice will ſhew to be beſt. However, the ſame quantity of ſeed will not do for every ſoil. It muſt be varied with judgement, and regulated according to the circumſtances of the ſeaſon, and the better or worſe condition of the land. I think, too, that in the firſt, and even the ſecond year of the trials which may be made, it will be proper to ſow a little thicker than I did in 1752. The farmer will eaſily perceive, that when his lands are well looſened and brought to a good tilth, they will require leſs ſeed; but till then, he will do well not to be over ſparing of it.

“ 10. We cannot yet determine ſo exactly as we could wiſh, what breadth the beds, including the alleys, ſhould be of, to make the ground produce the greateſt quantity of corn; nor whether it would be beſt to ſow more or leſs than three rows. We confeſs, that we ſhould be glad to ſee a longer ſeries of accurate experiments, and to have a greater knowledge of this matter, before we pretend to fix it. Our beds have always been about ſix feet wide.

“ M. Duhamel, who firſt introduced this New Huſbandry in France, intends to make experiments by ſowing only two rows. If they ſhould yield more grain, the breadth of the beds may certainly be diminiſhed: and as it is of conſequence to multiply and vary experiments, in order to determine this point, we now have ſeveral beds ſown, ſome in two, and ſome in three rows. I have likewiſe tried what multiplying the number of rows in ſome fields would do; and the reſult of this experiment promiſes an advantage in that way of ſowing. The ſucceſs of this firſt trial was as follows.

“ When the field of the experiment Numb. II. was ſowed, I obſerved, among the reſt, ten beds which the ploughman had made wider than the others. I was ſorry at firſt, that any part of the ground ſhould be loſt; but, upon ſecond thoughts, I determined to ſow thoſe beds with two turns of the drill-plough; and conſequently to plant them with ſix rows of wheat. I did ſo; and when the firſt ploughing after winter was given, little regard was paid to the two outſide rows, which were torn up by the plough in ſeveral parts; ſo that there remained but four or five rows in thoſe places.

“ The wheat of theſe beds, not excepting even the middle rows, grew as high, and branched as much as that of the others, in which there were but three rows. I examined them frequently with great care, and was aſſiſted therein by ſeveral perſons, very capable of judging and making good obſervations. The only difference we could diſtinguiſh, and that was ſcarcely perceptible, was in the ears, which we thought rather ſhorter in the middle rows than in the others; but as there was a greater quantity of them, we judged that theſe beds would yield the moſt grain.

“ We were not miſtaken; for their produce was as follows: the ten beds, ſown with ſix rows each, yielded ninety-one pounds of wheat more than ten beds ſown with three rows each. But as this reſult does not ſet the matter in a ſufficiently clear light, we muſt have recourſe to the following calculation. The ſix rowed beds took up more ground than thoſe which had but three rows: two beds more might have been made out of the ſurplus of their breadth; ſo that there would, in that caſe, have been twelve beds inſtead of ten. The queſtion therefore is, whether this ground, made into ten beds, produced more than it would have done if it had been made into twelve beds of three rows each. To which I anſwer, that it did produce thirty-eight pounds more; and that there was likewiſe a ſeventh part more ſtraw.

“ As this experiment deſerved to be repeated, I have tried it in a larger way. I have laid ſeveral acres out in beds of about ſeven feet wide: they are ſown with ſix rows: the plants are very fine, and I impatiently wait the event.

“ Though I have continued not to dung my fields, the plants ſtill grow very tall, and produce fine long ears, well filled with plump grain.

“ I am indebted to the New Huſbandry for the recovery and improvement of worn-out meadows. They have already yielded me plenty of fodder, the value of which ought to be added to the produce of the fields, becauſe the New Huſbandry is the immediate cauſe that manure can be ſpared to enrich thoſe meadows.

General Diſpoſition of the Lands for the Crop of 1754.

“ The more I have ſtudied the principles of the New Huſbandry, the more I have been convinced of the advantages attending it. My experiments have not only confirmed me in this opinion; but they have likewiſe ſhewed me, that my practice has been conſiſtent with thoſe principles. This made me determine to lay the whole of one of my farms out in the new way, as ſoon as I poſſibly could; its extent being no more than I can direct almoſt the whole culture of myſelf.

“ I have compleated it this year. All the fields, of which only half uſed to be ſowed every year in our old way, are now laid out in beds. I have ſowed them all, with a deſign to continue doing ſo for the future every year. They look exceeding well hitherto: the plants are extremely fine, and promiſe a greater crop next year, than that of the experiments of the foregoing years.

“ Theſe experiments have likewiſe made a ſtrong impreſſion on ſeveral perſons in this country, each of whom judged of the New Huſbandry, as his inclination, or proſpect of advantage, directed. It is true, our farmers are more generally inclined to ſow their lands in equally diſtant rows, with the drill-plough, than to lay them out in beds; the proper management of which, ſay they, is attended with much more care and trouble. My drill-plough is preferred on account of its ſimplicity. It began to be uſed laſt year, and numbers of fields near this city (Geneva) have been ſowed with it this year.

“ Several of our peaſants have likewiſe tried the drill-plough, and their example will be of conſequence hereafter. Their unwillingneſs to come into any new practice is well known: but this ſeems to get the better of their prejudices; and the proſpect they now have of greater crops than uſual, makes them regret their not having ſowed a larger extent of ground in this manner.

“ We have about an hundred and fifty acres ſowed in beds, and alſo near a thouſand ſowed in equally diſtant rows. Such large experiments, and made on different ſoils, cannot but afford new inſtruction: the facts will be better aſcertained, and people will be more thoroughly convinced that the greater product of the crops is owing to the New Huſbandry, and not to favourable circumſtances, to which they are too apt to impute it. Theſe experiments, ſay they, have been made on the very beſt ſoils; it is much eaſier to prepare two or three roods of ground, than an extent of ſeveral acres; theſe little ſpots have been cultivated with vaſt care; it is almoſt impoſſible to beſtow the ſame attention upon large tracts of land.—Luckily, ſeveral lovers of agriculture are making large experiments, which already prove, that the New Huſbandry may eaſily be practiſed in any extent of ground whatever.”

CONCLUSION.

“ Any one may now judge, by the experiments which have been made theſe laſt four years, and by the ſucceſs which has attended them, how far the principles of the New Huſbandry are juſtly founded, and how far we are in the right road to give ſtill farther demonſtrations of its excellence.

“ The lands on which it has been already practiſed, leave no room to doubt that all its operations may be performed with eaſe: and at the ſame time they prove to thoſe who ſhall be inclined to cultivate any part of their farms in the ſame way, that they may do it with equal advantage.

“ Convenient inſtruments for executing this culture are already invented and made. The uſe which has been, and ſtill is, made of them, ought to increaſe our confidence in them. It is by their means that the two moſt eſſential articles towards ſecuring ſucceſs, are obtained: the firſt is, the means of forming, ploughing, and cultivating the beds, with great eaſe and little expence: the ſecond, that of ſowing land more regularly, and of giving it the exact quantity of ſeed that may be thought moſt proper, by means of the drill-plough, which buries the ſeed at its proper depth in the furrows, covers it over, and, in ſhort, performs the whole buſineſs of ſowing, with great diſpatch, and a conſiderable ſaving of ſeed.

“ The chief obſtacles being now removed, we may reaſonably hope that the New Huſbandry will gain ground every year. Numbers of intelligent perſons, truly zealous for the public good, have ſeen how my lands were cultivated, and have been curious enough to be preſent at all the operations of this culture. They have frequently told me, that the public have not a right notion either of the New Huſbandry in general, or of the eaſe with which it is performed. They themſelves have wondered at it, and preſſed me to publiſh a circumſtantial account of the manner in which I have introduced this new method into our country, that they might alſo inſtruct their countrymen therein. I have yielded to their ſolicitations; and ſhall continue to communicate my farther obſervations in this fourth year of my practice of the New Huſbandry.”

EXPERIMENTS *made by* M. LULLIN de Chateauvieux, *in the Year* 1754.

“ My experiments in the year 1754, will afford a freſh proof of what I ſaid in my accounts of thoſe of the preceding years, viz. that land, by continuing to be cultivated in the new way, will become more and more fertile, and produce greater crops even in the ſecond or third year, than in the firſt; becauſe the earth will then be in a looſer ſtate, which is highly neceſſary in order to have plentiful productions.

“ This proof ought to be received with ſo much the more confidence, as the ſeaſons of the year 1754 were not favourable to the growth of corn. It was an extremely dry year; the earth had not the degree of moiſture which is neceſſary to promote the vegetation of plants; the wheat was in general very thin and low, and numbers of farmers did not reap above half the crop that the ſame lands had yielded them in 1752.

“ The wheat ſuffered great accidents early; for it was ruſted in October and November. 'Till then it was very ſtrong, and promiſed well; but afterwards, it turned yellow on a ſudden. The ruſt made a great progreſs. I met with places where the ground was entirely covered with the powder of this diſtemper. The vegetation of the plants before winter, was from that time nearly at a ſtand.

“ They were likewiſe hurt, and perhaps ſtill more, by the froſts which began again in March, and laſted till the 20th of that month. Theſe froſts rooted up prodigious numbers of plants of the wheat ſowed in the common way, which withered in a few days. Some fields ſuffered ſo much by this accident, that it became neceſſary to plough them anew, and to ſow them again with oats, or other ſpring corn.

“ To ſhew the reſult of my experiments more diſtinctly; I ſhall range them in the following order.

“ The firſt article will contain an account of three experiments made on lands laid out in beds, and which have borne a third and a fourth ſucceſſive crop; to which I ſhall add ſome remarks particularly relative thereto.

“ In the ſecond article, I ſhall relate four experiments which I made on lands formed into beds, which had borne a ſecond crop. Theſe too will be accompanied with ſome reflections.

“ The third article will give an account of three experiments made on lands formed into beds, which have borne a firſt crop, and of the manner in which I tilled them, in order to prepare them for ſowing. This will give riſe to ſeveral remarks.

“ The fourth article will inform the public of ſome other experiments made on lands laid out in beds, which have yielded a firſt and ſecond crop. This will be followed by ſome intereſting obſervations.

“ In the fifth article I ſhall relate ſeveral experiments made by divers lovers of agriculture, on lands ſowed in equally diſtant rows with the drill-plough.

“ The ſixth article will contain an account of the produce of ſeveral fields ſowed in equally diſtant rows, with the drill-plough.

“ In the ſeventh, I ſhall make ſome general obſervations on the experiments contained in the foregoing articles.

“ I ſhall ſpeak, in the eighth article, of the experiments which I have made on beds ſowed with ſix rows of wheat, and compare their produce with that of others, ſowed with only three rows. The reſult of this will enable us to judge how many rows it may be beſt to ſow.

“ In the ninth article, I ſhall give a circumſtantial detail of an experiment which I made in order to be more ſure of the beſt way of ſowing the beds; and to be able to determine more exactly, what quantity of ſeed is moſt likely to produce the greateſt crop.

“ Before I enter upon either of theſe ſubjects, it will be proper to obſerve, that I have not uſed any dung, or any ſort of manure, for my fields or beds; purpoſely to be the more certain of the effects of this new culture, and to ſee what land could do by mere dint of ſtirring it. My dung has been laid, as uſual, upon my graſs lands, where it continues to be of wonderful advantage.

“ I ſhall continue to reckon by the pound of ſixteen ounces.”

EXPERIMENTS *made on Lands formed into Beds, which have yielded a Third and a Fourth ſucceſſive Crop: with ſome Obſervations particularly relative thereto.*

EXPERIMENT, Numb. I.

N. B. This field is marked with the ſame number in the journals of 1751, 1752, and 1753; and is the ſpot on which I made my firſt experiments in 1751. This is the fourth ſucceſſive crop.

“ The ſmall ſpot of ground on which I made the experiment I am going to ſpeak of, being only a ſingle bed, 160 feet long and five feet wide, would not deſerve to be taken notice of in this account, were it not for a circumſtance extremely remarkable, and the more worthy of our attention, as the ſucceſs it was attended with, affords an unexpected and indiſputable proof of the fruitfulneſs which may be expected from land cultivated in the new way. If farmers will but continue it to the third or fourth year, they will then be ſure of having their ground in excellent tilth, well looſened and divided, and its pores properly opened, and exceedingly multiplied. That this will be the caſe, cannot be doubted. Yet ſome may perhaps be weary of cultivating their lands for ſo long a time, before they attain that perfection of culture, which we have all along declared to be neceſſary, in order to have great ſucceſs.

“ To prevent the diſguſt which might ariſe from ſo diſtant an expectation, and to encourage the lovers of the New Huſbandry, I ſhall obſerve, in the firſt place, that there are, in every country, conſiderable tracts of good land, which may be brought to a proper tilth in leſs time. I am, however, ſenſible how much the progreſs of the New Huſbandry would be promoted by the finding of ſome ſhorter way to break and looſen the earth, in ſoils of an inferior quality; and accordingly I have tried whether this cannot be done.

“ I have ſucceeded therein fully to my ſatisfaction; and can now ſay with certainty, that land may be brought to a ſufficiently looſe ſtate, even the firſt year, by ploughing it in the manner I ſhall explain in the third article, experiments VIII. IX. and X. the crops of which were very good.

“ The moſt certain and moſt inconteſtable principle of the New Huſbandry, is, that the earth muſt be thoroughly looſened by deep and frequent ploughings and repeated culture. In conſequence of this, I examined very carefully whether my lands were more looſened and rendered lighter by my manner of performing the operations of the New Huſbandry, than they were when cultivated in the common way. All my obſervations convinced me that they were.

“ The firſt glance of the eye ſhewed me, that the ſurface of the ground was ſmoother: on ſounding the ploughings, I found them deeper; leſs ſtrength was required to plough: two horſes, and ſometimes only one, or a ſingle ox, did with eaſe what would otherwiſe have required at leaſt double that number of cattle. A manifeſt proof that my lands were in excellent tilth.

“ If, after having thus examined the lands themſelves, I conſidered their productions, I had a freſh proof of their being brought to that ſtate of pulverization, in which alone plants can thrive well. My wheat was infinitely ſtronger than that in the common way; and, upon a minute examination, I found, that each plant had a greater quantity of roots, ſtronger, thicker, and much longer, than other wheat; and that the blades were broader and longer, and of a much deeper green. The plants had generally a great number of very thick and long ſtalks, which were crowned with large ears quite full of grain, and much heavier than thoſe of the wheat raiſed in the common way.

“ All theſe obſervations were ſufficient to convince me, that my lands were in the ſtate I wiſhed them to be; that is to ſay, that they were looſened and divided ſo as to be capable of yielding great productions.

“ It was therefore leſs to ſatisfy myſelf, than to give the public a farther proof of the excellence of the New Huſbandry, that I made the experiment I am now going to relate. It is an intereſting one in every reſpect; and I doubt not but that it will induce many others to make the like trial. I can aſſure them that they will find it well worth their while.

“ When the harveſt of 1753 was over, I immediately ſet about ploughing my fields, and forming the new beds that were to be ſowed. The year was a very dry one. I uſed frequently to walk, both over the beds, and over the fields cultivated in the common way, where the corn had likewiſe been lately cut down.

“ The firſt thing that ſtruck me in theſe walks was, the difference which I found in the ſtubble. That of the fields cultivated in the common way was ſo poor and weak, that it ſcarcely oppoſed the motion of my feet. That of the beds, on the contrary, reſiſted greatly: I often felt it break under my feet, and frequently met with tufts of twenty, thirty, forty, and ſometimes more ſtalks, which ſtopt me ſhort, like ſo many little buſhes.

“ I am the more particular in my account of this ſtubble, becauſe it ſhews the great ſtrength of the plants; which they would not have had if the earth had been leſs well prepared. Beſides, this ſtubble has its real uſe, as I ſhall ſhew elſewhere. It is a much better manure for land, than the common ſtubble.

" This obſervation led me to examine carefully what other differences I could find between the fields cultivated either way. The moſt important is, the ſtate of compreſſion which thoſe in the common way were in after harveſt. They offered nothing pleaſing or ſatisfactory to the eye; the earth was extremely hard, cloſe and compact; and its ſurface almoſt as firm as that of a beaten road.

" The fields in the new way, prepared by better ploughings made at proper ſeaſons, were, on the contrary, ſtill very light and ſoft in the middle of the beds, in the intervals between the rows of ſtubble. The earth gave way like ſand, when trod upon; and though it was very dry, I thruſt a ſtick of green willow eight or ten inches deep into it, with great eaſe, though I could not by any means puſh it at all into the land which had been cultivated in the common way. This plainly ſhews the better ſtate of the former.

" Laſtly, I compared theſe fields with thoſe that were in fallow, which had been ploughed, and were intended to be ſowed in autumn. I found the tops of the late reaped beds, in much better condition than the common fields which were under fallow. This made me immediately conclude, that theſe very beds might be ſowed again with ſucceſs, in the ſame places where the corn grew the year before, without ploughing them.

" I thought, however, that, if this trial did ſucceed, it would be owing, in ſome meaſure, to the culture of the alleys, and that this would fully prove their utility. This was another reaſon for my trying the experiment.

" It appears by this, that my chief deſign was to try whether the ſame ground could be ſowed, in the ſame place, two years running, without ploughing; and to ſee how ſtrong the plants would, in that caſe, be at harveſt.

" I was conſequently to avoid, in ſowing it, every thing that might ſupply the want of ploughing, and to ſtir only juſt ſo much earth as was abſolutely neceſſary in order to bury the ſeed. This conſideration prevented my uſing the drill-plough, the ſhare and harrow of which divide and looſen the earth perfectly well, as deep as the ſeed is planted.

" All that I did to this bed, was, barely to pull up the ſtubble, and afterwards draw a line with a ſtick, as if it had been for ſowing lettice. The ſeed was dropped by hand into three of theſe channels, and afterwards covered with a rake.

" Birds had done great damage to the wheat which I ſowed the year before in this ground. To avoid this accident now, I ſowed a kind of corn called ſpelt, which is uſed in many places inſtead of wheat. The Germans cultivate it greatly. The ſpelt which I ſowed is of a ſomewhat different kind. The grain of both ſorts is incloſed in double huſks, very thick, and of which the outer one does not open eaſily; ſo that birds cannot well pick out the grains.

" I ſowed this bed very thick, concluding that the plants would not branch much: and I ſowed it early, viz. on the nineteenth of July, becauſe this grain remains a whole year in the ground, from the time of ſowing till it is ripe. I uſed in all eleven ounces of ſeed, which ſoon ſprung up, and the plants made very ſtrong ſhoots; but I thought them too thick.

" As this ground had not been ploughed, I thought it was proper to aſſiſt the plants otherwiſe as early as I could. They were weeded on the twenty-ſecond of Auguſt.

" Theſe plants grew ſo extremely thick, that their blades covered the ground four feet round, before winter, in ſuch manner that the earth could not even be ſeen through them. The rows were from a foot to a foot and an half high, and the whole had already ſpindled, which made me ſorry I had ſowed ſo early; fearing leſt plants ſo forward before winter, as theſe were, ſhould be killed by the froſt; and, in order to ſecure ſome reſource in caſe that ſhould happen, I ordered part of the bed to be mowed on the ſixth of November, but did not touch the reſt. I muſt here obſerve by the way, that the part which was mowed had feweſt ſtalks at harveſt. At the ſame time I gave the alleys their firſt plouging before winter. Upon opening a furrow near the rows, I ſaw ſuch a prodigious quantity of long roots, interwoven as it were with one another, that I continued to hope well of the ſucceſs.

" Seeing, however, ſo many roots uncovered and expoſed to the air and froſt, I was tempted to fill the furrows up again, in order to preſerve them from it: but conſidering, that by leaving the furrows open, the part of the bed in which the plants were, and which had not been ploughed, would be much more expoſed to the froſt, which would then penetrate the earth through its ſurface, and through both ſides of the furrows, whereby it would be greatly divided, and perhaps meliorated more than by ploughing, I preferred leaving the furrows open, and have had no cauſe to repent it.

" I conſidered too, that ſuppoſing theſe roots expoſed to the air ſhould periſh, which was no more than I might reaſonably expect, the plants had other roots on their other ſide, which, ſtill remaining covered with earth, would be ſufficient to ſupply them with the neceſſary nouriſhment till ſpring.

" After winter, the ploughings were performed in proper weather, and the bed was weeded. I ſhall not repeat the detail of theſe operations, either here or in the following experiments. What I ſaid of them in the year 1753, may ſuffice, as they have not been varied ſince.

" The plants which I have been ſpeaking of, grew amazingly in thickneſs, height, and largeneſs of ears. They were reaped on the twenty-fifth of July, and yielded five hundred and forty ounces; which is forty-nine times the ſeed, and an ounce over. The birds did no damage at all. This is after the rate of 2041 pounds, or thirty-four buſhels to an acre, which is a good crop.

" This experiment amounts to a complete demonſtration of the ſuperiority of the New Huſbandry. It ſhews, beyond all doubt, how much the earth is more perfectly tilled by it, and that this tilth is laſting, if care be taken to preſerve it by good culture, performed at proper times, and with judgment.

" Can it be thought that a field cultivated in the old way, will, with only pulling up the ſtubble, and without ploughing it ſeveral times, even though it be harrowed, ever produce a crop of any corn whatever? Part of the ſeed might indeed ſhoot, and the plants might grow ſome inches high: but they would certainly periſh for want of nouriſhment, which they would not be able to draw from ſuch a ſoil, by reaſon of its extreme hardneſs: and conſequently they never would be able to produce any grain.

" It was of great importance to ſhew, by an unexceptionable experiment, that lands are brought to much better tilth by the New Huſbandry than by the old. This is now completely proved; and no doubt can any longer be made, that the conſequence we drew from it is equally certain; viz. that land ſo prepared, will produce more than lands which are cultivated in the common way. This fact, which is founded on the principles of ſound philoſophy, is likewiſe confirmed by repeated experience.

" The partiſans of both kinds of huſbandry will do well to conſider, that the great principle which we are endeavouring to inculcate, and on which almoſt the whole ſucceſs of the New Huſbandry depends, is admitted in the Old Huſbandry: viz. thoroughly to divide and looſen the earth. This principle is ſo generally received, that there is not a huſbandman who does not know that one ploughing more than ordinary does his land as much good as dunging it would do. His experience has certainly taught him, that this extraordinary ploughing produces him better crops: but he is not ſufficiently ſenſible, that, of all the ways of improving his land, no one is more effectual, or leſs expenſive than this. Were the full value of it known, it would be practiſed more: and every farmer would give all his lands at leaſt one ploughing extraordinary.

" What we propoſe, is therefore not a novelty capable of giving any huſbandman the leaſt diſlike to the New Huſbandry. We all proceed upon the ſame principle, and agree as to its effect. All of us ſay, the earth muſt be well divided and thoroughly looſened: but we differ in the manner of doing it. We propoſe a method by which the ground is much better prepared than in the old way. In this conſiſts all the novelty. Whoever rightly conſiders it, and compares it with the principles and experiments, will readily receive it; but he that is determined beforehand, not to enter into this examination, will never enjoy the benefits of it, but will continue plodding on in the old beaten track; not from reaſon, but becauſe others did ſo before him.

"The advantages of the New Huſbandry are however ſo great, that it would be doing the public an injury, not to endeavour to make them more and more known. The fitteſt way to anſwer this end, ſeems to be, to exhort all huſbandmen to convince themſelves, by ſtudying the theory of the New Huſbandry, weighing the ſolidity of its principles, and conſulting the experiments which have been already made.

"Every man of common underſtanding, cannot but ſucceed in the practical part; and his example being imitated by others, the New Huſbandry would ſoon become the general method."

EXPERIMENT, Numb. II.

N. B. This field is marked with the ſame number in the journals of 1752 and 1753.

For the crop of 1752, it was ſowed with eleven pounds four ounces of wheat, which yielded 1041 pounds twelve ounces.

For the crop of 1753, it was ſowed with thirty-four pounds fourteen ounces, which produced 1575 pounds.

For the crop of 1754, it was ſowed with ſixty-one pounds fourteen ounces, which yielded 1820 pounds.

"This field, which was to be ſowed for the third time, having been brought to a good tilth by former ploughings, I prepared it immediately after harveſt, by giving it a ploughing like that of the laſt year. I found that I had done right, in increaſing the quantity of the feed the ſecond year; and, upon examining the plants which the earth had nouriſhed, it ſeemed to me that it could yet bear a greater number, and that I might expect a ſtill greater crop, by adding to the feed.

"Accordingly, I ſowed it on the ſixteenth of Auguſt, with ſixty-one pounds fourteen ounces of very large and perfectly clean wheat, of my own growth. It was the ſame as I uſed for ſowing all my fields.

"The plants made a very conſiderable progreſs after winter, and ſhot up greatly, notwithſtanding the extraordinary drought. They began to ſpindle on the eighteenth of May; they bloſſomed on the firſt of June; and, being ripe, I cut them down on the tenth of July. They were threſhed a month after harveſt, and yielded 1820 pounds of perfectly clean wheat. Thus we ſee, that this field produced in 1754, 245 pounds more than in 1753, and 778 pounds four ounces more than in 1752."

EXPERIMENT, Numb. III.

N. B. This field is marked with the ſame number in the journal of 1753.

"This field, being now in much finer tilth than it was the laſt year, would certainly have produced a greater quantity of wheat. However, I reſolved to ſow it with a foreign wheat, by way of trial. I did ſo, and it yielded me ſcarce any crop at all.

"I thought it might be of great ſervice to try, whether wheat of a different quality from that which we uſually cultivate, would not yield more than even wheat of the growth of our own country. At all events it was right to make this trial, though the wheat which I uſed for it was by no means proper for ſowing in our lands. It was Sicilian wheat, the grain of which is very large and extremely hard. I ſowed it on the twenty-firſt of Auguſt. It roſe well; the plants grew very fine before winter, and were extremely thick. But this wheat, being doubtleſs of a much tenderer nature than our common wheat, could not reſiſt the winter's froſt, which almoſt entirely deſtroyed it. Only a few ſtrong plants eſcaped. Theſe grew exceeding fine, branched greatly, and produced very large ears, which contained more grains than thoſe of the wheat of our country. As the plants which ſurvived the froſt were very few, I reaped only about three times the ſeed."

Remarks on theſe Experiments.

"It is by experience that we can beſt judge how far the advantages aſcribed to the New Huſbandry are real. The foregoing experiments give riſe to two important obſervations.

"The firſt experiment ſhews us, that lands are brought to much better tilth by the New Huſbandry, and that they will conſequently produce much greater crops than in the old way. Experience proves, that they have done ſo.

"The ſecond experiment offers us the ſame proofs, but upon a much larger extent of ground. We have the products of three ſucceeding years, and the gradation of their crops. What ought to be particularly attended to here is, that as the internal pores of the earth became more open, the crops became more plentiful, which juſtifies what we ſaid before, that the crops of the ſecond, third, and following years, would be greater than that of the firſt.

"It was of great conſequence to eſtabliſh this fact, in order to found our calculations of the products upon certain and approved experiments. The following article will afford ſtill farther proofs of this truth."

Experiments made on Lands laid out in Beds, and which had borne a ſecond Crop. Reflections on theſe Experiments.

EXPERIMENT, Numb. IV.

N. B. This field is marked with the ſame number in the journal of 1753.

For the crop of 1753, it was ſowed with 181 pounds of wheat, which produced 3370 pounds.

For the crop of 1754, it was ſowed with 268 pounds fourteen ounces, which produced 4972 pounds eight ounces.

"I muſt remind the reader, that this field was ſowed in 1753, half in beds, and half in equally diſtant rows with the drill-plough. I will ſpeak firſt of the part that was laid out in beds, which continued to be cultivated in the ſame manner for the crop of 1754.

"The ploughings made during the year 1753, had the ſame effect upon this land, that is to ſay, they looſened and divided it. It was ploughed with eaſe after harveſt; and the new beds having been formed and well prepared, I ſowed them on the ſeventeenth and eighteenth of Auguſt, increaſing the quantity of the feed to 268 pounds fourteen ounces of wheat. The plants roſe well, and throve greatly before winter; and in the ſpring they made ſtrong ſhoots.

"The winter froſts, and perhaps ſome inſects too, had deſtroyed ſome plants in the rows. I ſaw plainly by this, that I had done right in increaſing the quantity of the feed. Though the year was dry and hot, the wheat grew to a great height, and ripened well. I reaped it between the tenth and fifteenth of July, and threſhed it out in the winter. This crop yielded me 4972 pounds eight ounces; ſo that I had this ſecond year 1602 pounds eight ounces more than the firſt.

"I ſhall ſhorten what I have to ſay of the other half of this field, which was ſowed in equally diſtant rows for the crop of 1753. After harveſt, I made it into beds. But how ſurpriſing was the difference between the mould of theſe two parts of the ſame field, even in this ſecond year! That which had been formed into beds, was fine and light; but this was ſcarcely divided at all; it was full of great hard clods, many of which it was neceſſary to break by hand. Though I had not much hope of its yielding any great crop, conſidering the condition it was in, I ſowed it on the twenty-ninth and thirty-firſt of Auguſt.

"Theſe beds were but poorly ſtocked with plants, which gathered little ſtrength before winter, and indeed always remained very weak and ſtinted, and, when reaped, yielded ſtill leſs than the other half of the field had done in 1753. But if I have not gained any thing by the crop, I have at leaſt brought my beds into ſuch tilth as aſſures me of a more plentiful harveſt in 1755."

EXPERIMENT, Numb. V.

N. B. This field is marked with the ſame number in the journal of 1753.

For the crop of 1753, it was ſowed with 139 pounds, which produced 2205 pounds.

For the crop of 1754, it was ſowed with 224 pounds of wheat, which produced 2283 pound.

"The ſoil of this field was of ſuch a nature, as rendered the looſening of it more difficult than that of the experiments Numb. II. and Numb. III. notwithſtanding the culture beſtowed upon it in the ſummer of 1753, which mended it greatly. Still it was not yet in the condition I could have wiſhed, when I ſowed it on the eighteenth and twentieth of Auguſt. I ſowed it thicker than it had ever been planted before, merely on account of the badneſs of its tilth. I beſtowed upon it 224 pounds of wheat, which roſe pretty well, but afforded fewer plants than that of the ſecond experiment. They branched tolerably, and their ears were very fine. I reaped this crop on the nineteenth and twentieth of July, and it yielded 2283 pounds of wheat, which is ſeventy-eight pounds more than the firſt crop in 1753."

EXPERIMENT, Numb. VI.

N. B. This field is marked with the ſame number in the journal of 1753.

For the crop of 1753, it was ſowed with forty-five pounds of wheat, which produced 724 pounds.

For the crop of 1754, it was ſowed with eighty-two pounds of wheat, which produced 798 pounds.

"What I ſaid of the foregoing experiment may likewiſe ſerve for this. All the circumſtances were alike, except that this field was ſowed a few days later, viz. on the twenty-ſeventh of Auguſt. It was reaped on the nineteenth of July, and yielded 798 pounds, which is ſeventy-four pounds more than in 1753."

EXPERIMENT, Numb. VII.

N. B. This field is marked with the ſame number in the journal of 1753.

For the crop of 1753, it was ſowed, as well in that part of it which was made into beds, as in that which was ſowed in equally diſtant rows, with 412 pounds of wheat, which produced 2646 pounds.

For the crop of 1754, the whole field was made into beds, and ſowed with 360 pounds, which produced 2467 pounds.

"It muſt be remembered, that one half of this field had borne a firſt crop, and the other a ſecond. From what I have already ſaid, it will be preſumed, that the mould of the new beds was not in ſo good condition as that of the others; conſequently the former could not be expected to yield ſo good a crop.

"This field was ſowed on the twenty-firſt and twenty-eighth of Auguſt. Its whole extent took up 360 pounds. of wheat, which yielded a crop of 2467 pounds. At firſt ſight, it ſeems to have yielded leſs now than in 1753; but it muſt be obſerved, that the beds of this field were of two different ages; thoſe which now bore their ſecond crop yielded more than in 1753; but as the ſheaves were not collected ſeparately, I cannot tell exactly the difference of their produce."

Reflections on the foregoing Experiments.

"I have now given an account of four fields, which produced their ſecond crops in 1754, all of which were greater than thoſe of 1753, and eſpecially that of the fourth experiment. I am fully ſatisfied, that their produce was proportioned to the preparation of the ſoil. This obſervation ſhews of what conſequence it is to divide and looſen the earth as much as poſſible, by deep ploughing, and thorough hoeing, in order to bring it to a perfect tilth, which may certainly be done, and that in a ſhort time, by the means which I ſhall point out in the following article.

"Neither our intereſt, nor the knowledge we would acquire of the products which the New Huſbandry is capable of yielding, ſuffer us to reſt ſatisfied with knowing, for example, what the crop of theſe four fields was the ſecond year, and looking upon that as the moſt they will ever produce. We ought likewiſe to examine, whether their crop was not diminiſhed by cauſes which we can account for, and which we may reaſonably hope will not take place in other years.

"By this examination we ſhall find, that the year was not a good one for great crops of wheat. There was not rain enough; the corn grew thin, and yielded but few ſheaves. The ears were indeed full of grain, but the quantity was not ſufficient to make amends for the thinneſs of the crop.

"The wheat was ruſted in autumn; and though this diſtemper ſhewed itſelf in that ſeaſon, in which I think it does the plants leaſt hurt, yet it prevented their branching, ſo much as they would otherwiſe have done the next ſpring. I obſerved exactly, that the thinneſt places were thoſe where the ruſt had prevailed moſt. Laſtly, the froſts which happened in March, did great damage to the wheat. It is therefore not to be wondered at, that the crop was not greater. I hope, and I flatter myſelf, not without foundation, that the ſame fields will produce better crops in years exempted from ſuch accidents.

"I do not pretend that the New Huſbandry can ſecure corn from the effects of all theſe accidents: but I have experienced that the crops cultivated in this manner have ſuffered leſs from the intemperature of the ſeaſons, than thoſe which have been raiſed in the common way: for inſtance, they will ſuffer leſs by a great drought, or even not be at all affected by it, if dews fall, which penetrate the well-looſened earth; as I have conſtantly obſerved: and beſides this, the roots of the corn in the new way, being much longer, will extend to a conſiderably greater depth in ground that has been ploughed deeper, and will find a moiſture there, which corn in the common way is deprived off."

EXPERIMENTS *made on Lands laid out in Beds which had borne a firſt Crop: with an Account of the Manner in which they were tilled, to prepare them for ſowing. Remarks on theſe Experiments.*

"The firſt crops of all my fields laid out in beds have hitherto been but ſmall. I eaſily diſcovered that this was owing to two principal cauſes, independent of the intemperature of the ſeaſons. The firſt was, that I ſowed too little ſeed at firſt, and that the quantity was not ſufficient to ſuſtain the accidents which befel my wheat, without being conſiderably diminiſhed thereby. This I remedied afterwards, by increaſing the quantity of the ſeed; which I have continued to do by little and little, from year to year, in proportion to the condition and quality of my land.

"The ſecond cauſe was the bad condition of my lands, which could not be ſufficiently looſened and divided in ſo ſhort a time, and therefore did not afford the plants the quantity of nouriſhment neceſſary to enable them to produce plenty of grain.

"I was in hopes that, by continuing my ploughings, I ſhould have better ſucceſs the following years: that is to ſay, that I ſhould bring my land to a looſer ſtate, and that if I gained that point, the crops would certainly be greater afterwards.

"Encouraged by this expectation, and provided with my plough and cultivators, I made no doubt of ſucceeding. To this end, I reſolved to multiply the ploughings: and certainly no one ought ever to heſitate ſo to do, even in the common huſbandry; ſo great have been the effects produced threby.

"I have often reflected on this paſſage in Mr. Duhamel's Treatiſe of the Culture of Land: One of the preſident Monteſquieu's farmers reaped a great crop of Spaniſh wheat, from his farm near Clairac, at a time when all his neighbours had very bad crops. The preſident aſked him, what he had done to have ſuch extraordinary ſucceſs. The farmer anſwered, that he had given his ground eleven ploughings between ſeed-time and harveſt; and that, by this means, it had reaped the benefit of all the rains, dews, fogs, &c. whilſt the lands of his neighbours were not at all bettered by them, on account of a dry hard cruſt which grew over their grounds, for want of ploughing. This obſervation agrees perfectly with the principles on which the New Huſbandry is founded.

“ This ſhews us that an active, intelligent, and induſtrious farmer, will always reap the fruit of his labour and expence. But without pretending to ſay that land ought to be ploughed quite ſo many times, we learn from this example, that it would be greatly for the public good, to plough it oftener than is generally practiſed.

“ I multiplied my ploughings, in the ſpring, and till ſeed-time. I gave my land ſix ploughings in all: but I aſcribe the great benefit which I received, chiefly to the manner in which thoſe ploughings were performed, and to which I beg the reader ſeriouſly to attend.

“ After the beds were formed, my method was this. I changed their poſition, by removing the middle of the beds to the place where the great furrow in the middle of the alley was before; or, to explain myſelf ſtill better, I then performed the ſame ploughing as we do after the firſt crop is reaped.

“ This operation is of ſuch importance, that it requires my being ſtill more explicit. I ſhall therefore relate the whole proceſs of the preparation of my land. In the firſt place, I ploughed it twice, as deep as I poſſibly could, in broad lands. The beds were formed at the third ploughing. I afterwards gave a fourth ploughing, to raiſe them ſtill higher, by opening the firſt furrow in the middle, or higheſt part of the beds, and turning the earth on both ſides up againſt that middle, by which means the beds were arched very high, and a great furrow was left in the middle of the alleys. I went farther yet; and this I ought to reckon as a ſeventh operation: I cut the great furrow in the middle of the alley ſtill deeper, with one turn of my cultivator with two mould-boards.

“ The beds thus prepared were certainly in excellent order for ſowing: I never had them in ſo good condition before: but I was willing to go ſtill farther, and that for the following reaſon.

“ I had obſerved, that there is always a greater depth of fine mould in the middle of the bed, when it is placed in the ſpace before occupied by the main furrow in the middle of the alley. My beds were not diſpoſed in this manner till the ſecond year.

“ I therefore thought it adviſeable to change the place of the beds, I did ſo, at the fifth ploughing, by filling up the great furrow, which now became the middle of the new bed. As the earth was in a very looſe ſtate, a great deal of it was heaped up by each turn of the plough, with eaſe to the horſes, and with ſpeed. The middle of the beds was raiſed as much as might have been thought neceſſary: but I raiſed it ſtill higher, at the ſixth and laſt ploughing, by cutting the firſt furrow in the middle of the bed, and turning the earth up from right and left towards it.

“ By theſe ploughings, the mould of the beds will be admirably well prepared even the firſt year, and the ſeed ſowed therein will not fail to vegetate very abundantly. It is by this means that I have brought the middle of my beds to the depth of fifteen or eighteen inches of fine looſe mould, in which the perpendicular roots of the plants extend themſelves, and multiply eaſily, and find plenty of nouriſhment, which they afterwards tranſmit to the plants themſelves.

“ I ſhall mention farther, as a proof of the fineneſs to which theſe ploughings brought the earth, that I was not obliged to harrow my beds before I ſowed them.

“ Some may perhaps object, that all this requires much labour, great trouble, and conſiderable expence: and how, will it be added, can one find time for ſo many ploughings?

“ To this I anſwer: firſt, that allowing all this to be true, the crop will make ample amends for it. What follows will eſtabliſh this truth beyond all doubt.

“ Secondly, that this labour ought not to diſcourage any one. The four firſt ploughings are abſolutely neceſſary, as all will agree: and the fifth and ſixth are performed with ſuch eaſe, and in ſo much leſs time than the common ploughings, and eſpecially the laſt, for which one horſe will generally be ſufficient, that it will eaſily be perceived I do not propoſe a thing either too difficult or too expenſive to execute.

“ The fields of the three experiments of this article, were prepared in the manner I have now related.

EXPERIMENT, Numb. VIII.

“ The ſoil of this field is very good and ſtrong. Its extent is one acre and twelve poles. I made the beds about ſix feet wide; and each bed was ſowed with two turns of the drill-plough, which were to make ſix rows: but the difficulty of guiding the plough ſo as to keep the three laſt rows exactly parallel to the three firſt, was ſo great, that the two middle rows were frequently jumbled together, ſo that there were in fact but five rows in ſome places. The ſpace which remained between the outer row of one bed, and the outer row of the next bed, left an alley wide enough to be ploughed. I muſt obſerve that our farmers hereabouts liked this way of ſowing much better than the firſt, in which I likewiſe made the beds ſix feet wide, and ſowed them with only three rows.

“ I ſowed each row a little thinner than in the former experiments: but as there were more of them in each bed, they would of courſe require a greater quantity of ſeed. This field was ſowed on the 27th of Auguſt, with ſeventy-ſix pounds eight ounces of wheat.

“ All my plants were equally fine till winter, and ſhot up with great vigour in the ſpring. They grew exceeding high, branched abundantly, and produced very large ears, among which there was but little difference. This crop was reaped on the 7th of July, and yielded 1462 pounds of wheat.

“ This produce made me good amends for the labour I had beſtowed upon the ground. It is after the rate of about 1500 pounds, or twenty-five buſhels to an acre.

EXPERIMENT, Numb. IX.

“ This field is of a very indifferent quality, and had hitherto yielded but ſmall crops. Its extent is four acres, three roods, eight poles, and nine feet. It was ſowed on the ſeventh and eighth of Auguſt, in the ſame manner as the former, with 249 pounds twelve ounces of wheat.

“ The young plants ſhot up as thick, and looked as ſtrong and of as good a colour, as thoſe of the foregoing experiment: but the ruſt took them all in October and November; and their blades, which were of the fineſt green before, turned yellow, and perfectly covered the ground with the powder of this ruſt. My plants ſuffered greatly by this accident. They branched imperfectly, and conſequently grew very thin. Their ſtalks were, however, long, and bore fine ears. They were reaped on the 8th of July, and yielded 2925 pounds of wheat.

EXPERIMENT, Numb. X.

“ The ſoil of this field is rather inferior, than equal to that of the field we ſpoke of laſt, whoſe fate it likewiſe ſuffered in every reſpect. The young plants were extremely fine, and, in October and November, they were ruſted almoſt as much as the others. This field contains three acres, three roods, and nine poles. As I thought this land inferior to the other, I ſowed it thicker; uſing to this end 294 pounds of wheat. It was ſowed on the 8th, 17th, and 28th of Auguſt; not being able to do it in any three days running. The crop yielded 3055 pounds.

Remarks on theſe EXPERIMENTS.

“ I have now been able to obtain better crops, even the firſt year, by the New Huſbandry, than any I ever had before. I think there can be no doubt but that this ſucceſs is owing firſt, and chiefly, to the better preparation of the ground; and ſecondly, to a proper increaſe of the ſeed. Upon the whole, I am inclined to think, that the ſowing each bed with two turns of the drill-plough increaſed the crop. But of that I ſay no more at preſent, as I intend to treat expreſsly of it in the eighth article.

“ All my obſervations ſhew, how much I am convinced of the importance of bringing the earth to a fine looſe ſtate: nor can I recommend it too ſtrongly. I have ſenſibly experienced the good effects of it in all my lands, and particularly in thoſe of the ninth and tenth experiments; for, though theſe fields are but of an indifferent quality, they have produced plants equal to thoſe of my very beſt lands.

" After what I have now ſaid, no one will be ſurpriſed that almoſt all my firſt crops were but ſmall, ſince moſt of the lands were ſown after a ſingle ploughing, which was not ſufficient to prepare them properly. I was indeed well appriſed of this defect at my firſt ſetting out: but all I then aimed at was, to lay all my fields into beds as ſoon as poſſible; being thoroughly ſatiſfied that it would not be long after, before I ſhould be able to bring them to a proper tilth, with great eaſe and little coſt.

" Theſe three experiments not only ſhew us how to conduct our works more profitably hereafter; but they likewiſe diſcover a new advantage in this huſbandry, which indeed I ſuſpected from my very firſt experiments. It is of importance to take notice of it here.

" All the experiments made by different perſons, and in different places, have ſhewn us, that wheat cultivated according to the New Huſbandry is very little apt to lodge; that the great ſtrength of its ſtalk ſupports it, and that it reſiſts the force of the wind much better than that which is raiſed after the common method, the ſtalks of which almoſt always give way in ſtormy weather.

" It muſt however be acknowledged, that the wheat of the new culture is not abſolutely able to reſiſt extremely violent winds accompanied with great rain. But would any one expect that the accident I am now going to ſpeaking of, far from hurting the wheat, ſeemed to me to be of great ſervice to it, particularly in very rainy years, or when cold dews fall about the time of its ripening?

" I obſerved, in the account of my experiments in 1752, that my wheat was not lodged; but that ſome of it was bent, without ſuffering any damage thereby. I added, that I imagined it might be of ſervice to the wheat not to remain always in an exactly perpendicular ſituation. I purpoſed watching cloſely what effect the ſituation of this would have. I could not be ſatiſfied in this in 1753; but the year 1754 furniſhed me with obſervations, and afforded me advantages with reſpect to the quality of wheat, which it is always of very great ſervice to know.

" Wheat grows and ſhoots up pretty perpendicularly, without altering this direction, unleſs it meets with ſome obſtacle. The moſt formidable is a violent wind, accompanied with great and heavy rains, which lodge it. Every one knows, that when wheat is lodged ſoon after it has done bloſſoming, it yields ſcarce any grain; and that what it does yield, is very ſmall and ſhrivelled, and contains very little flour: a manifeſt, and oftentimes very conſiderable loſs.

" The wheat which is only bent, continues to grow in that ſituation: its ears ſwell and fill equally with grain to the very point, abounding plentifully with good and very nouriſhing flour. Thus no loſs is ſuſtained in this caſe; and this inclined ſituation of the ſtalk does not at all interrupt the functions of the nutritive juices, as in wheat which is lodged. The growth of the plants in this ſituation proves plainly that their vegetation is not ſtopt.

" This bending of the ſtalks no way hinders a ſkilful and careful huſbandman from giving another ploughing, if it be neceſſary. I had it done in the field of the eighth experiment, without deſtroying or hurting a ſingle ear.

" All the beds of the three fields on which the experiments mentioned in this article were made, are in the ſame direction, viz. from eaſt to weſt, and lie ſomewhat ſloping towards the weſt. Soon after the wheat had done bloſſoming, a ſtrong ſouth wind blew for ſome hours, accompanied with a heavy rain, which made all the wheat of theſe three fields incline towards the north. It remained in this ſituation till harveſt, and the ſtalks grew ſo crooked that the points of the ears turned down towards the ground: they remained thus ſuſpended, by the ſtrength of the ſtalks, which ſeemed even to increaſe; for I did not find that they bent any more, though the weight of the ear increaſed as the grain grew riper.

" In this ſituation, this wheat continued to proſper: the ears filled with grain to the very point: they grew as large and heavy as thoſe of the other fields; and had beſides the advantage of being of a finer colour. This quality helps corn to ſell ſooner and more eaſily, becauſe the buyer judges by his ſight more than by his other ſenſes. It is of conſequence in all ſorts of goods, to catch the eye; but there is no fear of its deceiving one in the choice of wheat: the good colour of the grain is always a ſure ſign of its ſoundneſs, and invites the purchaſer to buy it with confidence.

" Since then there is no fear that any damage will ariſe from wheat's being bent, there is no cauſe to repine or be uneaſy at ſeeing it in that ſituation. But, beſides what I have been ſaying, I muſt now offer ſome reaſons why I think it may perhaps be better for wheat to be bent and curved in that manner, than for it to grow almoſt quite upright.

" Let us conſider what effect rain, the moiſture of the air, and dews have upon the ears of corn in both theſe ſituations. When the ears ſtand upright, and almoſt perpendicular, they retain a great deal of wet in rainy and dewy weather. This wet inſinuates itſelf very eaſily between the huſks which cover the grain, and gets even into the inſide of them. This water, thus got within them, remains there, and does not evaporate ſo eaſily as that which is only upon the outer ſurface of the huſks, which the motion of the air or the ſun diſſipates in a ſhort time.

" It may happen too, but I ſhall not give it as a fact which I have yet ſufficiently obſerved, that the water which has penetrated between the huſks, touches immediately the grain itſelf. Now this moiſture all around it, in whatever manner it gets there, muſt certainly be very prejudicial to the grain; and the longer it ſtays there, the more hurt it muſt do. We have ſeen ſuch continual rains in ſome years, that, for ſeveral days together, even the outſide of the ears could not be wiped dry, but they have remained wet ſo long, that the corn has ſprouted while it ſtood upon the ground. But, without ſuppoſing the miſchief to be always ſo great, wet, by remaining too long upon the grain, may, in ſome meaſure, ruſt it a little, as it ruſts ſtraw while ſtanding. I have ſeen this happen, though indeed but ſeldom.

" The imperfection which is often found in the quality of the grains, and their ſometimes leſs pleaſing taſte, may, with great probability, be imputed to this caſe: and perhaps it may be found upon ſtricter inquiries than thoſe I have hitherto been able to make, that the moiſture too long retained around the grain, towards the latter end of its growth, and particularly that of cold dews, is the real cauſe of the fatal and ſudden changes which often befall wheat in grain, a little before harveſt, and rob us of the beſt part of a crop which was juſt before thought to be quite out of danger.

" When the wheat is inclined, its ſtalks bent downwards arch-wiſe, and the point of the ears turned towards the ground, it is plain that no wet, either of rain or dews, can ſo eaſily get at the grain, and that only the outer ſurface of the huſks will be immediately touched by it: the water, not being able in this ſituation to glide in between the interſtices of the huſks, will drip down from one huſk to another till it comes to the point, and then will fall to the ground. Theſe huſks are ſoon dried again; and the ears which grow in this manner are much leſs expoſed to the conſequences of the wet, than thoſe which remain in a perpendicular ſituation; and conſequently their grain ought to be better conditioned.

" This advantage can be enjoyed only in the New Huſbandry; for in the old way, the wheat is either lodged quite flat, or ſtands quite upright; ſcarce any of its ſtalks are ſtrong enough to ſupport the ſmall weight of the ear, when bent and inclined towards the earth.

Experiments made on Lands laid out in Beds, which have borne a firſt and ſecond Crop, together with ſome intereſting Obſervations.

EXPERIMENT, Numb. XI.

" In the journal of 1753, I gave an account of the experiments which a perſon had made upon about twenty-eight acres laid out in beds about ſix feet wide, and which did not meet with the deſired ſucceſs. I added, that the ſame perſon, perſuaded nevertheleſs of the advantages of this culture, had prepared twenty-five acres more in the ſame manner, and that all of them were ſown for the crop of 1754.

“ All this ground was ploughed with care, and part of it was ſown earlier than the year before. Some little addition was likewiſe made to the quantity of the ſeed. The plants in general roſe extremely well, and were ſtrong and healthy before winter, in proportion to the time of their being ſown, and to the quality and condition of the land.

“ Such a beginning gave room to hope, that theſe fields would yield a pretty good crop; but the winter ruined all; and ſcarce any thing was reaped from ſo large an extent of ground.

Obſervations on this Experiment.

“ It would have been unfair in me not to mention this experiment, though it anſwered ſo badly. The reader may be ſurpriſed at firſt to ſee ſo great a contraſt between this and my own experiments, in which, notwithſtanding the intemperature of the ſeaſons, and other accidents, he finds the crops increaſe as the land becomes better tilled, according to the principles of the New Huſbandry. This increaſe was what we foretold would happen; but the field we are now ſpeaking of, produced leſs the ſecond year than it did the firſt, though even that was very little.

“ There muſt then neceſſarily have been ſome differences between theſe fields, to which this great diſparity of their corps was owing. Theſe differences doubtleſs were, either in the quality of the ſoils, the preparation of them, their expoſition, the quantity of the ſeed, the accidents that befel them, which might be greater or leſs in ſome than in others; or, in ſhort, many other cauſes capable of helping or hurting the crop; for otherwiſe, ſuppoſing all theſe things to be equal, or nearly ſo, the diſparity in their crops would not have been great.

“ Not to impute the bad ſucceſs of this laſt experiment too lightly to the New Huſbandry, we ought in juſtice to examine, whether it might not be owing to ſome other cauſe, and whether there may not be room to hope for better ſucceſs another time.

“ Theſe fields, without being all exactly of the ſame quality, are generally reputed, in the country, cold and ſtiff lands, and very apt to grow hard. Such lands will certainly require more time, more patience, and more perſeverance, to bring them to any degree of tilth; more ploughings will be neceſſary, and thoſe ploughings muſt be given in the moſt proper ſeaſons. By continuing to ſtir them well, their hardneſs and reſiſtance will be overcome, their pores will be opened and multiplied, and plants will then thrive in them as well as in the beſt of ſoils.

“ All lands ought to be treated according to their reſpective qualities. There is great reaſon to believe, that this field, when prepared as thoſe of the experiments Numb. VIII. IX. and X. were, will hereafter produce great plenty of corn. What I now ſay, is not mere conjecture. Repeated experiments, the effects of which have been conſtantly the ſame, have taught me, and I can ſafely affirm, that extremely bad lands, which could not ſo much as yield a crop that would pay the expence of tilling them, have been rendered good and fertile merely by ploughing, and without the aſſiſtance of any manure.

“ This is a ſtriking truth. It was what firſt determined me to practiſe the New Huſbandry; and therefore it was of conſequence to me to be certain of it. To this end, I reſolved to make a trial upon a ſmall ſpot of ground, which I knew to be incapable of producing any thing in its then ſtate.

“ Some years before I had dug away the earth three feet deep, from a ſpace of 360 feet ſquare. Nothing remained in it but a cloſe white clay, fit for potter's uſe. This ſpot, thus circumſtanced, ſeemed to me a proper one for my experiment. As the ſpace was too ſmall for the plough to work in, I made uſe of the ſpade and hoe. It was made into beds, which were afterwards ſown with wheat, and the ſpaces between them were frequently ſtirred. The firſt year my plants were very poor, and branched into only two, three, or four ſtalks apiece. The ſecond year they did much better; and the third year they were as large and fine as any my garden could have produced. This ſpot ſtill continues to produce equally well.

“ We have here a remarkable inſtance of what may be done by ſufficiently pulveriſing the earth: that which I am ſpeaking of is now like mould; and, which is very remarkable, it has loſt its former white colour, and now is black. Let us but do the ſame with any of our bad lands, and perſevere in ploughing and ſtirring them a ſufficient time, the ſucceſs will not be doubtful.

“ But to return to the ſubject of this article. Some of the fields we were ſpeaking of are ſurrounded by, or border upon woods. This ſituation is far from being good, and it ſeldom happens, but that ſuch a neighbourhood does great injury to the crops.

“ I could likewiſe have wiſhed, that a larger quantity of ſeed had been employed to ſow theſe fields. The loſs occaſioned by the froſt might have been leſſened thereby, as it may be preſumed that a greater number of plants would have eſcaped, if they had been thicker in the places where all of them were not intirely deſtroyed.

“ We obſerved before, that the young plants were in a fine condition before winter, and that they promiſed well: but the ſeverity of the froſts, doubtleſs too great for the condition and ſituation of theſe lands, did an irreparable injury to almoſt all theſe fields.

“ I examined the greateſt part of them in the beginning of the ſpring. Of all thoſe which I ſaw, I found but one ſpot, of three or four acres, where the earth was in the condition it ought to be, that is, well ſtirred and broken, looſe, light, and penetrable. Too few plants were left in this good ſpot: large ſpaces were quite empty in moſt of the rows: but thoſe which reſiſted grew very fine in the ſummer, branched extremely well, and bore fine ears.

“ By this one might gueſs what theſe lands were capable of. My opinion is, that, in other years, free from ſuch accidents, the rows will remain well ſtocked with plants, which, finding an equal plenty of nouriſhment, will be nearly of equal ſtrength and beauty in every part, and, altogether, will produce a conſiderable quantity of corn.

“ The other fields were infinitely worſe treated. Every thing was deſtroyed for ſeveral acres together. The plants were rooted up by the ſtrength of the froſt, and lay ſcattered upon the ground all along the rows, withered and unable to recover the leaſt vigour. Theſe are the only fields laid out in beds, in which I have ſeen this extraordinary accident; not a plant was rooted up any where elſe. It is very difficult not to ſuſpect, that there muſt have been ſome fault in the ſowing, and that the ſeed, perhaps, was not buried deep enough. The roots which were too near the ſurface of the earth, were nipped by the froſt. They muſt have been ſo, ſuppoſing them to be but about two inches deep. We likewiſe know, with certainty, that if the ſeed had been ſown in good time, the plants would have had roots above ſix inches long; and that ſuch roots would have ſecured them from being killed by the froſt. There is room therefore to believe, that the ſeed was not buried deep enough.

“ But even ſuppoſing the plants not to have been deſtroyed, I doubt whether they would have yielded a good crop, becauſe the ground, eſpecially that of the partitions between the rows, was extremely hard and cloſe, and therefore quite unfit to ſupply the plants with their neceſſary nouriſhment.

“ This experriment required theſe remarks: many more might be added; but theſe are ſufficient to ſhew, that ſome lands require a double portion of care and labour.

EXPERIMENT, Numb. XII.

“ The account of the ninth experiment in 1753, promiſed better ſucceſs the next year. The whole culture was performed by the ſame perſon, with great care and extraordinary judgment, in two fields, containing about ten acres. One of theſe fields is much better than the other; the beds were about ſix feet wide; one half of the worſt field was dunged; but not above a third part as much as it would have been in the common way. The ſoil of this field is very ſtiff. It had not been ploughed for fifteen or twenty years, and was not yet ſufficiently looſened and divided.

“ It was ſowed early: the plants roſe very well, but were greatly hurt by the froſt, excepting thoſe which the dung preſerved. The ſame thing happened to the beds which were ſown with ſix rows.

“ The ſoil of the other field is richer, and of a better quality. The winter did it little hurt. The plants throve by the culture which was given them, but leſs than was expected, owing, as is ſuppoſed, to the great drought of the ſeaſon. Theſe two fields produced, however, about 7000 pounds of wheat, which is extremely well, eſpecially for a firſt crop.

“ Theſe two fields have given us room to make two reflections: firſt, That the earth muſt be well prepared, without which the plants are not able to extend their roots to the ploughed part of the alleys. Secondly, That in dry ſprings, the plants of wheat preſerve one another mutually from the drought, for which reaſon it is proper to ſow ſomewhat more than would otherwiſe be neceſſary.

“ The ſame culture is now practiſed for the year 1755, and is extended to about fifteen acres more.

Experiment, Numb. XIII.

“ I mention this experiment on account of the faults committed by the huſbandman, in order that others may take care to avoid them. Near three acres of pretty well ploughed land, made into beds, produced only about 780 pounds of wheat the ſecond year.

“ The reaſons why this crop was ſo ſcanty are evident. In the firſt place, too little ſeed was ſowed; there ought to have been three times the quantity. Secondly, the beds were of an exceſſive breadth, all of them being eight or nine feet wide, and ſown with only three rows. By this means great part of the ground was loſt, which ought carefully to be avoided.

“ The ploughings too were made in a very ſlovenly manner; the huſbandman gave them, not when they were neceſſary, but when it ſuited his convenience. The reaſon was, that he was prejudiced againſt the New Huſbandry, and did not deſire to ſee it ſucceed.”

Experiments made by ſeveral Lovers of Agriculture, on Lands ſown in equally diſtant Rows with the Drill-plough.

“ Some of the principles of the New Huſbandry have been adopted in this way of ſowing; and even the common ploughing is now performed with more care than it was before the great advantage of thoroughly dividing and breaking the earth was ſo well known. This method of ſowing the land all over in equally diſtant rows, being, in appearance, eaſier and more ſimple than forming it into beds, has now a great number of partizans; and indeed the lands which have been ſown in this manner, have yielded much better crops than the fields cultivated in the old way.

Experiment, Numb. XIV.

“ It is pretty generally the cuſtom about Geneva, if the land is good, to ſow it in April, over the wheat, with clover ſeed, which yields a crop the next year. Agreeable to this cuſtom, a field of about three acres was ſowed with clover in April, 1752. In 1753, it yielded two crops of clover, after which the owner of the ground gave it three good ploughings in the common way. The clods which the plough had left, were broken by hand before the field was ſowed; for he was determined not to ſpare any pains to give it a good preparation.

“ About 630 pounds of wheat uſed generally to be employed to ſow this field; but it was now ſown on the fourteenth of September, with only 315 pounds. The earth was extremely dry, and the weather very hot, which it continued to be for ten days longer; circumſtances which ought to be attended to, and which it will be proper the reader ſhould remember when he comes to the continuation of this experiment in the ſeventh article.

“ This field was plentifully ſtocked with plants. They yielded 2926 pounds of wheat. In proportion to the produce of the other fields of the ſame farm, this would have yielded at moſt only between 18 and 1900 pounds: conſequently here is a gain of about 1026 pounds, beſides 315 pounds ſaved in the ſeed, which makes in all a profit of 1341 pounds.

Experiment, Numb. XV.

“ The ſame perſon who made the experiments Numb. VII. in 1752, and Numb. X. and XI. in 1753, continued them in compariſon with the Old Huſbandry. They anſwered as before, and the ſame advantages were again confirmed. A detail of the particulars would be needleſs. I ſhall only add, that barley, with which the experiment was likewiſe tried, anſwered much beyond any thing that was expected, and yielded a prodigious crop.

“ The farmer, convinced by ſuch ſucceſs, of the ſuperiority of the New Huſbandry over the Old, immediately deſired his landlord not to make any more experiments by way of compariſon, but to let him ſow all his lands with the drill-plough.

Experiment, Numb. XVI.

“ This experiment was made in the ſame farm where the XIII. and XIV. were made in 1753. All the lands were very well prepared, and ſowed with the drill-plough.

“ One of theſe fields, containing about four acres, which uſed to require 880 pounds of ſeed, was now ſowed with 315 pounds. The plants were extremely fine, both before and after winter, and, when reaped, yielded 4940 pounds of wheat. If it had been ſown in the common way, it could not have been expected to yield above 2900 or 3000 pounds; conſequently it now produced 1940 pounds more; to which if we add 565 pounds ſaved in the ſeed, we ſhall have 2505 pounds of wheat more by the new, than would have been obtained by the old huſbandry.

“ Another field, of an inferior quality, the extent of which is near nine acres, uſed, in the old way, to be ſown with 1764 pounds of wheat, and was now ſowed with only 819 pounds, which produced about 5720 pounds. Though the difference in the goodneſs of the lands is conſiderable, yet the drill-plough ſtill maintains it's ſuperiority: for, if this field had been ſowed in the common way, it would have been thought to have produced an exceeding good crop, if it had yielded between 5200 and 5300 pounds, though that would have been 420 pounds leſs than this, which, added to the 935 pounds ſaved in the ſeed, make this crop 1355 pounds greater than it would have been in the old way.

“ A ſmall ſpot, of about an acre and a quarter, which uſed commonly to be ſowed with 157 pounds of wheat, was ſowed with ſixty-three pounds, and produced about 430 pounds. This is nearly the ſame proportion as the foregoing experiment.

“ Theſe fields, being ſome better than others, may ſerve to ſhew what may be expected from lands of different qualities.

“ A piece of ground of thirty acres was likewiſe plowed with care. This, to have ſowed it in the old way, would have required about 6550 pounds of ſeed, which would have yielded at moſt 20000 pounds. I even think that I over-rate it in this.

“ Theſe thirty acres were ſown with 2772 pounds of wheat. Here is, in the firſt place, a ſaving of 3778 pounds in the ſeed, which is a very conſiderable object. The whole crop yielded about 19000 pounds, which added to the 3778 pounds ſaved in the ſeed, make 22778 pounds. The profit therefore is 2278 pounds more in the new way, than in the old.

“ To ſet this experiment in a yet clearer light, I ſhall add, that the ſheaves were ſtrong, the ſtraw fine, the grain very clean and plump, and that half theſe fields had ſuffered conſiderably by the froſts in March.

“ The produce of a few detached pieces of land might not have been ſufficient to perſuade the generality of mankind, ſo much as to adopt even this change, which conſiſts ſolely in the manner of ſowing the ground. They might ſtill think it imprudent to give up a certain profit for an uncertain one. It will therefore be proper to let them ſee, by the management of a whole farm, that this huſbandry may be practiſed to very great advantage. This will be ſhewn in the following article.

Experiment, Numb. XVII.

“ This experiment, which is a very conſiderable one, was executed on the ſame perſon's land, who made the experiment Numb. 12, in 1753. All the lands were ſown with the drill-plough. They were plowed four times, and a ſmall part of the whole was dunged. I cannot enter into all the details of this operation; but the general reſults, which we ſhall give, will be ſufficient.

“ The lands of which we are ſpeaking, compoſe three farms, ſituated in three different villages, about a mile and a half aſunder. Theſe lands are of different qualities; ſome ſtiff, others pretty light, others of a middling quality, and but little ſtony.

“ About 100 acres were cultivated in the firſt farm, forty in the ſecond, and forty likewiſe in the third. In all 180 acres.

		Pounds.	
The quantity of ſeed uſed in the common way, was,	For the firſt farm, ſowed in Auguſt and September	21420	of wheat
	For the ſecond farm, ſowed between the 1ſt and 15th of October	8190	
	For the third farm, ſowed between the 20th and 30th of October	8190	
	In all	37800	

		Pounds.	
The quantity of ſeed ſown with the drill-plough was,	For the firſt farm	8190	of wheat.
	For the ſecond farm	3276	
	For the third farm	3276	
	In all	14742	
	Saved in the ſeed	23058	
	Total	37800	

		Pounds.	
Crops in 1754.	Firſt farm	70200	of wheat.
	Second farm	22750	
	Third farm	15210	
	Total crop	108160	
	To which muſt be added the ſaving in the ſeed	23058	
	The whole profit is lb.	131218	of wheat.

“ It will be right to ſee now what the ſame extent of land might poſſibly have produced, if it had been cultivated in the old way. This can indeed only be gueſſed at, and I chuſe therein to favour the Old Huſbandry. According to the general run of this year's crops, theſe three farms would have produced, at moſt, about 95000, or 100000 pounds of wheat; which would conſequently have been 31218 pounds ſhort of what they yielded in the New Huſbandry.

“ This way of ſtating the account of the produce of both methods, is a fair one. The ſaving in the ſeed is always to be reckoned. But I have perceived, by the queſtions which ſeveral perſons have aſked me with regard to accounts thus ſtated, that they were not clearly underſtood. I ſhall therefore throw them into another form, which has been thought more diſtinct, but of which the reſults will ſtill be the ſame.

“ We will reckon only the real and actual produce, and then ſubſtract the ſeed: the remainder will conſequently be the neat produce.

New Method.

Total produce	108160 lb.
To be deducted for the ſeed	14742 lb.
Neat produce	93418 lb.

Old Method.

Total produce	100000 lb.
To be deducted for the ſeed	37800 lb.
Neat produce	62200 lb.
“ Therefore the new method produced more than the old would have done	31218 lb.
Proof	93418 lb.

“ Which reſult is the ſame as that of the other compariſon.

“ Are not ſuch advantages well worthy the attention of every one concerned in huſbandry?

Experiment, Numb. XVIII.

“ We ſaw by the fifteenth experiment in 1753, that the fields which I had ſowed, with the drill-plough, in equally diſtant rows, yielded very little corn. I mentioned the cauſes, which I knew. I have not yet had time to form them into beds, by which means I ſhall certainly remedy the too great coheſion of the ſoil, and without which thoſe lands will never yield any other than poor crops, as they have almoſt always done whilſt cultivated in the old way, which is infinitely leſs fit for lands that require a great deal of ſtirring, than for ſuch as are naturally fruitful.

“ I hope I ſhall be able to begin next year to practiſe the New Huſbandry in this farm. I ſhould have done it before now, if I could have made any ſtay there: but as I could not, I have only continued to ſow it with the drill-plough in equally diſtant rows.

“ I ſhall mention another ſmall farm, on which no dung or any other kind of manure was uſed, though it's lands, at leaſt the greateſt part of them, are but very indifferent.

“ I ſowed theſe lands towards the end of Auguſt and the beginning of September, in pretty hot and dry weather. The whole extent of this little farm is between twenty-two and twenty-three acres, which uſed to take up 4662 pounds of ſeed: but only 1950 pounds were employed now.

“ Some places looked well enough: but in general the wheat came up thin. I was however very well ſatisfied with my crop, which yielded about 13000 pounds of exceeding fine wheat, ſo clean that it wanted no ſifting. If I had not ſowed with the drill-plough, I ſhould ſcarcely have reaped more than barely the ſeed: for that was the caſe with all my neighbours, who had only about their ſeed and half as much over; and many of their crops yielded ſtill leſs. It is not to be ſuppoſed that I ſhould have fared better than them, if I had followed the old way, as they did.”

Summary Accounts of the Products of ſeveral Pieces of Land ſowed in equally diſtant Rows with the Drill-Plough.

Experiment, Numb. XIX.

“ As nothing but a great number of experiments, repeated under different circumſtances and in different places, can convince many of the advantages of the new huſbandry; I am the more readily induced to mention all that have come to my knowledge; though there are among them ſeveral of which I have not been able to get ſo particular a detail as I could have wiſhed: all that has been told me in relation to many of them being, that thoſe who made them were well ſatisfied with the crops they had obtained by means of the drill-plough, and that they intended to continue uſing it: but the following experiments will merit the reader's attention.

“ The lands I am going to ſpeak of are ſituated in a diſtrict of near thirty ſquare miles, and there are great differences in their qualities and ſituations; they were not all plowed with equal care: ſome of them were dunged, and others were not; and laſtly, the drought was greater in ſome places than in others. Notwithſtanding all theſe diverſities, it will appear from what we are going to ſay, that the uſe of the drill-plough was every where attended with uncommon ſucceſs.

" To ſhorten, and at the ſame time give the reader a full view of the purport of this article, I have drawn up a table of the extent of the ſeveral pieces of land, the quantity of ſeed uſed for ſowing them in the old way, the quantity they were ſown with in the New Huſbandry, and their produce in this laſt culture. Though theſe experiments are not related ſo exactly as my own, I am ſure there is no miſtake of any conſequence in them.

" I ſhould have been very glad to have known likewiſe the exact products of the crops in the old way. I have done all I could to come at the knowledge of them, but have obtained only very few ſatisfactory accounts. All that I have been able to learn, amounts only to a confirmation of what I found in my accounts of the culture and produce of my own eſtate; of which an exact account has been kept for about forty years paſt. Beyond that time, my papers furniſh me with only the produce of now and then a year, but not of any number of years together. Theſe detached hints have however afforded me ſome curious and uſeful knowledge. For example, I have learnt by them, that the produce of land was the ſame in the laſt age as it is in this. In the year 1668, which is the fartheſt back that any of my papers take notice of, I find that the crops were like thoſe which the ſame lands have yielded for theſe laſt thirty or forty years.

" All my inquiries have ſhewn me that, in this country, in what are reckoned good years, the lands yield but three times the ſeed; ſeldom more, and often leſs. Some few fields indeed muſt be excepted, which, being of a very extraordinary goodneſs, do produce more: and likewiſe, on the other hand, ſome very bad lands which do not yield ſo much: ſo that, upon the whole, this may be reckoned the medium crop during any number of years.

" The neat produce does not by any means amount to the whole of the crop, in the common huſbandry: for the good grain is frequently ſo mixed with bad, and with the ſeeds of weeds, that it ſuffers a conſiderable diminution thereby. The quantity of perfect grain is therefore what ought to be conſidered: and in this many are apt to deceive themſelves. Whenever people become ſenſible of the ſmall advantage of the common huſbandry, they will be more ready to attend to what is ſaid in favour of the new, and will be inclined to verify it by their own experience. When ſo convinced, they will endeavour to overcome the diſlike which moſt farmers have to this new method. They are, in general, a ſet of men, fit only to execute what they are bid to do; and therefore ought to be directed by perſons of better underſtanding. Patience and perſeverance may by degrees induce them to practiſe the New Huſbandry, which time will bring to its greateſt perfection.

" The following table will help to ſtrengthen theſe reflections."

TABLE.

Of the Extent, Sowing, and Crops of different Pieces of Land in 1754.

Extent.	Quantity of ſeed in the old way.	Quantity of ſeed in the new way.	Crops.
Acres.	Pounds.	Pounds.	Pounds.
2	336	168	1560
2	356	180	1230
4¼	882	392	2360
1¼	252	130	650
4¼	882	346	2275
3½	672	283	2080
9½	2016	670	6110
5	1008	485	4680
1	190	95	1040
2½	504	230	2520
4¼	819	390	3120
1¾	315	140	975
2¾	694	300	2340
Tot. 44	8926	3809	30940

General Reflections and Obſervations on the EXPERIMENTS *contained in the foregoing Account.*

" After all theſe experiments, I aſk myſelf, whether they are ſufficient to give us a ſatisfactory demonſtration that the New Huſbandry is more profitable than the Old? I anſwer, without heſitation, that it certainly is more profitable, both to the public, and to each individual, whether the lands be cultivated in beds, or whether they are only ſowed in equally diſtant rows, with the drill-plough.

" Such will likewiſe be the anſwer to this queſtion, if the reſult of theſe different experiments be conſidered. In the firſt place, we have thoſe of each field in particular; in the next, we have thoſe of ſome whole farms; and laſtly, we have thoſe contained in the table of the ſixth article, to which laſt I ſhall now limit my reflections.

" We may look upon the produce of forty-four acres ſpread up and down a diſtrict of near thirty ſquare miles, amounting all together to 30940 pounds of wheat, as the medium produce of the generality of lands. I ſhall therefore not dwell upon the produce of each of theſe fields taken ſeparately, but only conſider now, that forty-four acres yielded 30940 pounds of wheat.

" If theſe forty-four acres had been cultivated in the old way, they certainly would not have produced ſo much, ſince we have ſeen that the medium produce is but three times the ſeed; and I am ſatisfied that it would have been leſs in this year 1754. However, I will ſuppoſe the crop to have yielded three times the quantity of the ſeed. Theſe forty-four acres, ſown with 8926 pounds of wheat, would then have produced 26778 pounds; deducting from which 8926 pounds for the ſeed, the neat produce will be reduced to 17852 pounds.

" The forty-four acres ſown with the drill-plough yielded 30940 pounds, from which we are to deduct 3839 pounds, which was all the ſeed that was ſown. The neat produce will then be reduced to 27131 pounds, which is 9279 pounds more than would have been produced in the old way.

" The owners or farmers of theſe forty-four acres had therefore 9279 pounds of corn more. They reaped the firſt benefit of this gain, and the public the next, as ſo much more corn was carried to market than would otherwiſe have been. Such an advantage is very conſiderable, and deſerves the utmoſt attention of the public, whom we invite to conſider it in a more extenſive light. The object will thereby become the more intereſting.

" Let us but conſider how much more corn the whole of this ſpace of thirty ſquare miles would have produced, if all the arable lands in it had been ſown with the drill-plough: how much more grain would it not have afforded for the nouriſhment of the people! what increaſe of income to every individual concerned therein! and how ſure a way to guard againſt future dearths!

" But this is not yet all. Much greater advantages will ſtill reſult from the cultivating of lands entirely in the new way: I mean, by laying them out in beds, and obſerving all the practices of the New Huſbandry. This I proved plainly in my journal of 1753. This demonſtration is fully confirmed by the experiments of 1754, the products of which were greater, and their reſults ſtill more favourable to the new method.

" What has been already ſaid on this important ſubject, ſhews, what the neceſſary operations are, how eaſily they may be performed, and which are the points that merit moſt attention. The theory of the New Huſbandry is now fully proved by experiments; and that great principle, the neceſſity of preparing the earth well by proper ſtirrings, ſo clearly demonſtrated, that it would be needleſs to inſiſt any longer on it.

" But the ſowing of the land, which is of the utmoſt importance to the ſucceſs of the crops, depends greatly on the time and ſeaſon when it is performed, and the care with which it is done. We ſhall therefore give ſome obſervations on that head.

" The three moſt eſſential things which conſtitute a good ſowing, ſeem to me to be, next to the proper preparation of the earth, firſt, the time of ſowing; ſecondly, the choice of the ſeed; and thirdly, the due temperature of the ſeaſon, with reſpect to heat or cold, drought or wet; all which greatly influence the ſtate of the earth.

“ With regard to the time of ſowing, I ſay, it is better to ſow early, than too late, provided the ſeaſon will admit of it. The plants are better able to reſiſt the ſeverity of the winter, after they have acquired a certain degree of ſtrength. There have been years in which fields ſown very late, for inſtance in December, have done extremely well: but that ought not to be made a general rule; experience ſhewing, that ſuch late ſowings very ſeldom anſwer.

“ By too early ſowing, the corn is equally expoſed to other dangers. The ſtalks which ſhoot up before winter cannot well bear hard froſts, which would do no hurt to the wheat when but in blades. I obſerved, in the two laſt years, 1753 and 1754, that the firſt ſown wheat, which was attacked by the ruſt in autumn, was much more hurt by it than any other. Therefore I think the beſt time for ſowing, in ſuch a climate as Geneva, is, from the 20th of Auguſt, to the end of September. If, however, it ſhould not be practicable to ſow all the lands within that time, the firſt fortnight in October may likewiſe be taken in: but I would not adviſe this, except in a caſe of neceſſity. If all the land ſhould not be ſown within that time, I think one might expect a better crop by deferring to ſow it till ſpring. What I have been ſaying is more particularly applicable to land laid out in beds.

“ The ſame rules by which I judge of the proper time of ſowing here, may eaſily be adapted to other climates, in ſome of which the land will require being ſown earlier, and in others later.

“ The choice of the ſeed is the ſecond thing, which to me ſeems to require more particular care than many may perhaps imagine. Every one certainly endeavours to chooſe the beſt wheat he can for ſeed; and it ought likewiſe to be very clean. Such corn is not difficult to be had, when reaped off the beds cultivated in our way.

“ Though wheat ſo green that it had ſcarce loſt its milky quality, ſprouted pretty well when I tried the experiment with it; I think it is more proper to ſow none but what is thoroughly ripe. The ſeed has then attained its full perfection; and it is from that ripeneſs that we may moſt certainly expect the moſt vigorous plants.

“ The wheat that has been reaped in a warm dry year, ſeems to me fitter for ſowing, than that which has been gathered in a cold wet year: for in ſuch a ſeaſon, all the productions of the earth are leſs good; their taſte is leſs ſavoury; and as that wheat in particular in which there is moſt moiſture is moſt difficult to keep, I infer from thence that the formation of its grain muſt be leſs perfect. I ſhould therefore prefer wheat a year old, provided the year it was gathered in was warm and dry, to that which may have juſt been gathered in too rainy a ſeaſon. Accordingly, I always chooſe for ſowing, wheat of the growth of my high lands, rather than that which has been produced in flats.

“ The benefit accruing from all this care, may, perhaps, not be extremely great; but at the ſame time it coſts nothing. Let us do in agriculture what is done in all manufactures: the very ſmalleſt profits, the very leaſt ſavings, are never neglected. Thoſe ſmall articles, often repeated, make large ſums in the long run, and are a real profit.

“ There is another thing of greater conſequence, and of which I ſtrongly recommend the practice. It will not be attended with any expence. It is, by repeated experiments, always attended with the ſame ſucceſs, that I have found it to be extremely ſerviceable to the firſt ſprouting of the ſeed. Chance firſt made it known to me.

“ I have often ſowed, purely to try what wheat was fitteſt for ſowing. I commonly ſowed wheat taken from the heap in the granary. I likewiſe frequently ſowed wheat picked out of the ears the moment before I ſowed it. I counted the grains of both ſorts exactly. Would any one think there could be any difference in the productions of theſe grains? yet I found a conſiderable one: what was picked out of the ears always roſe extremely well; ſcarce a grain of it ever miſſed: whereas numbers of thoſe which were taken from the heap, never ſprouted at all. I did not perceive this difference at firſt; but at laſt it ſtruck me. I relate the fact as it is, without pretending to account for the cauſe of this difference, which would lead me into too long a digreſſion. The experiment itſelf may be of real uſe. It ſhews us, that inſtead of threſhing the wheat intended for ſeed at any time, without diſtinction, it ought not to be threſhed till a very few days, at moſt two or three, before it is ſowed. A few hands will be able to ſupply the ſeedſmen with as much as they will want. This will not be attended with any ſort of expence, and may be the means of ſaving ſomewhat in the ſeed.

“ Perhaps, too, this practice may be attended with a very valuable advantage. I have not, indeed, yet made the trials neceſſary to ſatisfy myſelf of the reality of what I imagine: but my deſire to be of ſervice to the public induces me to mention it, that the lovers of agriculture may reflect upon it, and try ſuch experiments as will clear up my conjectures.

“ Threſhing the ſeed only juſt before it is ſowed, may poſſibly, in ſome meaſure, or perhaps entirely, prevent the firſt cauſe of the diſtemper called *ſmut*. By this I mean, that the ſeed which has not been mixed with ſmutty wheat, or any infected by its black powder, will be exempt from this diſtemper. Not that I take that black powder to be abſolutely the original cauſe of this diſtemper; but I believe it very capable of communicating it to grains otherwiſe ſound.

“ I wiſh that the multiplicity of my occupations may permit me to endeavour to clear up this matter, and to purſue my obſervations. If I can be ſo happy as to make any uſeful diſcoveries, I ſhall communicate them to the public.

“ That nothing may be neglected which can be of any ſervice to the ſeed, great care ought, in my opinion, to be taken in threſhing it, eſpecially in the manner which is commonly practiſed with flails upon the barn floor, or by trampling it with horſes. In either of theſe ways, a great number of grains are ſo bruiſed and hurt, that it is impoſſible they ſhould ever grow. If the wheat intended for ſeed be not thoroughly dry and hard, the miſchief is ſtill greater; much more of it being then abſolutely cruſhed by the flail.

“ As the New Huſbandry requires much leſs ſeed, it will be the eaſier to execute an operation which might be too long and troubleſome to practiſe for ſo great a quantity as is uſed in the old way.

“ The method which I adviſe, and which I myſelf have practiſed, is this: let one or two beams, two feet and an half, or three feet thick, be laid acroſs the barn floor: let the threſhers ſtand at each ſide of the beam, with a looſe ſheaf of wheat behind every man, from which he will take a handful at a time, and give it two or three ſtrokes againſt the beam: this will bring out a great deal of grain, which is to be reſerved for ſeed. Theſe ears may be bundled up again, and afterwards threſhed out with the flail for other uſes.

“ This method is not ſo tedious as ſome may imagine: we are ſure that not a grain is bruiſed; the corns drop very readily out of the ears, eſpecially of wheat that has grown in beds: the great ſize of the grain helps to open the huſks, and thoſe are the moſt perfect grains which drop out in this manner. I think I may compare this operation with what is done in the making of wine. The firſt running is always the higheſt flavoured and beſt.

“ Though the proper time for ſowing be come, the corn ought not to be put into the earth, if the temperature of the ſeaſon is not favourable. It ought, on the contrary, to be deferred in hopes of a change. If the weather is very hot, and the earth extremely dry, there will be an abſolute neceſſity of waiting till ſome rain has fallen. Without this precaution, the ſeed will riſe but very imperfectly. I am ſure of it, by ſeveral experiments which I have made, and which contradict a common ſaying of our farmers, that the earth is the beſt granary to keep corn. Full of this notion, whenever the ſtated time comes round, they ſow, without diſtinction, in wet or dry land: even heat does not hinder them: they think their ſeed will certainly ſprout well after the firſt rain: but I have always experienced that the plants have come up thin.

" I tried an experiment purpoſely to ſatisfy myſelf, whether one can ſow with ſucceſs when the weather is very hot, and the earth very dry. Upon reading Mr. Duhamel du Monceau's excellent treatiſe on the Preſervation of Corn, I obſerved, that he had found by his experiments, that wheat which had been dried in a ſtove, heated to ſixty degrees of M. de Reaumur's thermometer, had loſt its faculty of growing.

" From thence I conjectured, that wheat which ſhould undergo a heat, for example, of thirty degrees, during a longer time, would be equally parched up, and rendered incapable of vegetating. I conſidered the earth, when hot and dry, as a kind of ſtove, in which the ſeed, if it remained too long, without receiving any moiſture, may become ſo dry, that the greateſt part of it will never be able to ſprout. I thought this reaſoning juſt, and therefore determined, in order fully to ſatisfy myſelf, to have recourſe to that truſty guide, experience.

" On the eighteenth of July 1754, at four o'clock in the afternoon, I placed M. de Reaumur's thermometer two inches deep in the ground, and ſcreened it from the immediate impreſſion of the rays of the ſun. The liquor roſe to the thirty-firſt degree, which ſhewed me the heat of the earth.

" The thermometer being afterwards expoſed to the ſun, the liquor roſe to thirty-ſix degrees.

" On the ſame day I ſowed eighty grains of wheat in this ground. The heat continued nearly the ſame during the reſt of that month, and almoſt all Auguſt. On the thirty-firſt of July, only ten grains had ſhot up, and on the ſixteenth of Auguſt there were in all ſixteen; after which, not one more roſe: conſequently ſixty-four grains out of the eighty never ſprouted at all.

" On the twenty-eighth of July I ſowed fifty grains. Only four of them roſe by the ſixteenth of Auguſt, and not one after. Here were again forty-ſix grains which did not grow at all.

" On the ſame day I ſowed ſixty grains in another place. On the ſixteenth of Auguſt only ſix grains had ſprouted, and not one plant more ever appeared after: conſequently here too were fifty-four grains which never grew. All theſe grains were ſown in my garden, in exceeding good mould.

" I was ſure that the wheat which I ſowed was perfectly ſound, and in every reſpect capable of growing. It was therefore quite clear, that ſo great a number of grains out of the whole, which did not ſprout at all, had loſt the faculty of growing, by their being parched up by the heat and dryneſs of the earth. To be ſtill more certain of this, three weeks after I had ſown theſe grains, I watered half of them ſeveral times, but to no purpoſe; not one of them roſe, and I found ſeveral of them quite whole in the earth where I ſowed them.

" After this experiment, on the eleventh of Auguſt I ſuſpended the ſowings which I had begun on the eighth, and did not reſume them till the twenty-ſixth, after ſome rain which fell on the twenty-ſecond and twenty-third. Theſe laſt ſowings roſe much better than the firſt.

" Thus it is, that experience and obſervation teach us to leave off bad cuſtoms, or ſuch as are not founded on principles with which a man of ſenſe can reſt ſatisfied.

" Whenever the produce of the fields on which my experiments were tried, is conſidered, it ought always to be remembered, that I uſed no dung on any of thoſe lands, and that they received no other improvement than what was owing to a better preparation of the earth, only by ſtirring it. Thoſe who chooſe to have recourſe to dung, will probably reap greater crops: with an hundred loads, they may dung three times more land than is done in the common way; for the dung ſhould be ſpread very thin, if one would have it be of any ſervice. By ſpreading it too thick, I believe the plants would grow too rank, and be apt to be lodged.

" The New Huſbandry ſupplies the want of dung, not only by ſtirring the earth, and not overburdening it with too many plants, but likewiſe by the ſtrong thick ſtubble it produces, which affords a moſt excellent manure, attended with no expence. It lies ready upon the ſpot; the ploughing of the earth buries it; and as it is a long time in rotting, it helps to keep the ſoil looſe and light, and is repeated every year. I have found ſtubble almoſt whole at a year's end; and have ſeen ſome not quite conſumed at the end of two years.

" But can we be ſure that this manure is of any conſequence or real advantage? After what I have already ſeen of its effects, I will venture to ſay, that it contributes greatly to increaſe the productions of the earth. I have very often plucked up plants remarkable for their beauty, and have frequently found their roots interwoven with tufts of ſtubble, which ſhewed me the cauſe of their extraordinary growth. I ſhall ſoon have more poſitive proofs of this, by the experiments which I am now making to clear up this point."

Experiments *made on Beds ſown with ſix Rows of Wheat: Compariſon of their Produce, with that of Beds ſown with only three Rows; and ſome Inquiry concerning the Number of Rows which it is beſt to ſow.*

" In the journal of 1753, Article VII. I gave an account of my ſucceſs in ſowing beds with two turns of the drill-plough, in order to have ſix rows of wheat. It anſwered ſo well, that I thought there could be no hazard in ſowing a larger extent of ground in the ſame manner.

" This experiment ſucceeded equally well this year. I ſhall not enter into a detail of it, becauſe that would be only a repetition of what I ſaid on this ſubject in 1753. As to the reſult, the reader will recollect, that the ſame ground made into beds wide enough to be ſown with two turns of the drill-plough, which make ſix rows, produced more corn than if it had been ſown in beds with only one bout of the drill-plough, which would have made but three rows.

" With regard to the quantity of the products of the crops of 1753 and 1754, compared together, I have found that the ſix rowed beds produced this year very nearly the ſame as they did in 1753; excepting the field of the experiment, No. VIII. which yielded about half as much again as the year before.

" Notwithſtanding the profit which I found in theſe experiments, repeated two years running, I do not think it adviſable to enlarge the number of rows to ſo many as ſix. Five will, in my opinion, be very ſufficient; and they may be made with one bout of the drill-plough, by giving it five ſhares, which is very eaſily done. This number of rows will be a proper medium between ſix and three.

" Sowing in five rows will not, however, do in all ſorts of land. I believe it ſhould be practiſed in none but good ſoils, and that middling lands ſhould continue to be ſown with three rows at moſt.

" I ſhould add farther, with reſpect to good lands, that they ought not to be ſown with five rows, till after they have been thoroughly well ſtirred; and, above all, not till after the main furrow in the middle of the bed has been cut extremely deep, in order that the roots of the middle row, which is the moſt diſtant from the ploughed alleys, may find a ſufficient depth of mould immediately under them, to ſupply them with their neceſſary nouriſhment.

" But at the ſame time that a proviſion is made for the nouriſhment of the plants, care muſt be taken not to loſe too much ground, by making the alleys wider than they need be. My experiments have determined me to make my beds, for the future, about ſix feet wide. By leaving ſeven inches diſtance between each row, the five rows will take up about two feet four inches, and there will remain three feet eight inches for the breadth of the alleys. This ſpace is ſufficient for the plough or cultivator to work in with eaſe."

Experiment *made in order to know which is the moſt profitable Way of ſowing the Beds, and to aſcertain more preciſely the Quantity of Seed proper to be uſed, in order to have the greateſt Crop.*

" The above title divides it naturally into two parts, which I ſhall treat ſeparately.

" It is of great conſequence to know which is the moſt profitable way of ſowing the beds; I mean, that by which they will be ſtocked with a proper number of plants: for when too much ſeed is ſown, the plants hurt one another;

ther; and when too little, the earth is not enabled to produce ſo much as it is capable of doing.

"The buſineſs therefore is, to determine what number of plants would be moſt advantageous. Fortunately, the difference is wide enough between the too great, and the too ſmall number; and the produce of the crops cannot be diminiſhed but by an exceſs one way or the other.

"But whatever certainty we may acquire with reſpect to this intereſting point, we cannot flatter ourſelves that we ſhall always be able to keep to it in our practice. The various accidents to which corn is liable, from the hour of its being ſown till it is reaped, will always fruſtrate the methodical arrangement which we may have intended to give the plants.

"The difficulty of ſucceeding in this inquiry ought not however to diſcourage us; for it would be attended with ſuch advantages, as would make very ample amends for all the labour beſtowed upon it. Let us then have recourſe to experiments. Thoſe that are made with this view, will never be quite uſeleſs. If they do not lead us to the very thing we are in ſearch of, they may at leaſt diſcover to us others which may be of ſervice.

"According to our principles, the diſtances between plants ought to be equal throughout the whole length of the rows, that all of them may have an equal quantity of earth from which to draw their nouriſhment.

"Several experiments have ſhewn, that ſix inches is not too great a diſtance for the plants to be at from each other. In this caſe, it would be ſufficient to ſow one grain of wheat at every ſixth inch. According to this diſpoſition, a field well prepared ought to produce the greateſt crop. The plants will very commonly branch out ſo as to have twenty, thirty, or forty ſtalks: I have had ſome with upwards of eighty. It is pity that this exact diſtribution of the ſeed cannot ſubſiſt long. The accidents which I met with, ſoon convinced me, that it was neceſſary to increaſe the quantity of the ſeed, and that very conſiderably.

"However, this does not yet hinder me from thinking, that if any eaſy method could be found, to have a plant of wheat exactly at every ſix inches diſtance in rows, it would be the beſt way of ſowing. I have often conſidered how this could be reduced to practice, as well to ſatiſfy my curioſity, as that I might be the better able to proceed in my operations. When a theory is known to be good, one is ſtrongly encouraged to draw all poſſible advantages from it for the practical part: one then proceeds with confidence and pleaſure.

"Experience having convinced me that it never would be poſſible to have a plant at every ſix inches in each row, by ſowing only a ſingle grain of wheat at thoſe diſtances; it naturally followed, that the way to have the ground better covered with plants was, to ſow more grains. The next queſtion was, how many grains ſhould be ſown in each place: ſhould it be two, three, or more? Experience only could clear this doubt. I therefore tried the following experiment. I ſowed a different number of grains in cluſters, ſix inches diſtant from each other, putting one grain in the firſt, two in the ſecond, and ſo on to the ſixth, which had ſix grains: then I began again, and went on as before, till the whole length of the row was ſowed in this manner. The produce of each cluſter was to ſhew me whether it would be beſt to double, triple, or quadruple the feed, which it was plain had been ſown too thin, when only a ſingle grain was dropt at every ſix inches.

"The winter of 1753 was already far advanced when theſe thoughts firſt occurred to me. It was then too late to try this experiment with wheat: but, that I might not loſe a year, I did it in the ſpring with barley, not doubting but that corn, which is uſually ſowed in March, might furniſh me with ſome uſeful hints for the culture of that which remains longer in the ground.

"Accordingly, on the ninth of April, 1754, I ordered another bed to be ſowed with barley, in my preſence, and in the manner I have juſt related. I counted all the grains of each cluſter myſelf. They were ſown in three rows. I varied the experiment in the row next to the ſouth, by ſowing no cluſters there of leſs than three, four, five, or ſix grains; and this I continued during the whole length of that row. At harveſt, all the cluſters in which ſeveral grains had been ſown, were ſo thick, that they touched one another.

"What is of moſt conſequence to our culture, is, to know the produce of each cluſter. I ſhall only add, that the cluſters, as they are here ranged under their reſpective numbers, occupied forty feet in length, and that the beds were five feet wide.

RESULTS.

"The ſouth row,
ſowed with 6, 5, 4, and 3 grains,
produced 661, 624, 447, and 493 ſtalks.
In all 2225 ſtalks.

"The middle row,
ſowed with 1, 2, 3, 4, 5, and 6 grains,
produced 48, 72, 147, 204, 219, and 487 ſtalks.
In all 1177 ſtalks.

"The north row,
ſowed with 6, 5, 4, 3, 2, and 1 grains,
produced 502, 372, 345, 276, 200, and 92 ſtalks,
In all 1787 ſtalks.

"Conſequently the whole number of ſtalks in the three rows was 5189. They yielded ſeventeen pounds of grain, beſides a great quantity that was ſhed in reaping.

"On the footing of this crop, an acre would contain at leaſt forty-four beds five feet wide, which was the breadth of the bed on which this experiment was made. The beds would be 222 feet long: the produce of one of them would be ninety-three pounds eight ounces, and that of the 44, 4138 pounds eight ounces; that is to ſay, near nine quarters to the acre: a very conſiderable crop; and which might be carried ſtill much farther by other experiments of this kind, as we ſhall ſoon ſee.

REMARKS.

"The following obſervations deſerve the reader's utmoſt attention. Firſt, By this experiment, I have very near effected what I aimed at, viz. to have two or more plants grow ſo cloſe together as to ſeem but one; and that at ſix inches diſtant from each other. If the three rows had been joined together lengthways, they would have been 120 feet long, and ought to have contained but 240 plants: but the diſtances, which were marked by gueſs, not being exactly ſix inches each, ninety-ſix cluſters were ſown in each row, which made ſixteen cluſters over and above. By this means, ſeveral of them were nearer than ſix inches to each other.

"Two hundred and eighty-eight cluſters were ſown, all of which produced plants, except twenty-five which did not ſprout, or of which the plants periſhed. This deficiency is not very conſiderable: but we muſt obſerve, 1. That almoſt all the places where this happened had been ſown with only one or two grains of wheat: 2. That it was in the middle row that the greateſt number of plants was wanting: 3. That the ſouth row, in which the ſmalleſt quantity ſown for any one tuft was three grains, furniſhed and retained its full number of plants: and laſtly, that almoſt all thoſe which were next to the vacant ſpaces, were ſtronger than the reſt, and thereby made amends for the loſs of the others.

"Secondly, The whole number of the ſtalks amounted to 5189, which is after the rate of forty-three ſtalks and a quarter to a foot: but it is much more conſiderable in the ſouth row, which having produced in all 2225 ſtalks, the proportion is fifty-five and a half to a foot. The cauſe of this difference is eaſily ſeen. The expoſition of that row to the ſouth, being more favourable than that of the others, may have contributed thereto; but it is very plain that it was chiefly owing to this farther circumſtance, that none of the cluſters in that row were ſown with ſo few as one or two grains.

"Thirdly, We ſee that the increaſe of the ſtalks was, in general, in proportion to that of the ſeed; only the cluſters which were ſown with three grains in the ſouth row, produced forty-ſix ſtalks more than thoſe which were ſown with four grains; but ſtill the general reſult of the three rows remains exactly in the ſame progreſſion, as appears by the following

“ RECAPITULATION.

Stalks produced by	1 grain — —	140
— — — —	2 gr. — —	272
— — — —	3 gr. — —	916
— — — —	4 gr. — —	996
— — — —	5 gr. — —	1215
— — — —	6 gr. — —	1650
	Total	5189

“ Fourthly, The ears were nearly equal, at leaſt in two thirds of the length of the rows: the other third ſurpaſſed the reſt, as will appear by the following extract of the twelve firſt numbers of the ſouth row.

Numb. 1	— produced —	87 ſtalks.
2	— — — —	122
3	— — — —	91
4	— — — —	99
5	— — — —	82
6	— — — —	66
7	— — — —	78
8	— — — —	100
9	— — — —	87
10	— — — —	116
11	— — — —	148
12	— — — —	68

“ Fifthly, The difference between the produce of the cluſters ſown with one and with ſix grains, is extremely great. The former produced but 140 ſtalks; the others multiplied to 1650. It is true that the number of the cluſters of ſix grains is greateſt; which is ſome diminution of the difference.

“ Sixthly, I obſerved ſeveral ſtalks from which others had ſhot out, all as ſtrong, and as long, as thoſe from which they derived their origin. They proceeded from the firſt joint above the ſurface of the earth, generally at the heighth of three, four, or five inches; and were two, three, and ſometimes four in number. I never perceived this kind of tillering before; but had, till then, always obſerved it to be at the neck, or point of ſeparation between the roots which deſcend, and the ſtalks which aſcend, that the plants branched out.

“ Seventhly, I ſuſpected, in the ſummer, what was the cauſe of the great vigour of the plants of this experiment: but I ſaw it much plainer after harveſt: for, upon pulling up ſome of the tufts of ſtubble, I found their roots innumerable. This fact is ſtrictly true. I could not count them upon any one plant that had more than fifteen or twenty ſtalks. Theſe roots were in ſuch bundles, and ſo confuſedly interwoven one with another, that, after counting ſeveral hundreds of them, I was forced to give up the taſk. Their length and thickneſs was anſwerable to their number.

“ I muſt now remind the reader of what I ſaid before, that the ſeveral accidents which I met with in my firſt experiments ſhewed me it was neceſſary to increaſe the quantity of the ſeed. I did ſo, by ſmall degrees, from year to year. It was equally important for the ſucceſs of the new culture, not to run into another extreme by loading the earth with more plants than it can nouriſh: the crop would be conſiderably diminiſhed thereby.

“ It appears by this experiment, that the cluſters which were ſown with ſix grains did not hurt one another: on the contrary, their being ſown in that manner proved an advantage, ſince they produced much more than the others: from whence it follows, that one may, without danger, extend the quantity of the ſeed beyond the limits of the principles of the New Huſbandry. The principles themſelves are not the leſs true; though the farmer is at liberty to uſe his own diſcretion in the application of them, according to the nature of his ſoil.

“ Thoſe principles, which ſuppoſe that every plant is to ſubſiſt till harveſt, reduce the ſeed to a very ſmall quantity: but numbers of accidents deſtroy many of them. Our reaſon ought conſequently to tell us, that, without deviating too much from the principles which we adopt, we may, and ſhould, judiciouſly ſtock our land with a ſufficient number of plants, in order to guard againſt unavoidable accidents.

“ Still I may be aſked, what is that ſufficient quantity? I anſwer, that our experiment ſhews that ſowing ſix grains together in a cluſter, from ſix to ſix inches, all the length of the rows, will not be found too thick. By following this rule, one may be almoſt certain that the whole ground will be ſtocked with a proper number of plants. However, this is to be looked upon only as a general propoſition, from which it will often be very proper to deviate in the circumſtances we are going to mention:

“ When the ſowing ſeaſon is favourable.
“ When the land is well prepared.
“ In countries where the winter ſeldom is ſevere.
“ When the land is but little liable to inſects.
“ When the land is not in danger of being hurt by too much drought, or too much wet. And laſtly,
“ When the land is good and very fertile.

“ In all theſe, and other ſuch like caſes, leſs ſeed ſhould be ſown; and, in the contrary caſes, more. Prudence, and a careful ſtudy of the nature of the ſoil, ought to be our guides. Two or three years experience will be ſufficient to ſhew us the practice which will anſwer beſt.

“ It will be right to repeat our laſt mentioned experiment, and even to vary it. In all probability it will afford us ſtill greater lights. It will be right, for example, to ſow the cluſters with a greater number of grains, beginning with ſix, the produce of which is known, and going on to ſeven, eight, and even more, always in cluſters, till one comes to a number at which the crop ceaſes to yield an equal profit. By this means the two extremes, either of too much or too little ſeed may be known; and the juſt proportion will then eaſily be determined.

“ Some farther alterations may likewiſe be made in this experiment. For example, I placed the grains in the earth ſo that they touched one another. I will try to place them at ſome little diſtance from each other, and to range them in a kind of circle, of about three inches diameter. It is reaſonable to think, that the plants may make a greater progreſs then, as they will not have all one common centre: ſome of them will be nearer to the ploughed alley; their roots will reach it more eaſily than before; and will multiply there, which may render the plants more vigorous.

General Diſpoſition for the farther Progreſs of the New Huſbandry, and particularly for the Crop of 1755.

“ It is with uncommmon ſatisfaction that we ſee the trials of the New Huſbandry multiply daily. A great number of intelligent perſons have ſown part of their lands in equally diſtant rows, with the drill-plough, for the next harveſt. We have already ſeveral farms, and among them ſome conſiderable ones, in the neighbourhood of Geneva, which are no longer ſown any other way.

“ It is much to ſee this new method thus readily entered into. Thoſe who follow it, will ſoon begin to take a pleaſure in calculating, and will be curious to compare the new crops with the old. Theſe calculations will inſenſibly lead to others, on the produce of lands laid out in beds. They will ſee, that there can be no hazard in making a few trials. Thus it is, that ſeveral have been determined to cultivate ſome of their lands this year in beds.

“ That theſe arguments ſhould have their full weight with men capable of reaſoning, is not to be wondered at: but I confeſs I have been agreeably ſurpriſed, to find this conviction extend to people who can ſeldom be prevailed upon to leave their beaten track. Some peaſants in theſe parts ſent a meſſenger this winter to tell me, that they began to have a good opinion of my method; that they were aſtoniſhed at the beauty of my young plants, the like to which they had never ſeen before; and that, if they continued to do well, and met with no accident, I ought to have a prodigious crop. After this preamble, he continued, ſaying, that he was directed to beg of me to

give

him the particulars of my experiments; for that ſeveral of his neighbours had agreed to meet, in order to read them over in the winter, and to make their little reflections upon them. He concluded with adding; "I believe we ſhall all agree to ſow in equally diſtant rows with the drill-plough; and perhaps too we may, by and by, lay our lands out in beds."

"This conduct of the peaſants ſeemed to me ſenſible and prudent. I gave them the experiments of 1753, and ſent them word, that both my advice and my drill plough were at their ſervice; and that it ſhould not coſt them any thing, if they choſe to make a trial of it. They have been well ſatisfied with what they have read, and ſeem diſpoſed to accept of my offers.

"I have experienced this year, more than ever, the facility with which lands are cultivated in the new way. No part of the farm where I ſome time make a little ſtay, is any longer cultivated after the old method. The moſt troubleſome part is now over: my lands were ſown in a favourable ſeaſon; the plants roſe extremely well, and flouriſhed perfectly till the beginning of winter; but the ſeverity of the froſts has proved fatal to many parts of my fields, and will certainly be a detriment to my crops."

Continuation of M. De Chateuvieux's *Experiments in the Years* 1755 *and* 1756.

"My lands were cultivated in 1755, in the ſame manner as in the preceding years; I therefore ſhall not enter into any detail upon that ſubject. When I ſowed my fields, they were well prepared to receive the ſeed; the ſpring was pretty kindly; and towards the end of autumn my corn was very fine, excepting ſome ſpots that were attacked with the ruſt ſo early as the tenth of November: other places, in which the plants were ſtrong and healthy, promiſed a moſt plentiful crop; and though it was greatly diminiſhed by the winter's froſt, it proved, upon the whole, ſufficient to confirm the advantages of the New Huſbandry, which have been already proved in my former accounts.

"The winter of the year 1754, was extremely ſevere. The froſt, which was exceſſively intenſe, laſted a long time, and killed a prodigious number of plants: thoſe that reſiſted it loſt ſome of the branches they had ſhot out in the autumn before, and the plants ſo weakened branched but little in the ſpring. The evil would have been infinitely greater, if the ground had chanced to be full of water, when thoſe exceeding hard froſts came on; but luckily it was not very wet.

This winter was followed by a very dry ſpring, uncommonly hot, and conſequently unfit to recover the corn. The ſummer, in which there was ſcarce any rain or dew, but very frequently ſultry ſcorching heats, exhauſted the plants in ſeveral fields. I was not ſurpriſed at it. The ſeaſons were extremely unfavourable to the productions of the earth; and, to add to the misfortune, a vaſt quantity of worms did likewiſe conſiderable damage to the corn.

"However, my wheat roſe; the ſtraw was pretty near as long as in the preceding years, and the ears were well filled with grain. The ploughings had been well performed, which kept the earth in a ſtate of moiſture; leſs indeed than in 1754, becauſe but very little dew fell in 1755.

"The wheat cultivated in the old way yielded but few ſheaves: the ſtraw was ſhort; the ears were very full of grain; and, in general, the quality of the corn was excellent.

"There was room to expect good ſucceſs from the lands that were ſown in 1755, for the crop of 1756. The young plants roſe extremely well, the ground had been properly prepared, and had the degree of moiſture neceſſary to promote their growth.

"Though ſome ſlight froſts were felt towards the latter end of October, they did not prevent the growth of the corn, the cold abating from the twelfth of November, to the end of that month. M. de Reaumur's thermometer was, during that time, at from ſix to eight degrees above the freezing point. At the ſame time we had pretty frequent, and often plentiful ſhowers of rain.

"The corn was in very good condition at the beginning of the winter, during which there was ſcarce any froſt, excepting the ten firſt days of December, when the thermometer fell to about ſix degrees below the freezing point. During the months of January and February, it was pretty conſtantly above the freezing point: we had little ſnow, but pretty frequent rains.

"The ſpring and ſummer of 1756 having been extremely rainy, and the earth too much ſoaked thereby, the plants were poor, and the ſummer ploughings could not be performed. For this reaſon, I could give ſeveral of my fields but one ſtirring, and others had two. I would not plough whilſt the earth was ſo very wet: for that would only have hardened, and, as it were, kneaded it; and I judged that ſuch bad ploughings would have been equally prejudicial to the corn then growing, and to the preparation of the fallow for the next ſowing. I found afterwards, that I had done right.

"It could not be but expected, that ſo unfavourable a ſeaſon would prove fatal to the corn. I had obſerved during all the month of April, in which there was not any froſt, and the thermometer was from five to ſeven degrees above the freezing point, and towards the end of that month from nine to twelve degrees, that the corn made but little progreſs, and grew yellow. The diſtemper continuing to increaſe, I perceived in May, that the corn was attacked with what we call the rickets. The bad ſtate of the roots of theſe plants, the colour of their blades turned to a blueiſh green, and yellow at the point, left no room to doubt what ailed them; and from that time it was eaſy to foreſee that the crop would certainly be ſcanty, not only on account of the ſmallneſs of the number of ſtalks which the plants had produced, but alſo becauſe their ears would have but little grain.

"In June the healthy plants throve greatly: the ſtraw grew long; but yet the ſheaves did not yield ſo much grain as in the foregoing years by about a fifth part, as nearly as I could judge. The corn was very fine and very clean; and had it not been for this accident, I am confident that the crop would have been very plentiful.

"I did not ſee any one field exempt from this diſtemper. Exceeding fine corn, cultivated in the old way, was totally infected with it; and the ſheaves in general yielded but about half the quantity of grain that they uſually do in good years. Theſe grains were very ſmall, and mixed with a great many ſeeds of weeds.

"Theſe general notions are neceſſary, in order to form a right judgment of the reſult of my experiment, which I ſhall relate in the following order.

"The firſt article will comprehend the experiments which I made upon all the fields I laid out in beds, the laſt of which now bore their third crop. I have diſtinguiſhed them by the ſame numbers as in the former years, and ſhall add to each of them the particular obſervations which relate immediately to it.

"The ſecond article will ſhew the produce of the lands ſown in equally diſtant rows with the drill-plough. I ſhall make ſome reflections upon the uſefulneſs of this practice, which is certainly alway preferable to the common way of ſowing.

EXPERIMENTS *made on Fields laid out in Beds, the laſt made of which have borne three ſucceſſive Crops. Theſe Fields are diſtinguiſhed by the ſame Numbers as in the foregoing Years. Obſervations relating particularly to each Experiment.*

EXPERIMENT, Numb. I.

Year 1755.

N. B. This was made on the ſame piece of ground as my firſt experiment in 1751: and this year's crop was the ſixth, without any interruption.

"I gave a very full account, in the ninth article of the year 1754, of the experiment I made in order to be the better able to judge which is the moſt profitable way of ſowing the beds, and to determine what quality of ſeed is moſt proper to ſow, in order to have the greateſt crop; and this I called, ſowing in cluſters, at the diſtance of ſix inches from the centre of the one to that of the other. I ſhall only remind the reader here, that the ſpot of ground which was ſowed in cluſters with barley in the ſpring, was part of a bed, forty feet long, and that the produce of the grain was ſeventeen pounds weight, beſides a conſiderable quantity which was ſhed in reaping.

" This experiment, which deſerved to be repeated, was tried again the ſame year, and upon the ſame ground which I had ſowed with barley. This laſt grain being reaped, I ſowed the ſame bed with wheat on the twenty-third of September following: but it is to be obſerved, that I did not plough this ſpot after the barley was off, but only plucked up the ſtubble, and made three channels, into which the ſeed was dropped by hand in cluſters ſix inches aſunder.

" As the cluſters ſown with ſix grains, in the experiment of 1754, were thoſe which produced the moſt ſtalks and grains, I ſowed all the cluſters now with at leaſt ſix grains, ſome with ſeven, and others with eight, keeping all the grains at ſome little diſtance from each other. The bed forty feet long contained eighty-three cluſters in each row, which were ſown with two ounces ſix penny-weights of wheat.

" The plants came up very well: I ſpared no pains to cultivate them; they throve wonderfully till harveſt; their blades, ſtalks, ears, and grains, were very fine; and I preſerved them from the birds with a net; but as I would not reap them till they were thoroughly ripe, a great deal was ſhed in cutting them down, and they yielded me but twenty-eight pounds of corn.

OBSERVATIONS.

" This experiment is a farther confirmation of the reſult of the firſt which was made in 1754, viz. that ſix grains are not too great a number to be ſown in a cluſter, ſix inches diſtant from the next cluſter. I had not leiſure to count the ſtalks which each cluſter produced; but the twenty-eight pounds of corn which they yielded, ſeemed to be a ſufficient proof.

" The circumſtance of not ploughing the bed before it was ſowed, confirms the advantages of preparing land according to the New Huſbandry.

" I ſaid, that the ſtubble was plucked up, in order to prepare the bed for being ſown. This ſhewed me how much ſtubble helps to enrich land.

" When this bed was ſowed, and the corn ſprung up, I ordered the furrows which were made before winter, next to the outward rows, to be opened for about half the length of the bed, and the ſtubble to be put into them, and covered over with earth: conſequently it was laid in the ground which was cultivated, and in that part of it where the plants were to extend their roots. As the quantity of roots collected there was pretty great, I concluded that the effect of the ſtubble ought to be much more viſible in that place, than it can be in fields where the ploughman buries it as chance directs. In effect, that part of the bed became much finer than the reſt; the plants produced a greater number of ſtalks; and there is no room to doubt, that the ſtubble was an excellent manure.

Year 1756. Numb. I.

" I propoſed to continue ſowing this bed in cluſters, and to increaſe the quantity of the ſeed, in order to ſee what the effect would be: but, in hopes of better ſucceſs, I gave up the thoughts I once had of reaping a third crop from this bed without ploughing it.

" After one ploughing, I ſowed it on the ſixteenth of September, 1755, in three rows of ninety-three cluſters in each row, and ten or fifteen grains in each cluſter; and, in order to place them with ſome kind of regularity, I made uſe of an iron hoop, about three inches in diameter, which was laid upon the ground at each ſpot intended to be ſowed, and the grains were dropt at nearly equal diſtances, ſome round the inſide, and ſome in the middle of this circle. Each cluſter was ſowed in this manner. The ſpace from one center to another, was about five inches. The ſeed was covered over lightly with a rake, and the quantity employed in this operation was five ounces twelve penny-weights.

" This wheat was always very fine from its firſt riſing till harveſt. It was reaped on the thirty-firſt of July, and yielded twenty-three pounds of grain.

OBSERVATIONS.

" Though the produce of this bed was leſs now than in 1755, I did not think this difference ought to be imputed to the increaſe of the quantity of ſeed ſown; becauſe the plants were as ſtrong as could be wiſhed for, their ſtraw was as long as in the former years, and their ears were as large: but I obſerved, that this bed had not been quite free from ſickneſs, and that it contained a pretty conſiderable number of rickety plants, which yielded but little grain.

" It reſults from this experiment, that a certain quantity of ſeed is neceſſary, to counterbalance the many accidents to which corn is perpetually liable.

" Though this bed might have yielded a greater quantity of grain in a more kindly year, yet its produce, even in this, was very conſiderable: for if we reckon in proportion the produce of an acre, it would yield 3795 pounds (nearly eight quarters) of grain, produced by fifty-ſix pounds ten ounces of ſeed: which is after the rate of ſixty-ſeven for one.

" To this it will be objected, that though a ſmall ſpot of ground, like that we have been ſpeaking of, was made to produce ſo conſiderable a quantity of corn, it would probably not be poſſible to obtain ſuch a crop in proportion from an extent of ſome acres of land. It may be ſo: but ſuppoſing the crop to be even greatly inferior, it would ſtill be much more conſiderable than the common crops.

" Let us examine this queſtion more minutely. It is of great conſequence not to embrace an opinion, and eſpecially a diſadvantageous one, before it has been carefully conſidered. Let us ſee then to what the diminution of the crop may be owing. I ſay nothing of the particular accidents which may in general leſſen crops: but ſuppoſing all things equal, in ſuch an extent of ground, my opinion is, that the firſt and eſſential cauſe of the miſcarriage can be imputed only to the cultivator himſelf, who ſees what is beſt to be done, but neglects it; and who ought at leaſt to endeavour, as much as he poſſibly can, to do that in great, which he ſees ſucceed ſo well in ſmall.

" I grant that many reflections and reaſonings, which ſeem at firſt ſight to be extremely appoſite, are in reality oftentimes only ſpecious and deceitful, and that it is always right to recur to experimental proofs. Luckily we have ſuch ready to produce.

" The celebrated Wolfius obſerved long ago, that the productions of plants which grow in large pieces of ground, are always fine when the ſeed has been properly buried, and ſowed thin: whence he concluded, that the moſt extenſive fields ought to produce as much in proportion as ſmall ones, and that it is evident that whenever an experiment has been made with the neceſſary precautions, and has ſucceeded upon the tenth part of any piece of ground, it ought to ſucceed equally upon two, three, or four tenths, and conſequently upon the whole of that ground.

" The experience of five years, of which I ſhall give an account in the following article, will, I believe, prove this very ſufficiently."

EXPERIMENT, Numb. II.

N. B. This field is marked with the ſame number in the former experiments.

For the crop of 1752, it was ſowed with eleven pounds four ounces of wheat, which produced 1041 pounds twelve ounces.

For the crop of 1753, it was ſowed with thirty-four pounds fourteen ounces, which produced 1575 pounds.

For the crop of 1754, it was ſowed with ſixty-one pounds fourteen ounces, which produced 1820 pounds.

For the crop of 1755, it was ſowed with ſeventy-eight pounds, which produced 1950 pounds.

For the crop of 1756, it was ſowed with fifty-one pounds, which produced 1885 pounds.

Year 1755.

" I had now cultivated Smyrna wheat for ſome years, ſowing the whole of each year's produce, in order to increaſe my quantity ſo as to be able to ſow a pretty large field with it; which I could not complete till 1754, for the crop of 1755.

“ The field in queſtion was ſowed with ſeventy-eight pounds of this corn. It roſe very well: but towards the end of winter, I was ſurpriſed to find that a great quantity of plants had been deſtroyed by the froſt; and I ſoon perceived, that almoſt all the ſtrongeſt and healthieſt plants were thoſe of common wheat, and that there were very few of Smyrna wheat. I had obſerved at the time of ſowing, that there was ſome mixture in the ſeed: and as I had ſome of the ſame ſort ſtill remaining, I was able to ſatisfy myſelf that there was a third part of common wheat in the Smyrna wheat which I had ſown; and that it was the former which grew ſo fine, and of which almoſt the whole crop conſiſted.

“ This ſhews that Smyrna wheat does not reſiſt hard froſts: but at the ſame time, ſuch winters as that of 1754, very ſeldom happen in this country. This field was reaped on the 19th of July; the common wheat was thorough ripe, and the Smyrna wheat quite green, though its grain was grown very hard.

“ I ſeparated the ears of Smyrna wheat from the others, in order to bind them up in diſtinct ſheaves, that I might have their grain pure and unmixed. This field produced 213 pounds of Smyrna wheat, and 1737 pounds of common wheat; in all 1950 pounds; which is a greater crop than that of the preceding years.”

Obſervations on Smyrna Wheat.

“ My former crops of this wheat, though the quantity was but ſmall, had already ſhewed me plainly that it produces more grain than any other kind. In 1755, the ſheaves of this wheat, of the ſame ſize as thoſe of our common wheat, yielded more grain by half than the others did. It is therefore probable, that the planting of this grain will be attended with advantage, eſpecially in climates not ſubject to too hard froſts.

“ But a point of very great importance, is, to know well at what degree of maturity this corn ſhould be reaped. In the two firſt years that I ſowed any of it, the ears were prodigiouſly large, and full of very plump well fed grain; but I was uneaſy at not ſeeing them ripen. They continued green, whilſt I daily expected that they would turn yellow, and the grains grow hard, but in vain. By this delay, the grain waſted ſo much, that I never ſaw any ſmaller, nor ſo much ſhrunk as theſe. However, they ſprouted well when ſowed, and produced very fine plants.

“ The third year, I determined to reap them earlier than I had done the firſt. Accordingly, I cut them down as ſoon as I found that the grain had acquired a ſufficient degree of hardneſs, notwithſtanding that the corn was ſtill quite green. The conſequence of this was, that the grain remained exceeding plump and fine.”

Year 1756.

“ I continued to ſow the ſame field with Smyrna wheat, of which I procured ſome quite pure and unmixed. I ſowed fifty-one pounds of this wheat on the firſt of October. The plants were fine, and ſufficiently forward before winter, and throve prodigiouſly from ſpring till harveſt. But I ought not to omit obſerving, that Smyrna wheat is as apt to be rickety as common wheat, and that numbers of theſe plants were affected with that diſtemper.

“ This crop was reaped on the twenty-ninth of July, whilſt it was yet green, and the grain only hardened. It yielded 1885 pounds of exceeding fine, clean, good ſized wheat.”

OBSERVATIONS.

“ It would be needleſs to make experiments, if the inſtructions which they may afford were not to be attended to: but as thoſe inſtructions will ſometimes eſcape the notice even of the moſt careful obſerver, it is proper always to repeat the experiments, and to continue them conſtantly for ſome time. It is by ſo doing, that the advantages of the New Huſbandry will appear in their true light, and be eſtabliſhed beyond diſpute.

“ The field I am now ſpeaking of, and from which I reaped five crops in five ſucceſſive years, preſents us real and very conſiderable advantages, which I ſhall ſet forth in what appears to me the juſteſt and moſt ſtriking manner.

“ To this end, I ſhall ſtate exactly the products of the field in queſtion, cultivated in the old and in the new way. I ſhall begin with its produce during ſixteen years that it was cultivated according to the rules of the Old Huſbandry: namely, from the crop of 1730, to that of 1744 incluſively. In this ſpace of time, it produced eight crops; the cuſtom of the country being to ſow but once in two years, and to reſt the ground each alternate year. My account may be depended upon, as perfectly exact. I have extracted it out of a journal kept by a ſteward of mine, who died in 1745, and who was ſcrupulouſly exact even in the ſmalleſt concerns.

“ After giving the produce of this field, the ſoil of which is very good and ſtrong, during ſixteen years that it was cultivated in the old way; I ſhall ſhew what the ſame field produced in five years cultivation according to the new method, in order to compare the different products of only five years with thoſe of ſixteen; and afterwards draw a compariſon between both the cultures for ſixteen years, ſuppoſing, which is a great diſadvantage, that the eleven remaining years of the New Huſbandry produced no more than theſe firſt five have done.”

Number I.

“ *Produce of the Field, Number* II. *during ſixteen Years that it was cultivated in the old Way*; *viz. from the Crop of the Year* 1730, *to that of the Year* 1744, *incluſively.*

SOWED.

		Pounds.	Pounds.
In 1729			267
1731.	Wheat	425	488
	Barbary wheat	63	
1733.	Wheat		441
1735.	Wheat		504
1737.	Engliſh wheat		441
1739.	Wheat		441
1741.	Wheat		472
1743.	Wheat mixed with tares		504
	Total feed of eight years		3558

REAPED.

		Pounds.
In 1730.		1134
1732.	A year extremely bad, on account of the great quantity of ſlugs which deſtroyed the wheat, and the many feeds of weeds intermixed with it.	1606
1734.		1953
1736.		1008
1738.		977
1740.		1291
1742.		1638
1744.		1512
	“ Total amount of the crop of eight years, in the ſpace of ſixteen years	11119

To be deducted.

	Pounds.	
Siftings of 1732	756	
* Siftings of the other years	1009	
Seed, as above	3558	
		5323

“ Remains for the neat produce of ſixteen years, 5796

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* “ This field always produced clean corn, greater pains being taken to keep it free from weeds, than could be beſtowed upon other pieces of ground, more diſtant or more extenſive. The ſiftings would otherwiſe have been more conſiderable in ſo many years.

Number II.

" *Produce of the Field, Number* II. *during Five Years of Culture in the new Way.*

SOWED.

		lb.	oz.
In 1751.	Wheat	11	4
1752.	Wheat	34	14
1753.	Wheat	61	14
1754.	Smyrna wheat	78	
1755.	Smyrna wheat	51	
" Total ſeed of five years		237	0

REAPED.

	lb.	oz.
In 1752.	1041	12
1753.	1575	
1754.	1820	
1755.	1950	
1756.	1885	
" Total amount of the crops of five years,	8271	12
" To be deducted for the ſeed, as above, There was no ſifting.	237	
" Remains for the neat produce of the five years	8034	12

Number III.

" *Compariſon of the above Produce of the new Culture with that of the Old.*

	lb.	oz.
" The New Huſbandry produced in five years, without any intermediate year of reſt,	8034	12
" The Old Huſbandry produced in 16 years,	5796	
" Conſequently the New Huſbandry produced in five years, more than the Old did in ſixteen,	2238	12

Number IV.

" *Farther Compariſon of the Produce of the New Huſbandry with that of the Old, as above.*

NEW HUSBANDRY.

	lb.	oz.
" The New Huſbandry produced in five years,	8034	12
" Suppoſing the crops to be to the ſame for 11 years more, they would amount to	17676	7
" And for 16 years, to	25711	3

OLD HUSBANDRY.

	lb.	oz.
" The neat produce of the Old Huſbandry, in 16 years, was	5796	
" The balance in favour of the New Huſbandry would conſequently be, in 16 years	19915	3

Reflections and Obſervations.

" I dare to ſay that very few of thoſe who might juſt have glanced over the products of the five years during which the field Numb. II. was cultivated in the new way, would have imagined the advantage to be near ſo great as it really is, had not the above compariſons been likewiſe laid before them. If nothing but the hope of great profit can recommend the New Huſbandry to the general practice of our farmers, the above calculations ought at once to determine them; ſince they here ſee that the ſame field produced much more grain in five years, and even in four, when managed in the new way, than it produced before in ſixteen years, whilſt cultivated according to the old method. I confeſs that when I firſt began to practiſe the New Huſbandry, I did not expect ſo great advantages. They might have been greater ſtill, if I had not committed in the firſt years, faults which conſiderably diminiſhed the crops of 1752 and 1753. Beſides thoſe firſt faults, I committed another, which greatly leſſened my crops. I was not aware that the fertility of every field which is ploughed deeper than it has uſually been, is often leſſened for ſome years, unleſs it be aſſiſted by a ſufficient quantity of manure. The new earth which is brought up to the ſurface by theſe ploughings, remains ſo hard and compact, that it cannot be fit for the nouriſhment of plants, till after it has been well broken by repeated ploughings, and as it were ripened by the influence of the air, &c.

" This obſervation will be particularly uſeful to all beginners in the New Huſbandry. They muſt not be ſurpriſed if their firſt crops do not anſwer their wiſhes: but the deeper they plough at firſt, the greater ſucceſs they may juſtly expect afterwards. In the mean time they muſt ſuffer patiently the inconvenience I have been ſpeaking of, or remedy it by uſing a great deal of manure.

" Would it be reaſonable to deſire greater advantages than thoſe we have proved above? any man of ſenſe may ſurely be ſatisfied with them: but through what fatality does it happen, that infinite numbers will not, or cannot ſee them? I know, for inſtance, that, excepting a certain number of perſons who have ſtudied the New Huſbandry thoroughly, or practiſed it with care, it is generally thought in this country, that the field Numb. II. which I have been ſpeaking of, has produced me leſs corn than it would have done if it had continued to be cultivated in the old way. Whence does this notion ariſe: ſurely from this, That men are apt to judge too precipitately, without examining ſufficiently, or calculating right. Whoever really wiſhes to be informed, and deſires to promote the public welfare, and his own private good, may eaſily attain theſe ends: but it muſt be by a different road from that which is commonly purſued: it muſt be by reckoning and calculating, as I have done with regard to the field in queſtion.

" Some fields will not yield ſo much as this has done: but yet their produce will be ſuch as muſt determine all unprejudiced perſons in favour of the New Huſbandry, as I ſhall demonſtrate by the calculations in the third and fourth articles.

Experiment, Numb. III.

N. B. The field on which this experiment was made, contains about an acre and a half of ground. I have joined it to that of the experiment Numb. VII. under which its produce is included.

Experiment, Numb. IV.

Sowed		lb.	oz.		lb.	oz.
In 1753		181		reaped	3370	
1754		268	14		4972	8
1755	1ſt half	488			5850	
	2d half	488			2080	
1756		816			3640	

Year 1755.

" One half of this field was laid out in beds in 1753, and the other half not till 1754. I ſhall begin with the oldeſt, from which I ought to expect the beſt crop, as that ground was the beſt prepared. It was ſowed on the twenty-ſeventh and twenty-eighth of Auguſt, with 488 pounds of wheat. This was a conſiderable increaſe of ſeed. I judged it neceſſary, and ſo it proved; for it preſerved this field from being greatly hurt by the froſt in winter, which deſtroyed a great number of plants. If they had not been ſo thick ſown, I make no doubt but that the crop would have been conſiderably diminiſhed. This half was reaped on the eighteenth of July, and yielded 5850 pounds of very fine grain. Here is a crop conſiderably greater than the former. It exceeds the firſt by 2480 pounds.

" The other half of this field now bore its ſecond crop. The ſame quantity of ſeed (418 lb.) was ſown, but did not produce ſo much as in the other half. As this part lies in a bottom, the froſt hurt it more than it did the other, nor had it been ſo long laid out in beds; beſides which, the rains hindered me from ſowing it at the ſame time as the other half. It could not be ſowed till the twenty-firſt, twenty-ſecond, twenty-third, and twenty-fourth of October, which is ſomewhat late. It was reaped on the nineteenth of July, and yielded 2080 pounds of wheat.

Year 1756.

"This field was ſowed on the ninth, tenth, and twelfth of September, with 816 pounds of wheat, and reaped on the twenty-eighth and twenty-ninth of July. The produce was 3640 pounds.

OBSERVATIONS.

"One might juſtly be ſurpriſed at the ſcantineſs of this crop, if, beſides what I ſaid before of the general cauſes which were ſo prejudicial to the crops of this year, I did not add thoſe which may have more particularly affected this field. My intention was to ſow it thicker than it chanced to be; through the fault of the ſower, who did not follow my directions. The hurt might perhaps not have been great, if the ſeaſons had proved kindly: but it was of conſiderable conſequence this year, and particularly in this field, in which all the corn was extremely rickety.

EXPERIMENT, Numb. V.

Sowed	lb.	Reaped lb.
In 1753	139	2205
1754	224	2283
1755	388	2600
1756	544	2700

Year 1755.

"This field ſtill continued to be difficult to bring to good tilth; and therefore required the more ſeed. It was ſowed on the twenty-ninth of Auguſt, reaped on the twenty-ninth of July, and produced 2600 pounds of grain.

Year 1756.

"I thought it neceſſary to continue to increaſe the ſeed of this field. It was ſowed on the 20th and 22d of September, with 544 pounds of wheat. The young plants looked very fine before winter, and promiſed better than thoſe of the preceding years. The general accidents of the year affected them. They were reaped on the twenty-ſixth of July, and yielded 2700 pounds of corn.

EXPERIMENT, Numb. VI.

Sowed	lb.	Reaped lb.
For 1753	45	724
1754	82	798
1755 { wheat	162	900
barley	12	nothing
1756 beans and tares	153: value in wheat	780

Year 1755.

"This field one of thoſe in which the ſtiffneſs of the ſoil reſiſted longeſt that degree of pulveriſation in which the chief merit of the New Huſbandry conſiſts. The firſt crops were not conſiderable. In 1754, I could not ſow this ground before the fifteenth of October, and yet the plants which it produced were very fine. It was reaped on the twenty-firſt of July, and produced 900 pounds of wheat.

"The moſt remarkable thing in this field, was what happened to ſome beds which I had ſowed with twelve pounds of barley. The young plants were exceeding fine in autumn, but the hard froſts of the winter killed every one of them.

"As ſoon as I perceived this loſs, I endeavoured to repair it, by ſowing the ſame beds again with ſpring barley: and as the two wheat beds next to them had likewiſe ſuffered ſo much as to have but few plants left, I ſowed them alſo with barley.

"Theſe beds were ſowed without being ploughed again. The whole charge of this ſecond ſowing conſiſted in paſſing the drill once over them, and in twenty-eight pounds of barley which was uſed for the ſeed. This was done on the eighth of April.

"This barley grew very fine. It was reaped on the firſt of Auguſt, and yielded 270 pounds of grain. I doubt whether that which was ſowed before the winter could have produced more: ſo that I think this crop made me ample amends for the loſs of my firſt ſeed.

"How great a proof is this of the excellence of the New Huſbandry! and how eaſy a means does this huſbandry afford of guarding againſt dearth, when our young crops chance to be deſtroyed, by the facility with which the ſame lands may be ſown again, without loſs of time, and with ſcarce any more expence than the bare coſt of other ſeed, which in ſuch times of general diſtreſs, will produce crops of other uſeful grains, even more profitable than thoſe of wheat! An ineſtimable advantage, which ſecures the ſubſiſtence of the people, and which cannot be obtained by the Old Huſbandry. This muſt be evident to every one who conſiders that all that is requiſite, in ſuch a caſe, in the New Huſbandry, is only to ſow again: whereas in the old way, the Huſbandman is obliged to plough before he ſows, to ſow a great deal of ſeed, and to harrow that ſeed in after it is ſown. The vaſt ſaving made in the ſeed, in the new way, is likewiſe another very important article in a time of ſcarcity.

"I reaſon here upon a ſuppoſition of the total loſs of all the crops of wheat, which really was the caſe in 1709.

Year 1756.

"I reſerved this field in order to ſow it in the ſpring, with the grain of that ſeaſon, with which I had not yet made my experiment, except in ſmall ſpots of ground. I ploughed it before winter: the new beds were well made, and the earth was in ſuch fine tilth in the ſpring, that I thought I might ſafely ſow it without any farther ploughing. Accordingly I did ſo on the 26th of April; the too great wetneſs of the earth not permitting it to be done ſooner. One half of this field was ſowed with beans, and the other half with tares; in all, 153 pounds of both, which produced a crop equal in value to 780 pounds of wheat.

OBSERVATIONS.

"This year was extremely bad for all grains ſown in the ſpring; moſt of which yielded but the value of the ſeed; ſo that the produce of this field, compared to that of others cultivated in the old way, ought to appear very conſiderable.

"The ſucceſs of this experiment ſhews, that when too much rain, or too great drought, hinders ploughing the land in due time, and ſome fields cannot be prepared for wheat in the autumn, they may be ſowed in the following ſpring, with the different grains uſually planted in March.

EXPERIMENT, Numb. VII.

Sowed.	lb.	Reaped lb.
For 1753	412	2646
1754	360	2467
1755 including the experiment, N° III.	639	4290
1756	1010	6760

Year 1755.

"The ſoil of this field is of ſuch a nature as to require a greater quantity of ſeed than many others. I ſhall doubtleſs be thought to have increaſed conſiderably, in having enlarged that quantity to 639 pounds: and yet this year's experiment makes me judge, that it will ſtill be neceſſary to ſow more another time.

"I ſowed this field on the 9th, 10th, and 26th of Auguſt, and reaped it on the 16th and 17th of July. It yielded 4290 pounds of grain.

Year 1756.

"I have a meadow adjoining to this field. I ploughed up part of it, which had produced but very little graſs for a long time, and turned it into arable land. This addition ſerved to replace another part of the field, which I ſowed with lucerne. This laſt part being leſs than that which was added from the meadow, the field may have been enlarged about two acres, and the ſoil is much the better for it.

"This field was ſowed with 1010 pounds of wheat, on the 10th, 13th, and 15th of September, and was reaped on the 23d and 24th of July, when it produced 6760 pounds of corn.

EXPERIMENT, Numb. VIII.

		lb.	oz.		
For 1754	were ſown	76	8;	which yielded	1462
1755		157			1300
1756		230			2080

Year 1755.

“ This great increaſe of the quantity of ſeed might be wondered at, if I did not obſerve that this field was ſowed with two bouts of the drill-plough; by which means each bed (for they were all wide enough to admit of it) had ſix rows of plants inſtead of three, and conſequently took up double the quantity of ſeed. The event will ſhew that I was right in ſo doing.

“ The field was ſowed on the 31ſt of Auguſt, with 157 pounds of wheat. Nothing could make a finer appearance than this corn did at the beginning of winter. The plants, which had already branched very abundantly, made the ground look ſurpriſingly thick covered. The ſtrength of the ſtems, and the deep green of the blades, made me expect extraordinary ſucceſs. They continued thus promiſing during all the winter; and the ſame in February and March, and to the middle of April.

“ The ſoil of this field is excellent: but it could not be preſerved from the fatal effect of the ſevere froſts in winter. I was extremely ſurpriſed when, going thither on the 27th of April, I found this wheat, which I had ſeen twelve days before without the leaſt ſymptom of decay, reduced to a moſt deplorable condition: not a ſingle ſtalk remained that was not dead, nor a blade that was not withered. Both the ſtalks and the blades adhered ſo little to the plants, that one might rake them up in heaps, like graſs that has been mowed: in ſhort, nothing could be more melancholy than the appearance of this field.

“ The earth was extremely dry, and the weather very hot for the ſeaſon: from the 16th to the 24th of April, M. de Reaumur's thermometer was always, at ſeven o'clock in the morning, at from fifteen to eighteen degrees above the freezing point. I am apt to think that this uncommon temperature of the air compleated what the hard froſts had begun, and which I did not perceive before.

“ My firſt thought was, to ſow the field again with barley, as I had done in the caſe of the experiment, Numb. VI. but ſeeing that the diſaſter was general, I examined moſt of the plants with great attention. I ordered the earth to be dug, and found ſome plants quite dead, and others, in pretty great number, which had ſtill ſome vigour, and were provided with very good roots, and of which only the ſtems and blades had periſhed. This gave me ſome hope; which was not a little ſtrengthened by my perceiving that ſeveral of theſe plants were ready to produce new ſhoots, ſome of which could juſt be diſtinguiſhed by their white point, ſcarcely perceptible; others were about the 12th part of an inch long, and others a quarter or half an inch: theſe laſt began to look green.

“ Several reaſons induced me to think that theſe plants might ſtill be ſtrong enough to produce new ſtalks, eſpecially if a little rain ſhould chance to fall. I therefore reſolved not to ſow this field again. Fortunately, a good ſhower of rain fell on the 29th, which did them wonderful ſervice. I went to ſee them ſoon after, and found the new ſhoots conſiderably grown: upon which I determined to cultivate the beds with care. By the middle of May, the plants were grown very fine, were loaded with blades and ſtalks, and only ſeemed much thinner than in the autumn: the ſtraw was as long, and the ears were as big, and as full of grain, as the year before. I was obliged to reap this corn early; becauſe, as the heat of the weather had precipitated the ripening of the grain, it might have ſhrunk and ſhrivelled if I had let it ſtand ſome days longer. It was cut down on the 17th of July, and yielded 1000 pounds of grain.

“ I am perſuaded that this accident diminiſhed the crop by above half; and this is certainly the reaſon why it produced leſs than that of 1754.

“ The ſhape of this field was irregular on the north ſide. The length of the beds in that part decreaſed progreſſively, ſo that thoſe next the end were not above three or four fathoms long. This made the tilling of them very troubleſome, becauſe of the frequent neceſſity of turning the plough. I ordered this triangular part, which was about the third of the field, to be ploughed for ſowing in equally diſtant rows with the drill-plough. The reſt was preſerved in beds, as in the preceding years.

“ I ſowed it on the 17th of September, with 230 pounds of wheat, which was reaped on the 24th of July, and yielded 2080 pounds of grain.

EXPERIMENT, Numb. IX.

		lb.	oz.		lb.
For 1754	was ſowed	249	12;	which yielded	2925
1755		312			1362
1756		295			2219

Year 1755.

“ This field, which had been well prepared, was ſowed on the 27th of Auguſt, with 312 pounds of wheat, which grew very fine and thick till November: but from the 10th to the 18th of that month, a general ruſt ſeized it. I imputed to this diſtemper the ſmallneſs of the crop, which amounted only to 1362 pounds.

Year 1756.

“ The ground was extremely well prepared, and better than in the preceding years. It was ſowed on the 24th of September with 295 pounds of wheat, which produced 2219 pounds. It was reaped on the 21ſt of July.

EXPERIMENT, Numb. X.

		lb.		lb.
For 1754	was ſowed	294;	which yielded	3055
1755		397		2210
1756	rye	348		2700

Year 1755.

“ This field was ſowed on the 30th of Auguſt, with 397 pounds of wheat, which produced 2210 pounds. I make the ſame remarks on this experiment, as on the preceding, Numb. IX. year 1755.

Year 1756.

“ Though it is not uſual for me to ſow rye, becauſe all my lands are fit to bear wheat, I was willing to make a trial with that grain; and accordingly I ſowed this field with it, on the 16th of September. The quantity employed was 348 pounds. The ſtraw was very long, and much thicker than that of rye in the common way: the grains alſo were conſiderably larger. It was reaped on the 19th and 20th of July, and yielded 2700 pounds of grain.

EXPERIMENT, Numb. XI.

Performed by the ſame Perſon who made thoſe of 1754, *marked with the ſame Number, and thoſe of* 1753, *marked Number* IX.

“ Though the following extract does not agree exactly with the title of this article, I was unwilling to make it a ſeparate one. It contains very intereſting details: the moſt eſſential circumſtances are related with great preciſion; and the conſequences of the reſults are eſtabliſhed by very inſtructive calculations. They ſhew the writer of them to be a ſtudious huſbandman, a very ſkilful naturaliſt, a zealous lover of the public good, who inſtructs by his example, and ſtill more by his knowledge.

“ Theſe experiments were made about fifteen miles from Geneva, in a country where it is the cuſtom to ſow the land two years running. The firſt year it is ſowed with wheat; the ſecond, with ſpring corn; and the third it is reſted.

Extract of a Letter to M. de Chateauvieux, *dated* December 7, 1755.

'I received the journal of your laſt year's experiments, and have read it with very great pleaſure. If it were poſſible for me to make any obſervation of the leaſt importance, upon your experiments, which had eſcaped you, I ſhould take the liberty to lay it before you, in full confidence of your receiving it kindly.

'In general, I aſcribe, as you have done, the different ſucceſs of the New Huſbandry, 1. To the intrinſic quality of the ſoils, ſome of which ſeem unfit for the production of wheat: 2. To the condition of the lands, when they firſt began to be cultivated in the new way: 3. To the manner in which they were prepared, according to the principles of this huſbandry: and laſtly, to the quantity of ſeed that was uſed.

'I was particularly pleaſed with your experiment on the barley. It is certainly very inſtructing, and confirms what I before ſuſpected, that in our climate, wheat and other plants love ſociety; and that they thrive better when numbers of them are planted together, than they would do ſeparately, provided that number be not too great. You will certainly not fail to repeat that experiment in years leſs hot and leſs dry, and upon other plants. Still I am afraid that no fixed rule can ever be given with regard to the quantity of the ſeed: too many circumſtances influence the condition of the ſoil: but it will always be of great ſervice to fix certain bounds, within which every one may chooſe what ſuits him beſt.

'You will ſee by the account of my little experiments, that I have ſowed in the ground of my rows, nearly what would have been ſowed by hand in the ſame ſpace. But the imperfection of my drill-plough, and the condition of my land, obliged me ſo to do; and I have not hitherto found any inconvenience from it.

'I ſhorten my reflections, and proceed to my experiments.

Produce of the firſt and ſecond Crop of a Field cultivated in the new Way.

'This field contains, according to our meaſure, ſix poſes, which are equal to very near four acres and a half. The ſoil of it is tolerably good; rather light than ſtrong; fitter for rye than wheat. I am the firſt that ever ventured to ſow it with wheat. Dung uſed to have a great effect upon it for the firſt crop, but the ſecond ſeldom ſucceeded: in ſhort, it was the general opinion, that nothing could be made of this field without the help of a deal of good manure.

'It was well dunged in 1749, and ſowed with maſlin corn. The year 1750 was very favourable to corn in general, and particularly to that of this field. It yielded as much as two middling crops; that is to ſay, ten for one: but being ſowed again the ſame year, it yielded, in 1751, but two and a half for one. The year 1752 was the year of reſt, or rather it was ploughed that year, according to the old method, and ſowed the broad-caſt way, but without dung. The autumn was not kindly: the plants roſe poorly: and the crop of 1753 yielded ſcarce three for one, after deducting the tythe. It was after this crop that this field was laid out in beds of ſix feet wide, and ſowed in the ſame year with wheat. As the mould of theſe beds could not be prepared properly, and the year 1754 was but a poor one for wheat, I was not ſurpriſed at the ſcantineſs of the crop. I ſowed twelve of our meaſures, and reaped ſeventy-two. Our meaſure of wheat weighs, when it is good, twenty-eight pounds; and that of maſlin twenty-ſix pounds. I did not weigh mine every year; but I am ſure it was always full weight.

'Encouraged, rather than diſheartened, by this trial, I ploughed theſe beds up for a new crop, and ſowed them, part with maſlin corn, and part with wheat.

'The ſummer of 1754 was ſo dry, that I deferred plowing the ſummit of the beds which had borne their crops, till the end of autumn. This was attended with theſe two inconveniencies: firſt, that the intermediate earth, which had been well pulveriſed, being no longer ſupported as before, ſlipt away from under the drill, and ſpread to the right and left; by which means the plants had leſs depth of good mould left, and I loſt part of the advantage I hoped for from this culture. The other inconvenience was, that the beds being no longer ſo high raiſed as they ſhould have been, the firſt ploughing in autumn covered their outmoſt rows in ſeveral places: a loſs, by ſo much the more conſiderable, as the rows ſo buried would, by their ſituation, have otherwiſe been the fineſt of all. I certainly under-rate it, in valuing it at only a tenth part of the crop.

'As maſlin is a much quicker grower than wheat, and being uncertain whether it could do without dung; out of eighteen beds, I dunged twelve, but very ſlightly; juſt as I would have dunged the third part of this ground, if I had intended to ſow it in the broad-caſt way.

'I ſowed it on the 4th and 5th of October, 1754, with two turns of the drill-plough, and very thick, by reaſon of the imperfection of my drill, and becauſe the ſeaſon was already ſomewhat advanced. A third more ſeed was ſowed this year than laſt, viz. eighteen of our meaſures.

'The plants roſe well, the rows looked very thick and well filled, except thoſe which were hurt by the firſt autumnal ploughing, and by cattle which broke in upon the ground, and did a deal of damage.

'The plants in the part which had been dunged, were very fine all the winter. In the beginning of April they grew with ſurpriſing vigour, and were as beautiful as could poſſibly be in May and June. They were ſo tall, that they hid my plough and horſes, and ſeemed to promiſe three times more than the other plants where the ground had not been dunged. Theſe laſt grew more ſlowly: but juſt before harveſt, they puſhed ſtrongly; and if their ſtraw was not ſo long or ſo thick as that of the former, there was ſcarce any difference in the length of the ears: and the difference of the product was but one-fourth in favour of the dunged plants.

'Both the one and the other ſuffered on the 23d of May, by a violent north-eaſt wind, which broke a great number of the ſtalks of the rye, and tore others up by the roots. The ſtalks that were not quite broken, recovered perfectly, and the loſs was not great with reſpect to them. The caſe was different in regard to the plants that were broke aſunder or torn up. I reckoned the damage ſuſtained by theſe laſt, equal to a tenth part of the crop.

'Of the forty-ſeven furrows of this field, eighteen ſowed with maſlin yielded me (excluſive of the tythe, which is an eleventh part) ſixty of our meaſures. This grain is the fineſt of its kind in the whole country, and is equal to the common wheat. The meaſure weighed, in the drieſt and coldeſt ſeaſon, twenty-ſeven pounds; which is a ninth part more than the weight of the common maſlin.

'The twenty-nine furrows ſowed with wheat ſeemed to have eſcaped the violent froſts of the winter: but I was greatly ſurpriſed in April, to ſee large ſpaces in which the plants periſhed daily; and others wherein the wheat ſeemed to have diſappeared, to make room for a prodigious quantity of ſenvy, which looked extremely well.

'I was not at all pleaſed with this change of crop: yet though I no longer expected any thing from theſe damaged places, which amounted to the value of nine furrows, I would not give up the good plants which I thought might ſtill be in them; and therefore ordered them to be weeded carefully, ſeveral times over, by women who deſired only the weeds for their labour. This operation was not uſeleſs: the ſurviving plants gathered new ſtrength: they branched conſiderably in June; and yielded me, at harveſt, about a third part of what I reaped from the places which had not been damaged. Theſe laſt ſeemed but indifferent during all the ſpring. Every one judged this corn inferior to that of the fields which had been ſown in equally diſtant rows and dunged: but, from the beginning of June, when the other wheat began to decline, my rows throve ſo well, that ſome parts of them were very greatly ſuperior, both in the length of the ſtraw, and the bigneſs of the ears, which laſt were every where longer and better filled.

'Notwithſtanding all this, my wheat had ſtill more to ſuffer. It was cut juſt before the heavy rains in July, and ſome of it ſprouted, as was the caſe elſewhere. Beſides the loſs in the quality of the grain, my threſhers reckoned that the quantity of it was diminiſhed eight meaſures. The whole produce was but ſixty-eight meaſures, after deducting the tythe.

‘ I have entered into this detail, in order to make the following remarks.

‘ 1. As this field, twelve furrows excepted, was not dunged ſo early as in the year 1749, the ſuperiority of the crop of 1755 over that of 1754, muſt be imputed chiefly to the New Huſbandry. The places on which my fineſt wheat grew, were not at all extraordinary in 1754, and yet they were not dunged for 1755; conſequently the culture, far from exhauſting, meliorated the ground.

‘ 2. Some ſoils are fitter to produce ſome grains than others; and it is in vain to attempt to force nature. Notwithſtanding the good culture, the bad part of my field was yet worſe than in 1754; but the ſenvy in it was finer. I ſowed this part with graſs, which ſtill covers it, and is very green and vigorous. I judge that radiſhes or turneps would do very well there.

‘ 3. One muſt not always judge of a crop by the appearance of the green corn in April and May; becauſe the dung then exerts its greateſt ſtrength for the production of the blades, and that appearance is oftentimes deceitful.

‘ 4. The laſt ploughings ought, if poſſible, never to be neglected: it is to them that I aſcribe the favourable change which happened to my wheat.

‘ To follow your method, I have now only to compare the produce of this field, with what it yielded when cultivated in the old way. I have not been able to find its exact produce before the year 1750. All I know is, that the crops varied extremely, according as the ground had, or had not been dunged, or the year was more or leſs kindly.

‘ I ſhall therefore eſtimate the produce of this by that of the neighbouring fields, which are thought to bear a good crop, when a poſe of land yields thirty-two of our meaſures, after deducting the tythe and ſeed corn. The next crop, whether it be of winter or ſpring corn, is ſeldom worth half the firſt: however, ſuppoſing it to be ſixteen meaſures, as the land is reſted the third year, the neat produce of the crop for three years will be forty-eight meaſures, which is ſixteen meaſures a year, and ninety-ſix meaſures for the ſix poſes.

‘ I had, in the new way, 128 meaſures of wheat and maſlin; deducting from which eighteen meaſures for the ſeed, there remain neat 110 meaſures, and a profit of fourteen; for which I am indebted to the New Huſbandry.

‘ If we add to this the eight meaſures loſt by the ſprouting of the grain, and the damage done by the ploughing in autumn, it will appear, that, without thoſe two extraordinary accidents, I ſhould have had thirty-five meaſures more than could have been expected in the old way, and that of a corn, which, ſuppoſing all other things equal, is worth twelve per cent. more than any of the common growth.

‘ I make no doubt, but that if I were to lay in my furrows the dung that is ſpread yearly upon my lands, and were to take all the precautions neceſſary to ſow and cultivate them properly, the neat produce would be thirty meaſures, one year with another, which would be a continual plenty.

‘ However that may be, thus much is certain in favour of the New Huſbandry, that, notwithſtanding all the accidents, my field produced the ſecond year about double the quantity that it did the firſt.”

Firſt Year's Produce of a Field ſowed and cultivated according to the New Huſbandry.

‘ This field contains about three acres and a half. It was divided into beds five feet wide, which were ſown alternately with one and with two bouts of the drill-plough; that is to ſay, with three rows and with ſix. The ploughings had been but badly performed, and the beds were not raiſed or arched ſo high as they ſhould have been. Thoſe that were ſown double, that is with ſix rows, were always ſuperior to the reſt. As the ſoil of this field is generally ſtrong, and fit for wheat, it did not afford the ſame variations as the former, though ſome of this wheat ſprouted.

‘ I ſowed ſeventeen meaſures, and reaped ninety-two, beſides the tythe. By the ſame calculation as before, the neat produce was one meaſure leſs than in the old way.

‘ But it is to be obſerved, 1. That by the ſprouting of the grain, I loſt more in this field than in the other. 2. That this was not a good year for wheat. 3. That this field, being bordered by two high-ways, and not being incloſed, was greatly damaged by cattle that got into it. 4. That what grain I did reap was clean, and ſuffered ſcarce any diminution by ſifting. 5. That if I had ſowed all my beds with ſix rows, I ſhould probably have reaped a fourth part more; ſo that no blame ought to be imputed here to the New Huſbandry. 6. That it is the firſt year of my trying this huſbandry; that my ground had been but very imperfectly prepared, and that it is now in a much better condition for the next crop, though my ſervants have again committed ſeveral blunders. All theſe conſiderations ſeem to me farther proofs of the excellency of the New Huſbandry.

‘ I could prove, that, in point of profit, this laſt field has yielded me three times as much as it uſed to do in the old way, and the other field twice as much.

‘ This may more than ſuffice for ſuch ſmall experiments as mine. I could wiſh that they had been greater, and the ſucceſs more complete. With what pleaſure ſhould I offer them to you, whom I look upon as the chief and patron of all who follow the true principles of agriculture!

‘ Though I have ſowed the bad parts of the firſt field I ſpoke of with graſs, I have added three poſes more to the arable againſt next year, in order to cultivate them in the new way, which I purpoſe extending to all my lands the next ſowing ſeaſon.

‘ I have very injudiciouſly, I doubt, ſowed between twelve and thirteen poſes with grain which had ſprouted. I do not believe the third part of it has come up; but as I ſowed thick, and my lands are much better prepared than they were laſt year, I hope to have at leaſt as good a crop.’

OBSERVATIONS.

“ When experiments have been repeated in different places, the circumſtances attending them ought to be greatly conſidered: for if theſe have been alike, and the event is the ſame, they ſerve to eſtabliſh one another, and merit our confidence in them. The compariſon of the laſt experiments with mine, gives me room to make two important obſervations. The firſt is, that both of us have perceived, and for the ſame reaſons, the neceſſity of ſowing a greater quantity of ſeed than we did in our firſt experiments. This augmentation produced better crops. We may therefore now lay down as a rule founded on experience, that the quantity of the ſeed muſt be what we ſaid in our laſt accounts, regard being had to the particular conſiderations mentioned therein.

“ The ſecond obſervation is, that both of us have ſowed beds with two bouts of the drill-plough, that is, with ſix rows of corn; and the event in both caſes has been, that the ſame extent of ground has always produced a greater quantity of grain. It is therefore probable that this method will be found to be the beſt.

“ But as it is poſſible that the effect may not be the ſame in different countries, a trial may be made by ſowing ſome beds with three rows, and others with ſix, and which ever anſwers beſt, may afterwards be practiſed.

“ Theſe two obſervations will be confirmed by ſome experiments which we ſhall give in the fifth article.

“ Other buſineſs prevented this lover of agriculture from following his experiments in 1756, with the ſame attention as before. The exact, though ſhort, account which we ſhall give of them, may ſerve for a ſequel to what we have been able to collect in relation to thoſe which he made in 1755.

Year 1756.

" In the firſt place, the field of ſix poſes, or four acres and a half, which bore a crop in 1754, and another in 1755, and which had not been dunged at all ſince the year 1749, being ſurrounded by a greater piece of land, which is ſowed ſometimes with wheat, and ſometimes with artificial graſſes, was ploughed in Auguſt, immediately after harveſt, and ſowed with ſain-foin. The crop of 1756 was very fine, each poſe yielding from twenty-five to thirty hundred weight of hay at the firſt mowing, and half as much at the ſecond. Therefore the New Huſbandry preſerved the ground in good condition, without the help of dung; and its productions do not ſeem to have exhauſted the ſoil.

" The field of about three acres and a half, ſowed with wheat, and which produced ninety-two meaſures of that grain in 1755, produced but ſixty-one in 1756. The inferiority of this crop muſt be aſcribed, 1. To the error of ſowing wheat that had ſprouted, which, in the opinion of all judges, occaſioned a diminution of at leaſt one fourth: 2. To the damage done by cattle (this field lying quite open to them) which was greater this year than it had ever been before, part of the green corn being eaten down twice. This loſs is valued at a tenth part of the crop, independent of the tythe. 3. That the ears were not ſo full of grain this year in this country as they uſed to be: that there was as much ſtraw within ſeven truſſes and a half as in 1755; but the corn ran leſs into grain, though it ſtill had more than the common wheat.

" Upon the whole, all loſſes and accidents deducted, the crop was worth double what the land would have let for.

" This field is now under wheat, which looks extremely fine, excepting one poſe, which muſt be ſowed again with ſomething elſe, on account of the damage the cattle have done to it. The owner of this field intends to continue ſowing it without dung as long as any heart remains in it, in order, ſays he, to confirm myſelf in what I now think, or to find out my error, if I am miſtaken.

" Another field of betwixt nine and ten poſes (equal to about ſeven acres and three roods) produced 160 meaſuers of wheat; but ſome loads of dung had been laid upon it. However, even the places which had not been dunged produced much ſtronger ſtraw than they did the years before, in which they were ſown by hand. It is true, that the dung made the ſtraw ſtronger, but the ears did not yield either more or finer grain. This was likewiſe ſowed with ſprouted corn; but the ſeed was better this year, and accordingly there is a proſpect of a greater crop.

Experiments made on Lands ſown in equally diſtant Rows with the Drill-Plough; with ſome Reflections on the Advantages of this Practice.

EXPERIMENT, Numb. XVII.

" A large extent of land, near Geneva, continued to be ſown with the drill-plough, in equally diſtant rows. I could inſtance the products of a multitude of experiments, to prove that the fields ſowed in this manner, have always produced much greater crops than thoſe which have been ſown in the common way.

" I ſhall mention only a few experiments this year: but they are ſuch as have been made on large tracts of ground, and conſequently are more deciſive than ſmall ones, of which we have already given a ſufficient number in the foregoing journals.

" I ſhall call this Numb. XVII. becauſe it was made by the ſame perſon, and in the ſame places, as that which is marked Number XVII. in the year 1754. I need not repeat what I then ſaid of the ſituation and quality of the land.

" This experiment contains the products of three different farms. About ſeventy acres were cultivated in the firſt, thirty-four in the ſecond, and twenty-ſix in the third: in all 130 acres, which were ſown with wheat in September and October.

Year 1755.

" Quantity of ſeed generally uſed in the old way.	Firſt farm	16002 lb.
	Second farm	7560 lb.
	Third farm	5922 lb.
	Total	29484 lb.
" Quantity of ſeed uſed with the drill-plough.	Firſt farm	7812 lb.
	Second farm	3276 lb.
	Third farm	3150 lb.
	Total	14238 lb.
" Saved in the ſeed		15246 lb.
" Crops of 1755.	Firſt farm	80210 lb.
	Second farm	27690 lb.
	Third farm	27040 lb.
	" Total of the crops	134940 lb.
" To which if we add the ſaving in the ſeed, viz.		15246 lb.
" The whole produce will be		150186 lb.

" I ſhall now examine what theſe three farms would have produced if they had been cultivated in the old way, ſuppoſing their crops to have been equal to thoſe of 1754; which is much in favour of the Old Huſbandry.

" I find that theſe three farms, which contain about 130 acres, and which would have required 29484 pounds of ſeed, would have produced at moſt from 75000 to 80000 pounds of wheat; which is 54940 pounds leſs than what was reaped in the new way. The following calculation of the real and effective products in both ways, deducting from each the neceſſary quantity of ſeed, will ſhew the advantage of the New Huſbandry in a yet ſtronger light.

NEW HUSBANDRY.

Total produce	134940 lb.
To be deducted for the ſeed	14238 lb.
Neat produce,	120702 lb.

OLD HUSBANDRY.

Total produe,	80000 lb.
To be deducted for the ſeed	29484 lb.
Neat produce,	50516 lb.
Conſequently the balance in favour of the New Huſbandry is,	70186 lb.

" This may perhaps ſeem ſurpriſing to many: but my calculation may be more ſafely depended on, as I have favoured the Old Huſbandry greatly in my eſtimate of the crops in that way, and have made no deduction for the loſs by ſifting, winnowing, &c. which, even in the very beſt years, is always conſiderably greater in the Old Huſbandry, than in the New.

Year 1756.

" The ſame farms continued to be ſown with the drill-plough. I ſhall therefore repeat the ſame calculations, to ſhew the conſtant advantage of the New Huſbandry, which is ſo much the more remarkable this year, as the corn in the common way yielded but very bad crops. The fields in general produced but few ſheaves, and the ſheaves very little grain, and even that was very poor in many places.

" About ninety acres were cultivated in the firſt farm, for the crop of this year; in the ſecond thirty-four, and in the third forty-five: in all 169 acres, which were ſown with wheat in September and October. About thirty of theſe acres had been dunged.

" Quantity

" Quantity of ſeed generally uſed in the old way	Firſt farm	20160 lb.
	Second farm	7560 lb.
	Third farm	10080 lb.
	In all	37800 lb.

" Quantity of ſeed uſed with the drill-plough	Firſt farm	9828 lb.
	Second farm	3654 lb.
	Third farm	5040 lb.
	In all	18522 lb.
" Saved in the ſeed		19278
		37800 lb.

" Crops of 1746.	Firſt farm	79560 lb.
	Second farm *	19110 lb.
	Third farm	31590 lb.
" Total of the crops		130260 lb.
" To which if we add the ſaving in the ſeed, viz.		19278 lb.
" The whole produce will be		149538 lb.

" * This farm did not produce ſo much corn as it ſhould have done, becauſe near a third part of the fields was almoſt totally ruined by inundations.

" Suppoſing this accident not to have happened, what might theſe fields have produced? If they had been ſown in the common way, they would have yielded leſs grain than in the two preceding years. I have eſtimated it at ſomewhat leſs than that, and the advantage is ſtill in favour of the New Huſbandry. Theſe three farms would have produced at moſt from 88000 to 93000 pounds of wheat; and, according to this eſtimation, which I think a great allowance, the whole crop would be 37260 pounds leſs than it was.

" To ſee the exact reſult, let us continue our calculations, deducting the grain that was uſed for ſeed.

NEW HUSBANDRY.

" Total produce	130260 lb.
" To be deducted for the ſeed	18522 lb.
" Neat produe	111738 lb.

OLD HUSBANDRY.

" Total produce	93000 lb.
" To be deducted for the ſeed	37800 lb.
" Neat produce	55200 lb.
" Conſequently the balance in favour of the New Huſbandry is	75060 lb.

" All theſe calculations prove, year after year, the advantage of uſing the drill-plough. To ſhew how great that advantage is, I ſhall briefly recapitulate what is moſt eſſential in this article.

RECAPITULATION.

" We have ſeen a very conſiderable experiment repeated three years running, and always attended with great ſucceſs. I ſhall now ſum up the eſſential and deciſive facts, which are ſo many unexceptionable witneſſes, who depoſe, That it is much more profitable to ſow lands with the drill-plough, than to ſow them in the common way.

" To this end, I reſume the neat products of the crops.

NEW HUSBANDRY.

Neat produce of the three farms.

	Pounds.
In 1754.	93418
1755.	120702
1756.	111738
" Total neat produce of three years	325858

OLD HUSBANDRY.

	Pounds.
In 1754.	62200
1755.	50516
1756.	55200
" Total neat produce of three years	167916
" The difference in favour of the New Huſbandry, in three years amounts to	157942

" This is an object of great importance, not only to the public, whoſe welfare it highly concerns, but to every owner of land. How ſtrongly does it ſhew the vaſt advantage of the drill-huſbandry! We here ſee 169 acres of land produce 157942 pounds of wheat more than they would have done without this favourable culture.

" Any one may eaſily reckon the value of ſuch a quantity of wheat, ſuppoſing it to be of the very beſt ſort, as it really was.

EXPERIMENT, Numb. XVIII.

" I ſhall now give a ſhort account of the ſucceſs of another farm, which I have hitherto ſowed in equally diſtant rows, with the drill-plough. I generally ſow about twenty-three or twenty-four acres of it every year. For the crop of 1755, I uſed 1840 pounds of ſeed corn, which produced 10400 pounds of grain. For the crop of 1756, I ſowed 2772 pounds of wheat, the produce of which was 14560 pounds, which is a great deal, conſidering the quality of the land.

" I ſhall conclude this article with a ſhort detail of two little experiments made by the perſon I laſt ſpoke of, on two fields of different ſoils. The firſt, which contained about two acres, was a light ſoil, and ſomewhat ſtony. The quantity of ſeed generally uſed for that ground, was about 380 pounds weight. It was ſowed very thick, with the drill-plough, and took up 252 pounds of ſeed. I attended carefully to the progreſs of this corn. It ripened well, the ſtraw was very long, and crowned with fine ears, which yielded 2835 pounds of grain.

" The ſecond experiment was made on a ſtiff ſoil. Half the field was ſown in the common way; and the other half in equally diſtant rows with the drill-plough, and only two-thirds of the uſual quantity of ſeed was uſed. This laſt half yielded double what the other did, though it was ſown with a third leſs ſeed.

" The deſign of the following article is, to ſhew that lands which are laid out in beds according to the New Huſbandry, produce more corn than thoſe which are only ſown in equally diſtant rows, with the drill-plough. The proof of this propoſition will reſult from proper calculations, and a compariſon of the products of theſe two different methods.

" It is of no ſmall importance to the public, to know exactly which is the beſt and moſt profitable way to cultivate land. This article deſerves ſtill more attention than the laſt, as it tends to point out the means that are in reality moſt advantageous, though oppoſed by an obſtinate attachment to the Old Huſbandry, and the extreme reluctance with which farmers can ever be induced to try a new practice, which they are almoſt always ready to condemn, without taking the pains to know what it is, and indeed generally, becauſe they are not able to judge of it. It cannot therefore be expected that the theory alone ſhould ſatisfy them that this huſbandry is conſiſtent with the beſt principles of agriculture. If any thing can convince them, it will be a ſeries of facts, and experiments repeated during a courſe of years, always ſucceſsfully in ſo many different places.

" It is highly eſſential to dwell upon the proofs that the Old Huſbandry is leſs profitable than the New, in which the field intended to be ſown is firſt laid out in beds: for, after ſhewing that lands ſo laid out and ſown, produce conſiderably more than thoſe which are ſown only in equally diſtant rows with the drill-plough, as has been demonſtrated in the foregoing article; and likewiſe, that theſe laſt produce conſiderably more than they uſed to do in the Old Huſbandry; the ſuperiority of the crops which the beds afford, will certainly appear ſtill more ſtriking, and no doubt will remain of the excellence of the new culture.

" To this end, we ſhall compare the neat produce of the three farms mentioned in the foregoing article, in this year 1756, with that of the fields which I have laid out in beds.

" In conſequence of the general opinion that dung, or any kind of manure, contributes greatly to fertilize land, and makes it produce more than it would otherwiſe do, it is to be obſerved, in the firſt place, that part of the land of the three farms was dunged, and that my fields, cultivated in beds, had not had any dung or other manure for many years.

" Secondly, that the lands of the three farms are always fallowed every ſecond year; whereas my fields have been ſown every year ſince they firſt began to be cultivated in the new way, and have already borne ſeveral crops running.

" Thirdly, it ſhould be conſidered, that the year 1756 was extremely rainy: a circumſtance by no means favourable to ſtrong ſtiff ſoils, like mine; and at the ſame time rather beneficial than hurtful to the three farms, a great part of which is light land, which requires frequent rain.

" Laſtly, the reader will remember, that about a third part of the ſecond farm was overflowed, whereby the crop was diminiſhed: but, on the other hand, I think this damage is pretty nearly compenſated by the accidents which happened to my field, (experiment Numb. IV.) which certainly leſſened the crop conſiderably.

" Theſe reflections ſeemed to me neceſſary, in order to give a juſt idea of the compariſon I am going to make, which, I believe, will be ſufficient to prove what I purpoſed to ſhew."

Compariſon of the Produce of Land ſown in equally diſtant Rows with the Drill-Plough, with that of other Land laid out in Beds.

" The neat produce of the three farms, containing about 169 acres, which were ſown in equally diſtant rows with the drill-plough, was, after deducting the ſeed,

		Pounds.
Of the	Firſt farm — — — — —	69732
	Second farm — — — — —	15456
	Third farm — — — — —	26550
	Total neat produce —	111738

" Neat produce, after deducting the ſeed, of the fields laid out in beds, and ſown with the drill-plough; with the number of each experiment, and the meaſure of each field.

			Pounds.
EXPERIMENT, Numb.	2.	— 1½ acre —	1834
	4.	— 15 — —	2824
	5.	— 7¼ — —	2156
	6.	— 2½ — —	627
	7.	— 15 — —	5750
	8.	— 1 — —	1850
	9.	— 6 — —	1924
	10.	— 6 — —	2352
	In all	54 acres.	
	Total neat produce in 1756 —		19317

" After the beds are once formed, the ſame fields are ſown every year: conſequently theſe will produce another crop in 1757, which, ſuppoſing it to be only equal to the laſt, though there is great reaſon to think it will be much better, will again be — — — — — 19317

" Fifty-four acres will then produce neat, in two years — — — — — — — 38634

" The 169 acres of the three farms ſown in equally diſtant rows with the drill-plough, will not produce any thing in 1757, that being their year of fallow; conſequently their neat produce in two years, will have been only 111738 pounds of wheat, whilſt the fifty-four acres made into beds, will have produced 38634 pounds. But ſuppoſing the 169 acres to have been cultivated in beds, and their produce to have been in the ſame proportion as that of the fifty-four acres, it would amount to 134769 pounds, which is 23031 pounds more than they produced when ſown in equally diſtant rows with the drill. This difference ought never to be forgot.

" The new method of laying the land out in beds, has ſtill greater advantages than this. Our compariſon has been only of the neat produce of 169 acres, which were ſown the ſame year in the three farms: but it is to be obſerved, that theſe farms conſiſted of 169 acres more, which were under fallow for the next year's crop. The neat produce of the crops of thoſe 338 acres in the two years of ſowing them in equally diſtant rows with the drill-plough, ſuppoſing both crops to be equal, would be

	Pounds.
For the firſt year, 169 acres — —	111738
For the ſecond year, for the other 169 acres	111738
For the two years — — —	223476

" If theſe 338 acres were laid out in beds, they would be ſown each year, and their neat produce, ſuppoſing both years alike, would be,

	Pounds.
For the firſt year, 338 acres — —	134769
For the ſecond year, 338 acres —	134769
For two years — — —	269538

" So that this calculation proves plainly, that the 338 acres will produce 46062 pounds of wheat more when cultivated in beds, than when ſown in equally diſtant rows with the drill-plough: a difference which, in ten years, will amount to 230310 pounds of grain.

" As great as this advantage is in favour of the beds, it will appear very ſmall when compared to that which the culture in beds has over the Old Huſbandry: as the following calculation will ſhew.

" Let us firſt ſettle what would have been the neat produce (by which we always mean that which remains after deducting the ſeed) of the 169 acres of the three farms, for one year; and afterwards that of the other 169 acres the next year, ſuppoſing both crops to be equal.

" We have already ſeen that the produce of 169 acres would, at moſt, not have exceeded 55200 pounds of wheat, in 1756. But as that was a bad year, I will make the following compariſon on the footing of a good crop, in order to give the Old Huſbandry every advantage that can poſſibly be deſired. I will therefore ſuppoſe the neat produce of 169 acres to have been the firſt year

	Pounds.
	76000
And that of the other 169 acres, the next year — — — — —	76000
For the two years —	152000

" We have ſeen that the ſame 338 acres cultivated in beds, reckoning their neat produce for two years only on the footing of the bad crop of 1756, would have yielded 269538 pounds of wheat; conſequently this culture would have produced in two years 117538 pounds of corn more than the Old Huſbandry; and this difference, in ten years, would amount to 587690 pounds.

" The great advantage of the New Huſbandry, in general, and that of laying the ground into beds, in particular, is, I think, now fully proved. The difference is great indeed! But I believe it will be ſtill much greater hereafter, when the yearly obſervations of the followers of this new way, whoſe number increaſes daily, ſhall have brought this culture to a greater degree of perfection; which I hope will, in ſome meaſure, be the caſe next harveſt."

Reſult and Compariſon of divers Experiments in Agriculture made at Fontclaire, *near* Avignon, *by* M. d'Elbene, *in the Years* 1757, 1758, *and* 1759. *Communicated to* M. Duhamel, *and publiſhed by himſelf in his Book, entitled, Culture des Terres, Tom.* VI. *C.* I. *Art.* 17.

EXPERIMENTS *made in* 1757.

" The principles of the New Huſbandry ſeemed to me ſo well eſtabliſhed, that I reſolved to practiſe it. To this end, I took into my own hands the farm I am now going to ſpeak of, in 1756; and, not to burthen myſelf with ſo conſiderable a detail as muſt of courſe ariſe from the number of labourers neceſſary to cultivate ſuch an extent of ground, I divided the greateſt part of it into lots, which I aſſigned to peaſants who undertook to perform by hand moſt of the work that was to be done, and to be at all the expence of harveſting, to the laying up of the corn threſhed and winnowed, in conſideration of one half of the produce.

" The ſhare of each of theſe peaſants was about three acres, of which one half was to lie fallow every year. They took great care to portion out the land in ſuch manner that the good and bad were equally divided among them.

" Some fields of an excellent quality were not included in this diſtribution: but the farmers to whom I entruſted them promiſed me two hundred pounds of wheat for every acre, over and above the half of the product.

" I deſtined two fields, one of which was pretty good, and the other very bad, to be laid out in beds.

" M. de Chateauvieux was ſo kind as to ſend me the ploughs, drill, and cultivator, which he has invented: but I did not receive them in time for this year's preparation of the ground, which had but two ploughings.

" I began to ſow a ſmall part of my fields, according to the new method, on the 19th of Auguſt. The reſt was ſown before the 25th of September, and the peaſants ſowed theirs in the beginning of October.

" The autumn was rainy, and favourable to the riſing of the corn, which made a great progreſs before the beginning of winter: but this ſeaſon proved ſo very wet and cold, that my plants ſuffered greatly in thoſe lands where they are apt to be forced out of the ground by froſt: many of them were abſolutely torn up in ſeveral fields ſown according to the old way, or in equally diſtant rows with the drill plough; and ſeven or eight acres were ſtripped entirely of all their growth.

" The beds, being arched, eſcaped unhurt, becauſe the wet did not ſettle upon them. Favourable weather in the ſpring, accompanied with gentle rains, repaired the miſchief which the winter had done, wherever any plants remained.

" The wheat in the new way began to ear on the 20th of April; and that in the old way, on the 5th of May. The grain was full grown by the end of this month. Frequent rains and dews which fell in June kept the earth cool, without too much haſtening the corn, which was reaped between the 21ſt of June and the ſecond of July. The ſheaves were very long, very heavy, and yielded plentifully in all my land: I found pretty commonly, in my beds, ears which had from eighty to ninety fine plump grains: but in my other ground, the largeſt did not contain above twenty-five, and part of them was ſhrivelled.

" The crops were but indifferent in this country, in general. They were very bad in ſeveral places; and thoſe of my neighbours who had the beſt, looked upon this as a middling year. As I had found it a very good one in this farm, I was deſirous to aſcertain the degree of advantage ariſing from good culture; for I could not impute the ſuperiority of my crops to any other cauſe. To this end I computed what theſe ſame lands had produced when cultivated in the ſame way as all others ſtill are in theſe parts. I could eaſily do this, as my father, grandfather, and great-grandfather had kept very exact accounts of all their crops, and the original papers relating thereto are now in the hands of my father at Avignon. I there found the whole detail, year by year, ever ſince 1677, and carefully made from thence the following calculation.

Reſult of the Produce of the Lands of this Farm from the Year 1677, *to* 1756, *incluſively.*

The quantity of land ſown in this ſpace of time was	4660 acres.
With	875887 l.
Which yielded	2914987 l.
The neat produce, after deducting the ſeed, was	2039099 l.
But as only one half of the land of this farm was ſowed every year, whilſt the other half lay fallow, it is evident that this quantity of corn was produced by double the land above-mentioned; that is to ſay, by	9320 acres.
Which produced	2039099 l.
The farmer had half of this product, for the expence of culture. Conſequently the landlord had but	1019549 l.
From whence it follows that the landlord received for each acre of land	109 l. 6 oz.

Produce, from 1677, *to* 1756.

" To eſtimate this produce in money, I ſuppoſe the price of the fineſt wheat to have been conſtantly at eight ſhillings and nine-pence for an hundred pounds weight, which is the medium value in theſe provinces. The corn of which I now ſpeak was not worth ſo much; a conſiderable quantity of oats and rye being included in the above product, and likewiſe the ſiftings, which are, taking one year with another, from fifteen to twenty per cent. An exact calculation of the neat produce of ſome years proved that this diminution was from thirty-five to forty per cent. but to avoid all error, I deducted only thirty per cent. from the fixed price of the fineſt wheat. This gave me ſix ſhillings and three halfpence for an hundred pounds of my corn, and ſix ſhillings and eight-pence for the 109 pounds above-mentioned, which was the medium annual produce of each acre of land during the ſpace of eighty years.

" By thus calculating the crops every year, I was enabled to know the advantage of each different kind of culture. The greateſt part of my farm was ſowed in the old way in 1756; a ſmall portion of it was ſowed in equally diſtant rows with the drill-plough, and only two pieces of ground were managed according to the principles of the New Huſbandry.

Produce, in 1757, *of the Land ſown in the old Way.*

I ſowed	58 acres.
With	9722 l.
They produced	55849 l.
Deducting the ſeed, there remained	46127 l.
Abating half of this for the year of fallow, in which theſe lands do not produce any thing	23063 l. 8 oz.
And likewiſe the huſbandman's half, I had, as landlord	11531 l. 12 oz.
So that each acre of land yielded me	198 l. 13 oz.
Or, at ſix ſhillings and three halfpence the quintal, for the reaſons before mentioned	12 s. 2 d.

Produce, in 1757, *of Land ſown in equally diſtant Rows with the Drill-Plough.*

I ſowed	2 acres and ½.
With	198 l. 12 oz.
Which produced	2400 l.
Deducting the ſeed, there remained	2201 l. 4 oz.
Of which abating half for the year of fallow	1100 l. 10 oz.
And deducting alſo the labourer's half	550 l. 5 oz.
I had, for the produce of each acre,	220 l. 2 oz.
Worth, at 6 s, 3 halfpence the quintal,	13 s. 6 d.

Produce, in 1757, of the Land ſown according to the Principles of the New Huſbandry.

I ſowed - - - - - - - - - -	5 acres and ¾
With - - - - - - - - - -	110 l. 10 oz.
Which yielded - - - - - - - -	4837 l. 8 oz.
Deducting the ſeed, there remained, -	4726 l. 14 oz.
And abating only half of this, for the huſbandman's ſhare, becauſe this land is never fallowed, I had, as proprietor	2363 l. 7 oz.
So that my product from each acre, was	411 l. 1 oz.
Which, at 7 s. and 10½ d. the quintal, at which I rate it for the following reaſons, makes	32 s. 4½ d.

" I did not think it right to deduct here the thirty per cent. from the medium price of the fineſt wheat, becauſe all this laſt was perfect grain, quite clean, and entirely free from any mixture of ſeeds of weeds; whereas I had not only reaped rye, oats, and barley, among that which was raiſed in the old way; but the ſiftings there were very conſiderable, and the corn, even after that, was not near ſo fine as the growth of the New Huſbandry. I deducted however ten per cent. from the price of the very beſt wheat, that I might not be any way partial to this method, though I ſold its produce at the higheſt price.

" The advantage of the New Huſbandry was infinitely greater than I expected. I am ſure that my reckoning is right; for my lands were diſtributed in ſuch manner that I could not miſtake. Each peaſant laid his ſheaves in a ſeparate heap, threſhing them, winnowed their grain, and divided the product with me. My ſheaves were alſo piled up, threſhed, and winnowed apart, and their produce was meaſured before all my ſervants and a number of peaſants, who were aſtoniſhed at it.

" It is true, that I mixed the ſheaves reaped from the ground ſowed in equally diſtant rows with the drill-plough, with thoſe of the beds: but I reckoned before hand the quantity of each, as I could eaſily do by means of the tythe, which is every twelfth ſheaf, and made my calculations according to the number of the ſheaves, though thoſe of the beds certainly contained the moſt grain.

" Some of my neighbours, determined by the great ſuperiority, which they had obſerved from the very firſt of my corn in the beds, beyond all the reſt, reſolved to practiſe the New Huſbandry: but moſt of them were deterred by a notion of its being too expenſive. This objection deſerved ſerious attention. I therefore, to know how far it was really founded, calculated the expence of each kind of culture in a manner leſs ſubject to error than any former way of reckoning. I ſuppoſed all the work to be done by day-labourers; and I had thereby a ſure means of compariſon, by ſuppoſing, as I could eaſily do with certainty, the quantity of work which a plough or a man did in a day, and how much each of them earned.

" I made this calculation in 1758, and ſent a copy of it to M. de Chateauvieux: but as I had forgot to notice there the charges of weeding and reaping, which are articles of conſiderable expence, I have inſerted that omiſſion in the following more careful computation.

" *Expence of the firſt Year's Culture of an Acre of Land, when it is firſt laid out in Beds.*

" To give an acre of ground that perfect tilth which M. de Chateauvieux deſcribes, will coſt, in this country, including the expence of weeding, performed by hand with hoes four inches wide (which will ſtir the ground pretty well) and all the charges of harveſt, to the laying up of the corn winnowed and cleanſed

l. s. d.
2 3 3

" The culture which I intend to practiſe, and which conſiſts in only the four firſt ploughings of the above article, with the ſame expences of weeding and harveſting, coſts 1 12 8

" The culture which I gave to my land in 1756, conſiſting in one ploughing in broad lands, and a ſecond to arch up the beds, with the expence of weeding and harveſting, as above, coſt me - - 1 3 4

l. s. d.

" Two ploughings in broad lands in 1757, with the ſame expences as before in other reſpects, coſt me - - - 1 8 7½

" *Annual Expence of cultivating an Acre of Land after the Beds are formed.*

l. s. d.

" To bring an acre of land to perfect tilth, by giving it five ploughings, three of which are performed with the plough, and two with the cultivator in the alleys, and a ſixth thorough ploughing of the whole ground immediately after harveſt, will coſt, with the ſame expences of ſowing, weeding and harveſting, as before mentioned - - 1 2 7

" I have not yet given this general ploughing to the whole of any of my fields; but have hitherto reſtricted the ſixth ploughing to the alleys only. This, with the ſame expences as before for all the reſt, has coſt me 1 0 0

" *Expence of cultivating an Acre of Land according to the Old Method.*

l. s. d.

" It is proper to obſerve, that, in all the following calculations, I have charged the huſbandman with only half the real coſt of each kind of culture for each year, becauſe the lands, being reſted alternately, are cultivated only every other year. I give a peaſant four acres of land to cultivate, and he ploughs two of them every year. The culture of theſe two acres coſt him (at 2 l. 12 s. each) 5 l. 4 s. which is after the rate of 1 l. 6 s. a year for each of his four acres

" The perfect culture of our peaſants, who give the ground five ſtirrings by hand, the firſt with a kind of ſpade (with which they dig twelve or fourteen inches deep) and the four others, including that which ſerves to bury the ſeed, with a ſort of hoe or mattock (which ſtirs the earth eight or ten inches deep) coſts, with the uſual expences of weeding, getting in the harveſt, and cleanſing the corn - - - 1 6 3

" The culture of the peaſants, which is now practiſed throughout the whole of my eſtate, conſiſts in four ſtirrings of the earth, the firſt of which is performed with their ſpade, with which they are ſo idle as not to dig deeper than ſeven or eight inches: the ſecond is given with a kind of hoe, which does not penetrate above five or ſix inches deep; the third with the common plough of this country, without wheels or mould-board, which even when drawn by the ſtrongeſt mules, can never enter deeper than five or ſix inches; and the fourth, which ſerves to bury the ſeed, either with that plough or their hoe, which ever they like beſt. Their expences of weeding, reaping, &c. are the ſame as in the foregoing article, and it coſts them in all for each acre of land - - 0 18 4

" Within theſe few years paſt, ſome more careful huſbandmen give the firſt ſtirring with a plough with one wheel and a mould-board, drawn by ſix ſtout mules. This cuts ſeven or eight inches deep; and they perform the five other ſtirrings with their common plough. Their expences of weeding and harveſting are the ſame as thoſe of the peaſants, and each acre coſts them 0 15 7

" Some give but two ploughings inſtead of five, with the common plough of this country. Their expences are the ſame in other reſpects, and the acre coſts them 0 11 6

" The generality of our huſbandmen do not yet uſe wheel-ploughs. The moſt diligent among them give ſix ploughings with the common plough of this country. Their

expences

	l.	s.	d.
expences for weeding and getting in the harveſt are the ſame as above, and the acre ſtands them in - - -	0	13	5
“ The ſlothful, who, unhappily, are the greateſt number, give their land only three ploughings with our common plough: but as they cannot avoid the expence of reaping and houſing their corn, each acre coſts them	0	9	2

“ The charge of tillage is not near ſo great to thoſe who aſſiſt perſonally at the work, or even to thoſe who keep their own labourers and cattle. A minute examination of this point induces me to think, that it does not coſt the former above half, nor the latter above two thirds of the ſums mentioned in the foregoing accounts.

“ From hence it follows, that every huſbandman will be repaid his diſburſements whenever his ſhare of the product, which is always equal to that of the landlord, is, for him who labours perſonally, one half, and for him who does every thing by his ſervants, two thirds of the above ſums; and that he will find a very conſiderable advantage in practiſing any method of which the product will repay his advancing money to day-labourers to do the work.

“ A proof of this is, that the peaſants who tilled my lands were very well ſatisfied with their gain, though their expences amounted to eighteen ſhillings and fourpence, and like me, they cleared but thirteen ſhillings and ſixpence by each acre of ground.

“ Where the land was ſowed in equally diſtant rows with the drill-plough, the expences were the ſame as in our common way; but the profit was greater.

“ Though the expences of the New Huſbandry, where the land was laid out in beds, amounted to 1 l. 3 s. 4 d. an acre; yet it was more advantageous to the huſbandman, who cleared, as I did in quality of landlord, 1 l. 12 s. 6 d.

“ We ſee, however, by theſe calculations, and the fact really is, that ſuch expence attends the laying of land out in beds, as may very often not be repaid the firſt year; but when the New Huſbandry is once eſtabliſhed, thoſe expences leſſen; and it appears that the cultivator will find his account in practiſing it, as much as the owner of the land.

EXPERIMENTS *made in* 1758.

“ My ſucceſs determined me to increaſe the number of my beds. I prepared, more carefully than the year before, a large piece of land, the ſoil of which was bad, and of which my farmers uſed always to ſow a part with rye or oats. Several peaſants adopted the method of ſowing in equally diſtant rows with the drill-plough. I ſowed my lands in the New Huſbandry in the month of September, and my other fields in October. The earth was ſtill gravelly, in poor tilth, and wanted moiſture. No rain fell during the months of September, October, and November. The corn roſe but indifferently even in the beſt prepared ſoils, and ſcarce a fourth part of it roſe in the common fields. It made very little progreſs before winter, and was not forwarder in the middle of January than it commonly is a fortnight after being ſown. We had, however, in December, and in the beginning of January, ſome ſlight rains, which, though they did not penetrate far into the earth, were ſufficient to make ſome of the corn that had not yet appeared, ſprout, and even to give the country a greeniſh hue. Froſts, which laſted from the 18th of January to the fourth of February, with ſuch ſeverity as is ſeldom known in this country, ſoon baniſhed this gleam of hope. They were accompanied with an impetuous north wind, which added greatly to the violence of the cold. I viſited my corn as ſoon as the weather began to grow a little mild, and found its blades abſolutely withered, though I ſtill diſcovered, with difficulty, a yet green part in the heart of ſome of the plants: but half of them were ſo totally deſtroyed, as not to retain the leaſt ſign of verdure. In ſome places, which were ſheltered from the wind, the blades were not at all withered, which made me think that the miſchief done to the reſt might proceed from ſome pernicious quality in the ſharp wind, rather than from the froſt.

“ Though the plants were dead, they ſtuck faſt in the ground, and none of mine were either rooted up, or laid bare by the froſt. The great drought preſerved them from this accident, which would have totally ruined all the corn.

“ The thaw was without rain, of which we had not any till the 14th of April, when it might have been of ſervice to the plants, but that ſnow (a phenomenon almoſt unknown here, even in the winter) fell on the 17th, and was followed by a hard froſt, which laſted two days, and not only prevented the good effects which we expected from the rain, but likewiſe did conſiderable hurt to all the productions of the earth, which, though they did not immediately appear to have been injured thereby, grew but poorly afterwards.

“ My corn in the New Huſbandry, where the intervals between the beds had been hoed at the end of February throve well, and began to look promiſing: but within a few days after the froſt, I perceived marks of its being rickety, and this diſtemper ſoon made a rapid progreſs.

“ The wheat in the common way, even in the beſt ſoils, was very thin, had not tillered, and was ſtill in nearly the ſame condition as at the end of the winter.

“ The rain which fell on the 23d of April did not do any good, nor had we any more of it from that time till the 27th of May. The corn was then in a deplorable condition: the ears of that in the New Huſbandry were beginning to appear; the winter had not left a third part of the plants, and moſt of thoſe that did remain were ſtinted and quite rickety.

“ The lands in the old way promiſed ſtill leſs. The plants there, beſides continuing to be very thin, were crooked and rickety, and ſeemed ſcarcely able to put forth their ears.

“ Thirteen acres of extraordinary good land, the culture of which was not begun till after the froſt on the 19th of April, were the only ſpot that afforded ſome little hope. 'Till that froſt, the wheat in the beds was greatly ſuperior to any in this ground. Could the cauſe of this alteration proceed from the froſt's acting more powerfully upon, and conſequently doing greater injury to, the plants which were in full ſap, and whoſe ſhoots were yet tender, than on thoſe where the ſap was not yet in motion, and which had not yet begun to ſpindle? I thought ſo, and to me it ſeemed probable.

“ Buſineſs obliged me to be abſent during the firſt fort'night in June, and I was greatly ſurpriſed at my return to find the corn, which had ſcarcely begun to ear when I left it, almoſt ready to ripen. Cold dews followed by great heats, and perfectly ſcorching weather which we had from the 6th to the 12th of June, joined to the dryneſs of the earth, occaſioned this ſudden change.

“ A violent north-eaſt wind, which blew impetuouſly from the 18th to the 21ſt of June, completed our misfortunes, by ſhedding great part of the corn which bid faireſt to ſucceed. The loſs occaſioned by this accident was valued at one-third of the crop: nor could it well be leſs; for, after ſome ſhowers which fell in July, the whole field was covered with young plants, as thick as if they had been ſown upon the ſtubble.

“ The crop was reaped between the 21ſt and 29th of June. It could not be a good one after ſuch adverſe events; nor was I, conſequently, ſurpriſed at finding the reſult of it different from that of the preceding year.

Product, in 1758, *of the Lands ſowed in the old Way.*

“ I have kept a ſeparate account of one part of theſe lands, conſiſting in meadow ground newly broken up, and a field that was dunged all over in 1756, which never happened to any other, either wholly or in part. The peaſants charged with the culture of this part engaged to give me two hundred pounds of grain over and above the half of the product.

“ *Produce, in* 1758 *of the very good Lands ſown in the Old Way.*

I ſowed - - - - -	13 acres.
With - - -	2424 l. 6 oz.
Which produced - - -	10005 l.
Deducting the ſeed, there remained	7580 l. 10 oz.
Abating half of this for the year of fallow - - -	3790 l. 5 oz.
And alſo half of this remainder for the labourer's ſhare, I had, as owner of the land - - -	1895 l. 2 oz. ½
So that each acre yielded me -	145 l. 12 oz. ½
Worth in money, at ſix ſhillings and three halfpence the quintal	8 s. 11 d. ¾

“ The labourer, being obliged by our agreement to give me part of his half, had, in reality, but 46 l. which may be valued at 2 s. 9 d.

“ *Produce, in* 1758, *of the ordinary Lands ſown in the Old Way.*

I ſowed - - -	25 acres.
With - - -	4316 l. 4 oz.
Which produced - -	8760 l.
Deducting the ſeed, there remained	4443 l. 12 oz.
Allowing half of this for the year of fallow	2221 l. 14 oz.
And half of the remainder for the labourer's ſhare, I had, as landlord	1110 l. 15 oz.
Which makes for each acre -	44 l. 4 oz. ½
Worth in money, at ſix ſhillings and three halfpence the quintal	2 s. 8 d. ½

“ I afterwards united theſe two calculations, in order to have the total product of my lands ſown in the old way, and found it to be as follows.

“ *Produce in* 1758, *of all the Land ſown in the Old Way.*

I ſowed - - - -	38 acres.
With - - -	6740 l. 10 oz.
Which produced - -	18765 l.
Deducting the ſeed, there remained	12024 l. 6 oz.
Allowing half for the year of fallow	6012 l. 3 oz.
And half of this for the labourer's ſhare, I had, as landlord	3006 l. 1 oz. ½
Being, for each acre - -	79 l. 2 oz.
Which in money, at ſix ſhillings and three halfpence the quintal, is equal to	4 s. 8 d. ¼

“ *Produce in* 1758, *of the Lands ſown in equally diſtant Rows with the Drill-plough.*

I ſowed - - -	9 acres.
With - - -	916 l. 14 oz.
Which produced - -	3406 l. 14 oz.
Deducting the ſeed, there remained	2490 l.
Allowing one half of this for the year of fallow -	1245 l.
And deducting again the labourer's half, there remained	622 l. 8 oz.
I received as landlord for each acre, in corn	69 l. 2 oz.
And in money, at ſix ſhillings and three halfpence the quintal	4 s. 3 d.

Note, I have included here the product of two thirds of an acre of meadow land newly broken up, which yielded ſeven times the ſeed.

“ *Produce in* 1758, *of the Lands ſown according to the New Huſbandry.*

I ſowed - - -	18 acres and ½
With - - -	703 l. 4 oz.
Which produced - -	2250 l.
There remained, after deducting the ſeed	1546 l. 12 oz.
And allowing half of this for the labourer, as the lands in this huſbadry are never fallowed, there remained for the landlord	773 l. 6 oz.
Being for each acre in corn	41 l. 11 oz. ½
And in money, at 7 s. 10 d. ½ the quintal	3 s. 3 d. ¼

“ Our very unfavourable ſeaſons could not but affect the crops; nor was it poſſible that any kind of culture ſhould guard againſt the repeated accidents which befel my corn. The misfortune extended to all the neighbouring provinces, and wheat, which had not been at above nine ſhillings and two-pence farthing the quintal, for ſeveral years paſt, roſe to thirteen ſhillings and three halfpence, and kept at this price during the whole year, notwithſtanding that there was a great deal of old corn in all the granaries, and quantities arrived from other countries.

“ This unſeaſonable weather was not only fatal to the corn, but likewiſe to all vegetation. Though the leaves of our mulberry trees did not ſeem to have been much hurt by the froſts in April, they were, however, ſo damaged, as to become pernicious to the ſilk-worms, which did not ſucceed any where. The winter killed all the clover in our fields; we had very little early crops of hay; not any ſpring corn, and ſcarcely half the uſual quantity of wine and oil: even our ſaffron, which is a conſiderable article in this country, produced very few flowers: in ſhort, the oldeſt man could hardly remember ſo bad a year. The New Huſbandry did not fare better than the Old: it could not reſiſt the rigour of the cold, which deſtroyed very many of the plants, and all the blades of the corn. The froſts in April were ſtill more fatal by the rickety diſtemper which they occaſioned; and the high winds in June did greater hurt to the wheat in the beds, where the grain was leaſt ſhrivelled, than to that in the old way. It appeared from an eſtimate of a number of ears taken as they came, without culling them, that half the product of the beds was loſt through this laſt accident.

“ Notwithſtanding all theſe misfortunes, when it is conſidered, that two thirds of my fields in the New Huſbandry were my worſt lands, and that the whole of them cannot be compared with thoſe of the farm in general, and much leſs with lands of the very beſt quality, it will be found, that this method afforded a profit, though not ſuch as to induce one to prefer it to all others.

“ I had already prepared another field of about four acres, in order to lay this likewiſe out in beds, as in fact I did: but I reſolved to wait the event of the year 1759, of which I am now to ſpeak, before I proceeded farther in this method.

EXPERIMENTS *made in* 1759.

“ Rain, which we wanted before harveſt, came after it, in ſuch abundance, that all work in the field was ſuſpended during the whole ſummer.

“ Twelve acres of my land in beds ſuffered greatly by an inundation of the Oveze, a neighbouring river, which overflowed its banks on the 6th of July. The water drowned entirely all this ground, and waſhed away the ſummit of the beds in ſeveral places. The plough could not begin to work till September; and though the culture which I then gave formed new ridges, yet it could not pulveriſe the earth, or arch up the parts intended to be ſown, which, in many places, were ſettled lower than the ſtubble.

“ I ſowed all my lands in the New Huſbandry within the firſt fortnight in September, and thoſe in the old way before the middle of October. The autumn was very rainy, and conſequently favourable to the ſprouting of the corn, which was however ſomewhat too thin in the part that had been overflowed. The plants in the beds were very fine in the beginning of December (at which time I was obliged to loſe ſight of them) excepting the field of about four acres, which was now ſown for the firſt time in this way, but with two turns of the drill-plough, and in which the corn began to be ruſted. I did not return to this farm till the middle of April.

“ The winter had been very mild and wet. I found the corn in the beds very fine, and ſuperior to all the reſt, but too thin in the places which had been damaged by the flood. The field which began to be ruſted in autumn, was now more ſo, and promiſed little; but, through the negligence of my ſervants, the alleys wanted ſtirring, and weeds choaked the corn in ſeveral places. I endeavoured to remedy this by good hoeings and careful weedings, which could not be performed in this advanced ſeaſon, without pulling up many of the plants of corn. Notwithſtanding all of my endeavours to correct the evil, I am perſuaded that this neglect coſt me a part of the crop I might otherwiſe have had.

" We had a good deal of rain on the firſt and ſecond of May; but a ſharp north-eaſt wind, which blew violently during the reſt of that month, hurt the corn greatly when it firſt began to ſpindle, and dried the earth at a time when we never find it too moiſt.

" Gentle rains and plentiful dews, which fell in the beginning of June, ſucceeded this ſtormy weather, and ſeemed to remedy the miſchief which the high winds had done.

" The wheat was cut between the 16th and 27th of June. Its ſtraw was ſhort, though long enough to bind up in ſheaves, which looked well. The grain was plump, and of a very good quality. The only complaint was of its being mixed with a great quantity of darnel.

" We had hopes of a plentiful harveſt. The price of wheat fell at once, towards the end of June, from thirteen ſhillings to ſeven ſhillings and ten-pence the quintal; but by the middle of July it roſe to twelve ſhillings and three-pence, and ſtill keeps at that price in the preſent month of January, 1760, notwithſtanding the immenſe quantities which arrive here daily from other countries.

" Our flattering hopes ſoon vaniſhed. The ſheaves yielded but very little grain, and the harveſt proved extremely bad, contrary to the expectation of every one. I endeavoured to trace the cauſe of this miſtaken opinion, and found it to be, that our huſbandmen had judged by the length of the ears, without conſidering that a great many huſks were ſo empty as not to have the appearance of corn in them. This accident ſeemed to me to have been occaſioned by the plants having loſt their bloſſoms, through the impetuoſity of the winds, which never ceaſed to blow with great violence during the whole time that the wheat was in bloom, and whilſt the grains ſhould have kerned.

" The corn in the New Huſbandry was equally affected by theſe adverſe events; but its ears were better filled with grain, than thoſe of the wheat raiſed in the old way.

" The people in theſe parts look upon this year as having given but half a crop: mine was tolerably good.

Produce, in 1759, of the Lands ſown in the old Way.

I ſowed	23 acres	
With	3731 l.	4 oz.
Which produced	17202 l.	8 oz.
Remained, after deducting the ſeed	13471 l.	4 oz.
Allowing half of this for the year of fallow	6735 l.	10 oz.
And half of the remainder for the labourer	3367 l.	13 oz.
I had, for each acre of land	146 l.	7 oz.
And in money, at ſix ſhillings and three-pence the quintal	9 s.	

Produce, in 1759, of the Lands ſown in equally diſtant Rows with the Drill-Plough.

I ſowed	20 acres. ½	
With	2353 l.	2 oz.
Which produced	19221 l.	14 oz.
Deducting the ſeed, there remained	16968 l.	12 oz.
Allowing half of this for the year of fallow	8484 l.	6 oz.
And half the remainder for the labourer's ſhare	4242 l.	3 oz.
I had, for each acre	206 l.	15 oz.
And in money, at ſix ſhillings and three halfpence the quintal	12 s.	3½ d.

Produce, in 1759, of the Lands ſown according to the Principles of the New Huſbandry.

I ſowed	24 acres.	
With	1261 l.	14 oz.
Which produced	12150 l.	
Deducting the ſeed, there remained	10888 l.	2 oz.
And only half of this for the labourer's ſhare, as theſe lands are not ever reſted, I had	5444 l.	1 oz.
Which is for each acre of land	227 l.	7 oz.
And in money, at 7 s. 10½ d. the quintal	17 s.	9 d.

" I may, perhaps, be thought to favour the New Huſbandry in my eſtimate of its produce, in money: but I can aver that, this year, my land in beds, though part of it was deemed fit for rye only, produced nothing but very fine wheat, which ſold at market for twelve ſhillings and three-pence the quintal. My lands ſown in the old way, or in equally diſtant rows with the drill-plough, produced 4200 pounds of oats, 900 pounds of barley, and 800 pounds of rye. The ſiftings of my wheat raiſed in the Old Huſbandry amounted to a twelfth part of the crop; ſo great was the quantity of darnel mixed with it: a quarter part of the remainder ſold only at the price of rye, and the very fineſt part of it fetched no more than 10 s. 6 d. the quintal, at the very market where the wheat of my beds ſold for 12 s. 3 d. without having been ſifted.

" I have, however, deducted ten per cent. from the wheat of the New Huſbandry, though it ſold at the higheſt price, and have abated only thirty per cent. on that of my other lands, though an exact calculation proved to me that the loſs upon it amounted really to thirty-three per cent.

" The dearneſs of corn this year increaſed the price of all the productions of the earth to above one third more than before: a circumſtance which added conſiderably to the value of every advantage in huſbandry, as the expences attending this were ſtill the ſame.

" The reſult of theſe three years afforded a manifeſt evidence of the benefits which accrue from good tillage, and ſeems to prove plainly the ſuperiority of the drill-plough over the common method of ſowing, and that of the New Huſbandry over the Old.

" The harveſt in 1757 was but middling throughout this country, and good in my farm only. It was bad in 1758, becauſe nothing could poſſibly guard againſt ſuch adverſe weather as we then had. In 1759, no one in theſe parts had ſo good crops as mine were. Theſe ſucceſſes cannot be aſcribed to any other cauſe than the manner in which my lands have been cultivated.

" The diſtribution of my lands proves likewiſe evidently the advantage of ſowing in equally diſtant rows with the drill-plough. My peaſants ſpared no pains to render their reſpective portions equally fruitful. They cultivated them in the ſame manner, excepting only in the ſowing of the ſeed, where the drill-plough, ſowing in equally diſtant rows, always yielded a greater profit than the common way.

" The lands ſown in beds yielded ſtill more grain than thoſe ſown either in the old way, or in equally diſtant rows with the drill, in 1757 and 1759. This advantage cannot have been owing to any other cauſe, as I did not uſe dung any where; the culture there was not performed more carefully than in my other grounds; it coſt very little more than that of the peaſants; and a part of the fields in beds is known to be ſome of my worſt land, for which reaſon my farmers had always uſed it for rye.

" The year 1758 was ſo fatal to all the productions of the earth, that we ought rather to wonder at our having had a crop, than at its being very ſcanty.

" I may juſtly flatter myſelf that my ſucceſs will be ſtill greater in future years: my culture is improved by practice, my lands are brought into better tilth, my peaſants become accuſtomed to the new method, their repugnance to it leſſens, and I daily ſee faults of my committing, which now are leſſons to me.

" I was long perplexed about the proper time of ploughing in the ſtubble: but various trials induce me now to think, that this ſhould be done immediately after harveſt. It is what I ſhall practiſe for the future, and I recommend it to all who follow the New Huſbandry. It cannot be done after ſowing, becauſe ploughing then would bury the ſeed; and if it be performed only a little before ſeed time, the clods and ſtubble will neceſſarily obſtruct the operation of the drill-plough.

"My trials during theſe three years have convinced me, that the quantity of ſeed ſhould be diminiſhed in proportion to the goodneſs of the ſoil. The contrary cuſtom prevails in this country, becauſe, ſay our farmers, the richer the land is, the more plants it can nouriſh: but my experience during theſe three years has invariably proved to me that this is a vulgar error."

EXPERIMENTS *made near* Guignes, *in the Province of* Brie, *under the Direction of* M. Rouſſel, *and communicated to* M. Duhamel *in* 1755.

"M. Rouſſel prudently began, as we would advice every one to do, with ſmall experiments. His firſt trial of the New Huſbandry was upon a little ſpot: but being prevented from attending to it in perſon, many faults were committed during his abſence. On his return, which was towards the end of November 1754, he inquired after his crop, and learnt with pleaſure, that ſome grains had produced upwards of ſixty ears a-piece, and that many of theſe ears contained ſixty-four grains. This was ſufficient to ſhew him the excellence of the new culture, which he immediately determined to extend to larger objects.

He had no time to loſe. Two contiguous pieces of ground, containing twenty-four acres, had been folded, and were juſt going to be ploughed for the laſt time, in order to be ſown according to the uſual practice of the country. Theſe were choſen for the farther trial of the New Huſbandry, and were accordingly ſown with the drill-plough, between the ninth and twenty-firſt of October, with 571 pounds of wheat, including ten pounds and an half, which were uſed to fill up ſome ſpaces where the ſeed had miſſed. This is after the rate of about twenty-four pounds to an acre.

At the ſame time, an adjacent piece of ground, which had been folded like the former, and of which the ſoil was equal to the beſt part of the field ſown in rows, was ſowed in the common way. This laſt contained four acres and a half, and took up, 486 pounds of ſeed, which is 108 pounds to an acre.

The corn came up finely in both fields: but that which was ſown in rows happened to be near a wood, from which numbers of rabbits came, and entirely deſtroyed the plants of near five acres: the roots which they left, were eaten up by worms: and the dung of the ſheep-folds produced a great quantity of weeds. This was not all: as the furrows did not run in the direction of the declivity of the ground, the water lodged in them, ſo that the firſt ploughing, which ought to have been given in March, could not be performed till April, when it left a great many clods.

Theſe clods were grown hard by the time of the ſecond ploughing, which was performed with a plough with two mould-boards, which inſtead of breaking and looſening the ground, and laying freſh earth to the roots, only turned thoſe hard clods over upon the rows.

The third ploughing, which was given with a plough with two ſhares, and in more favourable weather, had a better effect.

Notwithſtanding the accidents which had reduced this piece of wheat to ſo wretched a condition, that the huſbandmen ſaid they were ſure it never would produce a crop worth reaping, and that all the labour beſtowed upon it was thrown away; yet, reckoning upon the ſame footing of twenty-four acres, though it would be but juſt to deduct the five which were abſolutely deſtroyed by the rabbits; and ſuppoſing too the crops of 1756 and 1757 to be no greater than that of 1755; M. Rouſſel's calculation proves, that even theſe three crops will ſtill be better than what the ſame field would produce in the common way.

But, ſays M. Rouſſel, if we do the New Huſbandry part of the juſtice it deſerves; and inſtead of including the five acres which the rabbits deſtroyed, we reckon only the produce of nineteen acres prepared in a hurry, and badly ploughed; and even ſuppoſe them to be no better managed in the following years, and the whole extent of the 24 acres, to be only of the ſame quality as the four acres and a half with which it was intended to be compared; the produce of both, in three years, will be as follows.

The nineteen acres produced 11592 pounds of wheat, which was preferred to any other for ſeed, not only becauſe it was finer, but likewiſe becauſe it was quite free from all ſeeds of weeds. This is after the rate of 610 pounds for every acre.

From this, we are to deduct the ſeed, which is, for each acre, twenty-four pounds.

The neat produce of each acre will then be 586 pounds of wheat, free from all ſeeds of weeds.

Suppoſing the crops to be no greater in the following years, though what we ſhall ſay hereafter will ſhew that they certainly will, each acre will have produced neat at the end of three years, 1758 pounds of wheat.

The other piece of ground, which was cultivated in the old way, in order to make the compariſon, produced 1260 pounds an acre, from which we are to deduct 154 pounds for the ſeed.

The remaining neat produce is 1106 pounds.

The ſecond year's produce of this ſame acre, ſowed with ſpring corn, can be reckoned at only half the value of the firſt year's crop of wheat; and the third year produces nothing, being the year of fallow.

Thus the total neat produce of the acre cultivated in the common way will be, at the end of three years, only 1659 pounds; whilſt that in the new way, will be 1758 pounds.

M. Rouſſel *gives the following Account of his Experiments in* 1756, *in a Letter to* M. Duhamel.

"In October 1755, I choſe, in the middle of a fallow field which had been well ploughed, and was not expoſed to any of the accidents I met with laſt year, a piece of ground, which, to make a fair compariſon between the new method and the old, I divided into two equal parts, each containing twelve acres. One of theſe ſpots was ſet apart for the New Huſbandry; and the other, exactly of the ſame quality, and quite contiguous, to be ſowed broadcaſt in the old way.

"This laſt ground had been extremely well dunged by the folding of the ſheep. With regard to the other, which was to be cultivated in the new way, and which compoſed ninety-three beds five feet wide, including the alleys; only eight of theſe beds were dunged by ſheep, and that at the ſame time, and to the ſame degree as the ground by which the compariſon was intended to be made: of the other beds, ſeventy-ſix had no ſort of dung or amendment whatever: and nine were dunged more or leſs, in the manner and proportion hereafter mentioned.

"Moſt of thoſe who practiſe the New Huſbandry uſe no dung at all. I ſuppoſed that their reaſon for rejecting this manure was, the difficulty of finding a proper time to apply it; for whilſt the alleys receive their ſeveral ſtirrings, no wheel-carriage can be admitted with dung without hurting the beds which are ſown, and hardening the looſe mould of the alleys: to carry it on the backs of cattle, would be at beſt a very difficult, tedious, and expenſive way, where any conſiderable ſpace is to be dunged: to ſpread it upon the earth only the moment the ſeed is ſown, is a ſure way to clog up the drill-plough, and hinder its operation, if the dung be not thoroughly rotten; and to breed weeds, which by no means ſuit this culture. To remedy theſe inconveniencies, I contrived the following method. I opened in each of the alleys one of thoſe large furrows which muſt always be every year at the concluding of the ſummer hoeings, in the place where the three rows of ſeed are afterwards to be ſown; and by drawing the plough with two mould-boards once through it, I made it fourteen or fifteen inches wide; which is the breadth that the three rows of ſeed require. The ſpace between two of theſe deep furrows, is exactly the breadth of a cart, the wheels of which going in them, hurt no part that has been ploughed, and do not preſs down or harden the looſe mould; nor do the horſes do any damage, becauſe they neceſſarily tread upon the ſtubble of the late reaped beds, in the middle between theſe two furrows. This was the method I uſed to dung the nine beds, in queſtion. The dung was well rotted: it was ſpread at the bottom of the furrows, and immediately covered over by the ſame ploughing that made the beds which were ſown ſome days after. Perhaps this manure may be of more ſervice to my lands than to many others, becauſe the ſoil is naturally cold and backward. The grain is by this means ſown upon a kind of gentle hot-bed, the warmth of which promotes the branching and vegetation of the plants. The winter rains and froſts, raiſe a fermentation. The firſt ſpring ploughing, by giving it a little air, revives that fermentation at the very time when the ſap is moſt active, and the plant begins to branch. As the dung rots, a kind of motion is cauſed in the earth, which in ſome meaſure anſwers the end of a ſlight ploughing, and brings freſh nouriſhment to the roots. The ſame heat as conſumes the ſtraw, likewiſe conſumes the little ſeeds that are in the dung, which might otherwiſe produce numbers of weeds. When this dung is brought up again to the ſurface of the earth, by the next year's ploughings, it will no longer have thoſe hurtful ſeeds. It will indeed have loſt its heat; but it will ſtill have retained all its fatneſs, which will mix with the earth; and land thus conſtantly dunged, will in time become a perfectly fine mould. But if theſe layers of dung ſhould be ſpread too thick, or the dung itſelf be of too hot a nature, the roots of the corn might perhaps be endangered thereby. It was to determine this, that I tried the following experiments, to know the effects of different dungs, and what quantity it is proper to employ.

" Three beds were dunged, in the above manner, with horſe-dung: the firſt, which was 1165 feet long, had three loads of dung; the ſecond, of 1171 feet, had but two and a half; and the third, 1183 feet, had but two. Three other beds were dunged with cow-dung: one of 868 feet, with two loads and a half; and the ſecond of the ſame length, with two loads; and the third, of 874 feet, with only one load and a half. The three remaining beds had ſheep's dung: the firſt, of 842 feet, two loads; the ſecond, of 838 feet, one load and a half; and the third, which was of the ſame length, one load.

" Theſe beds were diſtributed in ſuch manner, that each of them was in the middle of two other beds which were not dunged. The field, thus laid out, was ſown on the thirteenth, fourteenth, fifteenth, and ſixteenth of October, with the drill-plough, which plants three rows in each bed. I uſed 378 pounds of ſeed; and afterwards ten pounds to fill up the chaſms; which is after the rate of thirty-two pounds ſix ounces to an acre, and conſequently a little too much. Accordingly, when the corn came up, I ſaw it was too thick ſown. The reaſon was, that the grain was too ſmall, in proportion to the outlets of the drill-plough. At the end of ten days, this corn roſe well. On the eighteenth of December, I obſerved that moſt of theſe plants had branched into four ſtalks, whilſt thoſe in the common way had but three. I perceived no ſenſible difference then, between the dunged and the undunged beds. It was not till the twenty-fourth of January that I ſaw plainly that the plants of the dunged beds were of a deeper green, and had made longer and more vigorous ſhoots than thoſe of the undunged beds. By the twentieth of February, five ſmaller ſtalks iſſued out of the five great ones, which was not the caſe with the wheat in the common way. The alleys did not receive their firſt ploughing till the 10th of March. Eleven of the main ſtalks grew an inch and an half in five days; and I obſerved that the moles were rather more buſy in the dunged beds, than in the others. As the earth was yet ſomewhat too ſoft, I thought it needleſs to continue a ploughing which could not do any good, and therefore poſtponed it to the twenty-eighth of March, and following days. On the ninth of April, I found a plant with eighteen ſtalks in one of the dunged beds: the greateſt number of branches that any of the plants in the undunged beds had, was twelve: but, on the other hand, I likewiſe found ſome which had eighteen in the field of compariſon ſown in the common way.

" On the ninth of May, this ſame plant had twenty ſtalks; and from that time it branched no more. The ſecond ploughing was not given till three weeks after, viz. the twenty-eighth of May; which, I think, was ſomewhat too late after the corn had ceaſed to branch. By the twenty-third of June, there were three ſorts of wheat in all the beds: there were ears in bloſſom, others juſt going out of bloom, and others not yet out of their hoods. The fineſt ears were thoſe which came up and bloſſomed firſt. The moſt forward beds were thoſe which had been dunged under furrow with ſheep's dung: the next to them were the eight beds which had been folded, the plants of which were a little greener than thoſe of the undunged beds. The laſt ploughing was given on the tenth of July. The grain had then begun to fill: but that in the common way was the moſt forward, though it was ſowed three weeks later than the other. I know not for what reaſon, the wheat of the New Huſbandry began to be reaped on the fourth of Auguſt, and that in the old way was let ſtand till the thirteenth. The produce of both cultures was as follows.

In the twelve Acres cultivated in the new Way, the three Beds dunged with Horſe-Dung, yielded,

	Sheaves.
The firſt, 1165 feet long, dunged with three loads	19
The fellow to it, not dunged, - - - - - -	15
The ſecond, 1171 feet long, dunged with two loads and a half	18
The fellow to it, not dunged, - - - - - -	14
The third, 1183 feet long, dunged with two loads	16
The fellow to it, not dunged, - - - - - -	13

The three Beds dunged with Cow-Dung, yielded,

The firſt, 868 feet long, and dunged with two loads and a half	16
The fellow to it, not dunged, - - - - - -	11
The ſecond, likewiſe 868 feet long, and dunged with two loads	15
The fellow to it, not dunged, - - - - - -	12
The third, 874 feet long, and dunged with one load and a half	14
The fellow to it, not dunged, - - - - - -	12

The three Beds dunged with Sheep's Dung, yielded,

The firſt, 842 feet long, and dunged with two loads	17
The fellow to it, not dunged - - - - - -	10
The ſecond, 838 feet long, and dunged with one load and a half,	15
The fellow to it, not dunged - - - - - -	11
The third, alſo 838 feet long, and dunged with one load,	14
The fellow to it, not dunged, - - - - - -	10

The eight Beds which had been folded, two of which were

1171 feet long, three 1177 feet, and three 1183, produced in all,	142
This is near 18 ſheaves a-piece.	
The 67 other beds, which had not been dunged, produced in all	814
This is ſomewhat more than 12 ſheaves a-piece.	
Total produce of the 12 acres cultivated in the new way,	1208
The 12 acres ſown in the common broad-caſt way, after having been well folded all over, produced	1820

" Theſe facts ſhew the advantage of dunging in this manner. It is plain that the beſt dung is that of ſheep, and that it is more profitable when laid under furrow, than when it is ſpread upon the ſurface of the ground by folding.

" In proportion to the produce of the bed 842 feet long, which was dunged with two loads of ſheep's dung, and produced ſeventeen ſheaves; the bed 1165 feet long, which was dunged with three loads of horſe-dung, and produced only nineteen ſheaves, would, if dunged with ſheep's dung, have produced $23 + \frac{69}{133}$; and the bed dunged with cow-dung, which yielded but ſixteen ſheaves, would have yielded $17 + \frac{63}{133}$.

" The eight folded beds, whoſe whole length was 9412 feet, would have yielded 190 ſheaves $+ \frac{43}{135}$, inſtead of only 142 ſheaves, which was the amount of their product.

"It is likewiſe plain, that if the whole of my twelve acres in the new way had been dunged with ſheep's dung, as the bed 242 feet long was; I ſhould, in the ſame proportion, have reaped 1700 ſheaves, which would be but 120 ſheaves leſs than the whole produce of the twelve acres folded all over, and ſown in the broad-caſt way. But even then, I ſay, that thoſe 120 ſheaves would not be equivalent to the quantity of grain which I ſaved by ſowing according to the New Huſbandry. An hundred of our ſheaves yielded, in general, little more than 378 pounds of wheat. The 120 ſheaves which the twelve acres ſown in the broad-caſt way produced more than the twelve acres in beds, would therefore yield but 453 pounds. Deduct this from 871 pounds, which I ſaved in the ſeed of theſe laſt twelve acres ſown in the new way, and I ſhall ſtill be a gainer: for I ſowed only 388 pounds in this ground; whereas 1260 pounds were uſed to ſow the other twelve acres in the common way. This would have been the produce of this firſt year's crop, ſuppoſing that the whole of my twelve acres in beds had been dunged in the ſame manner as the bed 843 feet long. For want of that, I reaped but 1208 ſheaves. They have juſt been threſhed, and have yielded only 5040 pounds of grain."

M. Duhamel makes the following remarks on this account of M. Rouſſel.

"The 1208 ſheaves yielded but 5040 pounds of grain; from which we are to deduct 388 pounds for the ſeed. The neat produce is therefore 4652 pounds, which would make in three years 13956 pounds. The other field in the common way produced 8757 pounds; from which we are to deduct 1260 pounds for the ſeed: the neat produce is conſequently 7497 pounds; the half of which is 3748 pounds and a half, for the value of the next year's crop. This is all that the twelve acres in the common way would produce in three years, and amounts to no more than 11245 pounds and a half: conſequently the balance in favour of the New Huſbandry in three years, is 2710 pounds and a half, or one fourth part of the whole: and that from a field which was ſown in rows for the firſt time, and of which three fourths were not dunged at all: whilſt the other, with which it is compared, had been folded all over, and for the year, produced a very plentiful crop."

Extract of a Letter from a Gentleman in Poitou.

"Being convinced of the advantages of the new method of cultivating land, I reſolved to make a trial of it, by comparing the produce of a field cultivated in the common way, with that of another field cultivated according to the New Huſbandry: and as M. Duhamel has deſired all lovers of agriculture to try by experiments made with care, whether it be moſt profitable to ſow beds with two, or with three rows of corn; or, which is the ſame thing, to find at what diſtance the rows ought to be ſown; I divided a ſpot of ground into ten equal parts, which I made into as many beds, each ſix feet wide.

"In the middle of five of theſe beds I ſowed three rows, ſeven inches aſunder; ſo that they took up fourteen inches of ground, and there remained four feet ten inches for the breadth of the alleys, which is very ſufficient for the horſe-hoeing huſbandry.

"I ſowed three other beds with only two rows, a foot diſtant from each other; conſequently the alleys were five feet wide.

"The two remaining beds were ſown with two rows each, three feet aſunder. The alleys were therefore but three feet wide: or rather the whole of this laſt ſpot may be looked upon as ſown in ſingle rows, with alleys three feet wide, which is too narrow a ſpace to admit of horſe-hoeing them conveniently.

"Before I ſpeak of the produce of theſe beds, it will be proper to obſerve:

"1. That this trial was made with rye. My fear that birds might eat up the wheat, made me prefer rye, which I adviſe every one to do, when only ſmall experiments are made. This eſcaped without the leaſt damage; whereas I have obſerved, that when experiments have been made with wheat, the birds, preferring that to any other grain, have always deſtroyed a conſiderable part of the crop.

"2. The beds ſown with three rows were near a hedge, which greatly damaged two of them, either by its roots exhauſting the ground, or by its ſhadow keeping that part harder frozen than the reſt.

"3. The intervals were not hoed at all, between either the double or the triple rows; only the alleys were horſe-hoed; and conſequently none but the ſingle rows were hoed on both ſides.

"4. On the 25th of February, the alleys were ploughed. I viſited them on the ſecond of March, and found, upon examining the plants, that, in theſe five days, they had ſhot out roots four inches long into the new ſtirred mould. I repeated the hoeings at proper times, and the rye continued in good condition till it was reaped. The laſt hoeing was given after the bloſſoming was paſt.

"5. I then examined the roots, and found they had extended eighteen inches into the looſe mould. This may ſeem ſtrange; but I am certain it is true; for I took every precaution not to be deceived.

"6. The alleys between the ſingle rows were hoed but twice, being too narrow to admit the plough after the plants had begun to branch. However, I had not reaſon to complain of the produce of theſe ſingle rows.

"Having now given an account of my operations, it is time to ſpeak of the products.

"The ears in my rows were from four to ſeven inches long, and the ſtalks from four to ſix feet high, which was one third taller than in the neighbouring fields cultivated in the old way.

"This ſpot of ground, in the beſt years, never produced more than five buſhels, including the buſhel of ſeed corn; for that was the quantity generally uſed: in common years, it has not yielded above four buſhels, and frequently much leſs. We therefore cannot reckon its produce, one year with another, at more than four buſhels, including all faulty grains and ſeeds of weeds, which fall through the ſieve, and remain mixed with the good grain. This year it has yielded me ſeven buſhels of fine clean rye, conſiderably larger than the common ſort. I make no account of the ſeed, the quantity was ſo ſmall. To prevent this grain's being mixed with any other, and at the ſame time to judge more exactly of the produce of my ground, I had the ſheaves threſhed out cloſe by the field; but it was in the middle of a road, where all the grains ſcattered by the flail could not be gathered up; by which I reckon I loſt more than the amount of the ſeed that was ſown in the rows. The produce of my little field was therefore this year, compared to other years, as ſeven is to four; to which muſt be added, that it is capable of bearing as great a crop every year, which is not the caſe in the common huſbandry.

"Let us now examine the produce of the rows, and compare them with one another, in order to judge whether it be moſt profitable to ſow in ſingle, double, or triple rows.

"Two beds, the moſt diſtant from the hedge, ſown with triple rows, yielded each three quarters of a buſhel.

"Two beds with double rows, yielded each two thirds of a buſhel; conſequetnly the three beds with double rows yielded two buſhels, and the ſix rows ſown two and two, in three beds, yielded one quarter more than the ſix rows ſown three and three in two beds; but two beds of three rows a-piece yielded one ninth more than two beds of only two rows a-piece; whence we may conclude, that the diſtance of the rows increaſes the produce of an equal number of plants; or, which comes to the ſame, that an equal quantity of ſeed will produce more grain when the rows are more diſtant, than when they are ſown cloſer together. But this is not a real profit; becauſe the ſix double rows take up one third more ground than the ſix triple rows.

"Each of the ſingle rows yielded ſeven-eighths of a buſhel, which is one ſeventh more than the triple rows, though they took up no more ground; and their produce would probably have been greater, if they had been hoed two or three times more.

"It appears by this account, that the profit would probably have been on the ſide of the double rows, if the alleys had been made only four feet wide, inſtead of five; for by this means I ſhould have gained one fifth more ground; and four feet are a ſufficient breadth for the operations of the horſe-hoe. Where the ſingle rows are ſo near as in this experiment, the ſame ground would ſcarcely bear another crop the next year, for want of having been ſufficiently ſtirred. To clear up this point by a new experiment, I have ſown ſingle rows in the middle of four beds, two of which are four feet wide, and the two others only three. The winter hoeings have been given them with eaſe, and I hope the others will not be more difficult, at leaſt till all the corn is ſpindled. What I fear moſt is, the earth's being carried off the narrow ſpace on which the rows ſtand, when a thaw comes on, or by the heavy rains which are frequent with us.

"The reſt of my field is ſowed in two rows, in beds four feet two inches wide. I have done this, becauſe, as it is the general cuſtom here to make our ridges about that breadth, I am in hopes that if I obtain a plentiful crop, I ſhall be able the more eaſily to prevail on the farmers of this country to adopt a method, the advantage of which I am ſenſible of, before I tried the above experiment."

As it will be doubtleſs expected by our readers, that the advantages reſulting from both the Old and New Huſbandry, ſhould be ſet in the cleareſt and moſt conſpicuous point of light under this article; we ſhall add here two calculations, that lately appeared in the Muſeum Ruſticum, and appear to be made with great accuracy and candor.

The Profit attending Arable and Paſture Land compared, as found by Experience, near Bury, in Suffolk.

The following calculation of the different profit attending arable and paſture land in my neighbourhood, is drawn up not merely from fancy, but from the exact accounts I have kept of my own crops, and the information I have gained from ſeveral ſenſible farmers.

I take twenty acres, and ſuppoſe them an addition to a farm; but I ſhould premiſe ſuch an one as will require ſome additional cattle to be kept for it, perhaps two horſes; but a farm of fifty pounds per annum may be ſo circumſtanced as to require no material ſtanding expences extraordinary for ſuch an addition, in which caſe the ploughings, &c. will not coſt near what I have laid them at; but the faireſt way is the ſuppoſition I have made. We reckon nothing is either got or loſt by four ſhillings per acre for a clean earth.

Calculation of the Expences and Profit of farming a ploughed or paſture Field of twenty Acres for nine Years, on a Suppoſition, that it is not a Farm by itſelf, but an Addition to another of fifty Pounds per Annum, the Soil wet, and a looſe Woodcock, Brick Earth, on the Surface, for eighteen Inches deep, and under that a very good ſtiff Clay, improved by Land-draining.

Firſt Year, Fallow.

	l.	s.	d.
Rent charges	15	0	0
Firſt ploughing, a clean earth	4	0	0
Second ditto, ribbling it cloſe overwart	4	0	0
Harrowing it overwart	0	5	0
Rolling	0	3	0
Third ploughing, a roving	2	10	0
Fourth ditto, a clean earth	4	0	0
	29	18	0

Second Year, Barley.

	l.	s.	d.
Rent, &c.	15	0	0
Firſt ploughing, a clean earth	4	0	0
Harrowing down the ridges	0	5	0
Expences of mucking, at twenty loads per acre, and ſpreading the muck, ſuppoſed to be at the farmer's houſe	10	0	0
Second ploughing, the ſowing earth, as it may be done with a double-breaſted plough, to ſhut up the barks; that and the harrowing	4	0	0
Seventeen comb and two buſhels of ſeed-barley, at eight ſhillings and ſix-pence per coomb	7	8	9
	40	13	9
Brought over	40	13	9
Two buſhels and a half of clover-ſeed, at twenty five ſhillings per buſhel	3	2	6
Harrowing and water-furrowing	0	10	0
Weeding	1	0	0
Harveſting, two ſhillings and ſix-pence per acre	2	10	0
Threſhing one hundred and ſixty coombs, at ſix-pence per coomb	4	0	0
Carrying out one hundred and ſixty coomb at eight times, eight pounds; but as back carriage may ſometimes be got, ſay	5	0	0
Expences eight times at market	1	10	0
	58	6	3

Third Year, Clover.

	l.	s.	d.
Rent, &c.	15	0	0
Cutting twenty acres, and harveſting it	3	0	0
Threſhing thirty-two buſhels of clover-ſeed, at four ſhillings per buſhel	6	8	0
Expences of carrying the ſeed out, and at market	1	15	0
Weeding the clover	0	10	0
	26	13	0

Fourth Year, Wheat.

	l.	s.	d.
Rent, &c.	15	0	0
Ploughing, harrowing, and water-furrowing the clover-land, and ſowing the wheat, five ſhillings and ſix-pence per acre	5	10	0
Ten coomb of ſeed	8	0	0
Weeding	1	10	0
Harveſting, including all expences, five ſhillings per acre	5	0	0
Threſhing one hundred coomb	5	0	0
Carrying out ditto, at five goings, back carriage three of them, and at market	3	0	0
Haulming, at one ſhilling and ſix-pence	1	10	0
	44	10	0

Fifth Year, Fallow.

	l.	s.	d.
Rent, &c.	15	0	0
Expences the ſame as the firſt year	14	18	0
	29	18	0

Sixth Year, Wheat.

	l.	s.	d.
Rent, &c.	15	0	0
Mucking, the materials ſuppoſed to be in the farmer's yard	10	0	0
Ten coomb of ſeed blew-chaff wheat	7	0	0
Sowing earth	4	0	0
Weeding	2	0	0
Harveſting	5	0	0
Threſhing one hundred and twenty coomb, at one ſhilling and two pence per coomb	7	0	0
Carrying out ditto, at ſix times, as before	5	0	0
	45	0	0

Seventh Year, White Oats.

	l.	s.	d.
Rent, &c.	15	0	0
Firſt ploughing, a clean earth	4	0	0
Water-furrowing	0	5	0
Second ploughing, a clean earth	4	0	0
Water-furrowing	0	3	0
Third ploughing, ſowing earth, and harrowing	5	0	0
Twenty coomb of ſeed	8	0	0
Weeding	0	10	0
Harveſting, two ſhillings and ſix-pence per acre	2	10	0
Threſhing one hundred and twenty coomb	3	0	0
Carrying out ſix times, and marketing	3	18	0
	46	6	0

Eighth Year, Tares and Turneps.	l.	s.	d.
Rent, &c.	15	0	0
One clean earth, and harrowing ten acres for tares, and water-furrowing, and rolling	2	10	0
Five coomb of ſeed-tares	2	10	0
Cutting, making, loading, and ſtacking of fifteen loads of tare fodder	2	0	0
Ploughing up the tare land, a clean earth	2	0	0
Overwarting another clean earth	2	0	0
Roving it	1	5	0
Firſt ploughing for turneps, ten acres, a clean earth	2	0	0
Second ploughing, drawing the ridges into barks	1	0	0
Third ploughing, ribbling it overwart	1	10	0
Harrowing it flat	0	2	6
Fourth ploughing, a clean earth; draw it on to the ſteach	2	0	0
Fifth ploughing, ſowing earth, up-ſet it, and harrowing	2	5	0
Turnep ſeed	0	5	0
Firſt hoeing, at four ſhillings per acre	2	0	0
Second ditto, at two ſhillings and ſix-pence	1	5	0
	39	12	6

Ninth Year, Wheat and Barley.			
Rent, &c.	15	0	0
Ploughing and ſowing the tare land with wheat, water-furrowing, &c.	2	10	0
Five coomb of ſeed red-ſtalked wheat	4	0	0
Weeding	0	15	0
Harveſting	2	10	0
Haulming	0	15	0
Threſhing ſixty coomb	3	0	0
Carrying out ditto, &c.	2	10	0
Ploughing and ſowing the turnep land with barley, harrowing, rolling, and water-furrowing	2	10	0
Eight coomb of ſeed patney barley	3	4	0
Weeding	0	2	6
Harveſting	1	5	0
Threſhing ſeventy coomb	1	15	0
Carrying out ſeventy coomb	1	10	0
	41	6	6

PRODUCE.

Firſt Year.

Sheep-feed worth	1	10	0

Second Year.

One hundred and ſixty coomb of barley, at eight ſhillings per coomb	64	0	0
Shack for cattle	2	0	0
	66	0	0

Third Year.

Feed of clover before it is ſeeded	20	0	0
Thirty-two buſhels of clover-ſeed, at one pound five ſhillings per buſhel	40	0	0
Feed after ſeed	2	0	0
	62	0	0

Fourth Year.

One hundred coomb of wheat, at fifteen ſhillings per coomb	75	0	0
Shack for cattle	1	10	0
	76	10	0

Fifth Year.

Sheep-feed	1	10	0

Sixth Year.

One hundred and twenty coomb of wheat, at fourteen ſhillings per coomb	84	0	0
Shack for cattle	1	10	0
	85	10	0

Seventh Year.

One hundred and twenty coomb of white oats, at eight ſhillings per coomb	48	0	0
Shack for cattle	2	0	0
	50	0	0

Eighth Year.

	l.	s.	d.
Fifteen load of tares	15	0	0
Ten acres of turneps to buy cattle in, and fatten on them, to ſell off in the ſpring, worth three pounds per acre	30	0	0
	45	0	0

Ninth Year.

Sixty coomb of wheat, at fourteen ſhillings and ſixpence per coomb	87	0	0
Shack	0	15	0
Seventy coomb of barley, at ſeven ſhillings and ſixpence per coomb	26	5	0
Shack	1	0	0
	115	0	0

Firſt Year.

	l.	s.	d.
Expences	29	18	0
Produce	1	10	0
Loſs	28	8	0

Second Year.

Produce	66	0	0
Expences	58	6	3
Profit	7	13	9

Third Year.

Produce	62	0	0
Expences	26	13	0
Profit	35	7	0

Fourth Year.

Produce	76	10	0
Expences	44	10	0
Profit	32	0	0

Fifth Year.

Expences	29	18	0
Produce	1	10	0
Loſs	28	8	0

Sixth Year.

	l.	s.	d.
Produce	85	10	0
Expences	45	0	0
Profit	40	10	0

Seventh Year.

Produce	50	0	0
Expences	46	6	0
Profit	3	14	0

Eighth Year.

Produce	45	0	0
Expences	39	14	6
Profit	5	7	6

Ninth Year.

Produce	115	0	0
Expences	41	6	6
Profit	73	13	6

Profit.

	l.	s.	d.
2d Year	7	13	9
3d Year	35	7	0
4th Year	32	0	0
6th Year	40	10	0
7th Year	3	14	0
8th Year	5	7	6
9th Year	73	13	6
Profit of 7 years	198	5	9
	56	16	0
	141	9	9

Loſs.

	l.	s.	d.
1ſt Year	28	8	0
5th Year	28	8	0
Loſs of 2 years	56	16	0

Total profit in nine years;

Which is fifteen pounds fourteen ſhillings and eightpence per annum, or rather better than fifteen ſhillings per acre.

But I ſhould obſerve, that as a crop of clover-ſeed is the moſt uncertain and various of any that is grown, I have reckoned leſs for it by far than multitudes produce, though, at the ſame time, many bring nothing at all.

I know a field of twenty acres, which I have been often told by ſeveral who knew the crop, once produced the farmer five buſhels per acre. It was all down on a Friday, and the farmer ſuſpecting a change of weather, by great rewards to his workmen, and bringing caſks of ale into the field, and feeding them well, tempted them to work in an extraordinary manner all the Saturday, and cleared the whole into barn. It began raining in the night, and ſo much ſucceeding bad weather came, that the crops were, in general, greatly damaged. His produced, as I ſaid, one hundred buſhels, all which he ſold at three pounds ten ſhillings per buſhel, ariſing to three hundred and fifty pounds. And a few years ago I ſaw the ſame field with a crop of clover, which did not produce twenty pecks, and that ſo wretched as to fetch nothing.

I read this calculation to a farmer, and he obſerved, that I ſhould reckon eighty buſhels for the crop; and as it is often grown, I will give you another total, with that alteration, that your readers may adopt either, according to their idea of the chance.

	l.	s.	d.
Profit - - -	248	13	9
Loſs - - -	56	16	0
	191	17	9

which is twenty-one pounds ſix ſhillings and five-pence per annum, or better than a guinea per acre.

As I mention back-carriage in this calculation, I will explain my meaning. We generally carry our corn to Ipſwich, Manningtree, or Thetford, from which places we load home with coals for blackſmiths, or any perſons that want them, who pay us eighteen ſhillings for the carriage of a loading, twelve ſhillings per chaldron, and we generally bring one and a half. But as we may accidentally carry our corn where none is to be had, I make ſuch allowance as to bring it near the truth.

Calculation of nine Years Expences and Profit of twenty Acres of Graſs-Land, the Soil ſuppoſed to be the ſame as the above Arable-Land, with no other Difference than being Graſs or Ploughed.

Firſt Year's Expences.	l.	s.	d.
Rent, &c. - - - - - - - - - - -	15	0	0
Mowing, making and cocking ten acres of graſs to hay at three ſhillings per acre with beer - - - - - - - - - - - -	1	10	0
Stacking, loading, &c. of ten loads of hay -	1	10	0
Expences on four goings of hay when it is ſold, weighing, and market - - - -	0	16	0
N. B. Nothing is reckoned for carriage as manure is brought back.			
Fifteen old crones, bought in Auguſt - -	3	15	0
Expences in buying ſheep - - - - -	0	4	0
Three cows at five pounds each - - - -	15	0	0
A ſow, and ten pigs three weeks old - -	2	12	6
Suppoſing two acres to be manured each year with twenty-ſix loads per acre.			
Forty loads of clay, at two-pence halfpenny per load - - - - - - - - - - -	0	8	4
Twelve ditto of aſhes, mortar, or rotten dung, brought from Bury; ſix waggon loads, at eleven ſhillings and ſixpence per load - - - - - - - - - - - - -	3	9	0
Expences of carrying it on, and ſpreading, &c.	1	8	0
Turning and mixing manure - - - - -	0	4	0
	45	16	10

Second Year.

	l.	s.	d.
Rent, &c. - - - - - - - - - - -	15	0	0
Mowing, making, &c. of ſix acres of graſs	0	18	0
Stacking, &c. ſix loads of hay - - - -	0	18	0
Weighing, marketing, &c. - - - - -	0	10	0
Expences of buying ſheep - - - - -	0	1	6
A ſcore of old crones - - - - - - -	6	0	0
Manuring two acres as above - - - -	5	9	4
	28	16	10

Third Year.

	l.	s.	d.
Rent, &c. - - - - - - - - - - -	15	0	0
Mowing and making, &c. eight acres of graſs at three ſhillings per acre - - -	1	4	0
Stacking, &c. - - - - - - - - - -	1	4	0
Weighing and marketing, &c. - - - -	0	12	0
Expences on cattle - - - - - - - -	0	2	0
Fifteen crones - - - - - - - - - -	3	15	0
Manuring two acres as above - - - -	5	9	4
	27	6	4

Fourth Year.

	l.	s.	d.
Rent, &c. - - - - - - - - - - -	15	0	0
Mowing and making twelve acres, at three ſhillings per acre - - - - - - - -	1	16	0
Stacking, &c. - - - - - - - - - -	1	16	0
Weighing and marketing - - - - -	0	18	0
Expences on cattle - - - - - - - -	0	5	0
Fifteen crones - - - - - - - - - -	4	0	0
Manuring two acres as above - - - -	5	9	4
	29	4	4

Fifth Year.

	l.	s.	d.
Rent, &c. - - - - - - - - - - -	15	0	0
Mowing and making ten acres - - - -	1	10	0
Stacking, &c. - - - - - - - - -	1	10	0
Weighing and marketing - - - - - -	0	16	0
Expences on cattle - - - - - - - -	0	3	0
Fifteen crones - - - - - - - - - -	3	7	6
Manuring two acres as above - - - - -	5	9	4
	27	15	10

Sixth Year.

	l.	s.	d.
Rent, &c. - - - - - - - - - - -	15	0	0
Mowing and making nine acres - - - -	1	7	0
Stacking, &c. - - - - - - - - - -	1	7	0
Weighing, &c. - - - - - - - - -	0	14	0
Expences on cattle - - - - - - - -	0	4	0
Fifteen crones - - - - - - - - - -	4	5	0
Manuring two acres as above - - - - -	5	9	4
	28	6	4

Seventh Year.

	l.	s.	d.
Rent, &c. - - - - - - - - - - -	15	0	0
Mowing and making twelve acres - - -	1	16	0
Stacking, &c. - - - - - - - - - -	1	16	0
Weighing, &c. - - - - - - - - -	0	18	0
Twenty crones - - - - - - - - -	5	0	0
Expences on cattle - - - - - - - -	0	5	0
Manuring as above - - - - - - -	5	9	4
	30	4	4

Eighth Year.

	l.	s.	d.
Rent, &c. - - - - - - - - - - -	15	0	0
Mowing and making eight acres - - - -	1	4	0
Stacking, &c. - - - - - - - - - -	1	4	0
Weighing, &c. - - - - - - - - -	0	10	0
Twenty crones - - - - - - - - -	5	10	0
Expences - - - - - - - - - - -	0	7	0
Manuring two acres as above - - - -	5	9	4
	29	4	4

Ninth Year.

	l.	s.	d.
Rent, &c. - - - - - - - - - - -	15	0	0
Mowing and making ten acres - - - -	1	10	0
Stacking, &c. - - - - - - - - - -	1	10	0
Weighing, &c. - - - - - - - - -	0	8	0
Twenty crones - - - - - - - - - -	3	15	0
Expences on cattle - - - - - - - -	0	10	0
	22	13	0

PRODUCE.

Firſt Year.

	l.	s.	d.
Ten loads of hay, waſted to eight, and ſold in the winter at two pounds per load	16	0	0
Fifteen old crones ſold fat, with their lambs at fifteen ſhillings per couple	11	5	0
As no expences are calculated for the dairy, ſuch as wood, utenſils, &c. I ſhall lay the clear profit of the cows at four pounds each, which is what I have generally made of mine, every thing paid, and yet kept a calf now and then for ſtock: one I reckon this year	12	0	0
I ſhall not explain all the method of managing the hogs, but lay the clear profit of a ſow at different ſums, ſuch as I have generally found my own produce	6	0	0
	45	5	0

Second Year.

	l.	s.	d.
Eight loads of hay waſted to ſeven, and ſold at two pounds per load	14	0	0
Twenty crones, ſold fat at ſeventeen ſhillings per couple	17	0	0
Three cows, at four pounds each	12	0	0
One ſow	6	5	0
	49	5	0

Third Year.

	l.	s.	d.
Ten loads of hay, waſted to eight, ſold at two pounds per load	16	0	0
Fifteen crones, ſold at fifteen ſhillings per couple	11	5	0
Four cows, the new one at three pounds (the calf is now a cow)	15	0	0
One ſow	6	10	0
	48	15	0

Fourth Year.

	l.	s.	d.
Fourteen loads of hay waſted to twelve	24	0	0
Fifteen crones, ſold per couple at fifteen ſhillings	11	5	0
Four cows, the new one three pounds five ſhillings	15	5	0
One ſow	7	0	0
	57	10	0

Fifth Year.

	l.	s.	d.
Twelve loads of hay waſted to ten	20	0	0
Fifteen crones, ſold per couple at ſixteen ſhillings	12	0	0
Four cows, the new one at three pounds ten ſhillings	15	10	0
One ſow	5	0	0
	52	10	0

Sixth Year.

	l.	s.	d.
Ten loads of hay waſted to eight	16	0	0
Fifteen crones, ſold per couple at 16 ſhillings	12	0	0
Four cows	16	0	0
One ſow	7	10	0
	51	10	0

Seventh Year.

	l.	s.	d.
Fourteen load of hay waſted to twelve	24	0	0
Twenty crones, ſold per couple at ſeventeen ſhillings	17	0	0
Four cows	16	0	0
One ſow	5	0	0
	62	0	0

Eighth Year.

	l.	s.	d.
Twelve loads of hay waſted to ten	20	0	0
Twenty crones, ſold per couple at ſixteen ſhillings	16	0	0
Four cows	16	0	0
One ſow	5	15	0
	57	15	0

Ninth Year.

	l.	s.	d.
Twelve loads of hay waſted to ten	20	0	0
Twenty crones, ſold per couple at fourteen ſhillings	14	0	0
Four cows	16	0	0
One ſow	7	0	0
	57	0	0

Expences.	l.	s.	d.	Produce.	l.	s.	d.
1ſt Year	45	16	10	1ſt Year	45	5	0
2d Year	28	16	10	2d Year	49	5	0
3d Year	27	6	4	3d Year	48	15	0
4th Year	29	4	4	4th Year	57	10	0
5th Year	27	15	10	5th Year	52	10	0
6th Year	28	6	4	6th Year	51	10	0
7th Year	30	4	4	7th Year	62	0	0
8th Year	29	4	4	8th Year	57	15	0
9th Year	22	13	0	9th Year	57	0	0
	269	8	2		481	10	0
					269	8	2
					212	1	10

Which is twenty-three pounds eleven ſhillings and two-pence per annum, or one pound three ſhillings per acre profit.

The above account diſplays the vaſtly ſuperior advantages of graſs, with us, to arable land.

You will certainly remark, that nothing in the above account is reckoned for loſſes of ſtock; but in anſwer to that I ſhould obſerve, that nothing is calculated in the arable account for ſome bad years, when in ſuch land not a quarter of a crop is produced: and I do not mean this calculation as perfect (that is impoſſible) but only to diſcover the proportion between the one method and the other; and from what I have obſerved, and gathered from the information which the moſt intelligent farmers can give me, I am clearly of opinion, that the chances, on the whole, are much in favour of the graſs-land, the crop of hay and feed being much more regular than thoſe of corn, clover, or turneps; and ſuppoſing the eighty buſhels of clover-ſeed, yet the graſs profit far exceeds the arable, even then; but, as I obſerved, the probability lies againſt the latter, ſuppoſing the profit to be only fifteen pounds fourteen ſhillings and eight-pence per annum.

I may remind you, that I ſuppoſed this twenty acres to be an addition to a farm, not one by itſelf, and ſo compared the reſpective profits; therefore I have not allowed any thing for the feed which the above-mentioned cattle may accidentally have on the arable land, or turneps which they may expend in the winter; and for this reaſon, becauſe, although it appears to me that graſs is the moſt profitable huſbandry, yet a certain quantity of ploughed land ſhould undoubtedly be a part of every graſs-farm, for the raiſing turneps, ſome artificial graſs, and ſtover enough for the winter's food.

I hope your readers will peruſe this calculation with candour, and believe me, when I aſſure them it is the neareſt truth of any I can make, either from my own experience, or beſt information. *Muſeum Ruſticum, vol.* III. *p.* 317.

State of the Expence of a hoed Crop of Wheat, and the Profit of it compared with that of the common Huſbandry.

I propoſe here to ſtate the expence of a hoed wheat-crop. If this is done in any place where the price of labour is known, it will be eaſy from thence to calculate the expence of ſuch crops in any other places.

When wheat is to be horſe-hoed, it is planted upon three-bout ridges, about four feet and eight or nine inches broad. If the ſoil is poor, they may be made broader, but ſhould not be much narrower, otherwiſe there will not be room enough to plough the intervals. Two rows of wheat, about ten inches aſunder, are drilled upon the top of each ridge, and then the intervals or ſpaces between the double rows will be about three feet and ten inches wide.

For the firſt crop the land ſhould be well prepared, and very clean: it will therefore coſt more than the following crops; and if the land is not in good heart, the firſt crops will be the ſmalleſt, for hoeing greatly improves it. The following eſtimate is of the ſucceeding crops.

The neceſſary culture for theſe is, once ploughing in autumn, to form the new ridges for the next crop. This may be done with three horſes; for the intervals, by frequent hoeing, are kept in fine tilth, and are ploughed at one bout; and the middle of the ridges where the laſt crop ſtood, being only the breadth of two narrow furrows, are eaſily ploughed at another bout; ſo that theſe ridges, which in common ploughing required three bouts with four horſes, are now ploughed at two with three horſes.

The intervals, after the corn is planted, are hoe-ploughed at one bout, to or from the rows. They are uſually thus ploughed four times, once in the beginning of winter, and three times afterwards in the ſpring and ſummer.

The ten inch partitions, or ſpaces, between the rows of wheat, are hand-hoed about the end of March: once is generally ſufficient, becauſe the wheat ſoon afterwards ſpreads, covers the partitions, and keeps down the weeds. The rows are alſo to be weeded. This is all the ploughing and hoeing that is commonly neceſſary till harveſt. But as in ſome years it may be proper to plough the ridges in autumn at five or ſix furrows, or plough them twice, ſometimes to hoe-plough the intervals more than four times, or to give them a trench-ploughing, where the ſtaple is deep enough to admit of it, I ſhall make a full allowance for theſe, and charge two ploughings and ſix horſe-hoeings every year.

The hiring price in ſome parts of Middleſex for ploughing a ſtrong loam the firſt time, in the common way, is ſeven or eight ſhillings an acre; I ſhall ſay eight ſhillings. They work about eight hours, and plough about an acre a day with four horſes. The price of the labour may be thus diſtinguiſhed: to the ploughman twenty-pence, and boy eight-pence a day, including their beer; and then the horſes and harneſs, &c. will come to ſeventeen-pence a day each. Twice ploughing therefore in autumn, with three horſes, comes to eight ſhillings and nine-pence.

The tops of the ridges are to be rolled with a light roller, or harrowed once or twice with two very light harrows, to break the clods, and lay the tops of the ridges ſmooth for drilling. The harrows are faſtened together by a pole; and a horſe, walking in the furrow, draws the two harrows, one upon each ridge. A rolling in the ſame manner is alſo uſeful in the ſpring, when the earth is pretty dry, and before the partitions are hand-hoed. Theſe rollings and harrowings, of two ridges at once by once horſe, are done at a ſmall expence; and not being neceſſary every year, may coſt about four-pence: but to make the total an even ſum, I ſhall charge for them (and uncovering the plants, if any clods happen to fall upon them at the firſt hoe-ploughing) ſeven-pence halfpenny per acre.

The uſual quantity of ſeed is three pecks, and if it coſts five ſhillings and ſix-pence per buſhel, is four ſhillings and three halfpence per acre. The drilling is performed by a man and boy, and one horſe. They may drill ſix acres a day: I ſhall ſay but five, which is nine-pence per acre.

The intervals ſhould be kept in fine tilth: they are hoe-ploughed at one bout: three horſes are ſufficient for the firſt two hoeings, and two for the reſt. I ſhall reckon three for each hoeing, and then ſix hoeings come to thirteen ſhillings and two-pence.

The price for hand-hoeing of beans the firſt time is about five ſhillings per acre; I ſhall call it ſix; and as the ten inch partitions, and about two inches on each outſide of the rows, is the whole to be hand-hoed (for the hoe-plough does the reſt) theſe are about one fourth part of the ridge, and ſhould be done for eighteen-pence an acre: but it is a good way to agree with the hoers to cleanſe the rows alſo of weeds; and as theſe ought to be well done, they expect ſomething more than for common work, and they will coſt near half a crown per acre.

For reaping the prices are various; from five or ſix, to ten ſhillings per acre; at a medium, eight ſhillings is a high price. The drilled wheat, having ſcarcely any weeds in it, and ſtanding upon only about a fourth part of the ridge, is eaſier and much quicker reaped than ſown wheat, and not really worth above half the common price; but, for the above reaſon, I ſhall allow, for reaping and carrying ſix ſhillings per acre.

Wheat-ſtraw is a valuable article in the neighbourhood of London; and the ſtraw, chaff, &c. might be reckoned here to pay for threſhing and carrying the corn to market: where it is otherwiſe, an allowance is to be made. And as the diſtance from the market is uncertain, I ſhall charge the carrying out, and at market, a ſhilling per quarter, beſides the value of the ſtraw.

Some eſtates are tythe-free; others pay in kind, or a modus. I ſhall reckon the tythe at four ſhillings per acre.

Suppoſe the rent is ſixteen ſhillings per acre, there remain to be added the taxes, or rates payable by the tenant, which, at two ſhillings in the pound-rent, come to nineteen-pence per acre.

I reckon nothing for dung or manure; for land that is proper for wheat, allowing ſufficient intervals and hoeing, requires none. If the wheat of the firſt crops is weak in the ſpring, a top-dreſſing of the rows will be of ſervice, or afterwards, if the proper hoeings have not been given the preceding year; but this ſeldom happens; for hoeing makes the plants ſtrong, and if then alſo top-dreſſed, they would be in danger of lodging.

The whole expence, at theſe prices, of horſe-hoed wheat, is, per acre, as follows:

	l.	s.	d.
Two ploughings in autumn, with three horſes	0	8	9
Harrowing, ſeed, and drilling - -	0	5	6
Six hoe-ploughings of the intervals, with three horſes - - - -	0	13	2
Hand-hoeing, weeding, and harveſting	0	8	6
Carrying out twenty buſhels, and at market, (beſides the value of the ſtraw and chaff) at one ſhilling per quarter - -	0	2	6
Tythe, rent, and taxes - -	1	1	7
	3	0	0

This is the whole expence, ſuppoſing the ſoil to be a ſtrong loam, the wages high, and the horſes hired; but when done by the farmer's own horſes, or the ſoil lighter, and they work more hours in a day, the expence will be a great deal leſs, as we ſhall ſee below: in ſome places it will not much exceed half this ſum.

It has been already ſhewn, that one hundred acres of horſe-hoed wheat, much of it a light, poor ſoil, produced near twenty buſhels per acre; and that a ſtrong ſoil, by a medium of twenty hoed crops, produced about twenty-four buſhels per acre, both nine-gallon meaſure; and therefore we might reckon here a middling crop about twenty-four buſhels: but to avoid all ſuſpicion of partiality, I ſhall ſuppoſe, that a good loam may, one year with another, produce only the leaſt of theſe, or twenty buſhels per acre.

The mean price of wheat at Windſor market, for the laſt twenty years, ending at Michaelmas, 1762, is nearly four ſhilling and eight-pence three farthings per buſhel; and twenty buſhels, at this rate, come to four pounds fourteen ſhillings and ſeven-pence; ſo the profit of the horſe-hoed wheat is one pound fourteen ſhillings and ſeven-pence per acre, or above two rents.

Your ingenious correſpondent has above ſtated the produce and expence of twenty acres of arable land for nine years, according to the courſe of huſbandry practiſed in his neighbourhood, I ſhall, by way of compariſon, calculate the profit of theſe twenty acres, ſuppoſing they had been under crops of hoed wheat during theſe nine years.

I reckon, from your correſpondent's account, the wages of his ploughmen to be about fourteen-pence, and a boy four-pence a day (if not allowed beer) and the horſes a ſhilling a day each; in all, five ſhillings and ſixpence, beſides repairs: and if they work more than eight hours, his land being lighter than the above, they may plough about an acre and a half a day, which brings the price for ploughing to near his reckoning of four ſhillings per acre. If this is not exact, he will rectify it. I ſhall ſtate the ploughings and horſe-hoeings in this proportion, and allow three horſes, though fewer will do in this land. The rent-charges, I ſuppoſe, include the tenant's taxes; if not, they are to be added to the expence. As the tythe is not mentioned in his account, I do not charge it here. The other items are computed in proportion to his, and the above, ſtate of the expence; and as I abated four buſhels in the above crop per acre, I ſhall do the ſame here, and reckon a middling crop of hoed wheat at only eighteen buſhels; his producing, by a medium of three crops, twenty-two buſhels and two fifths per acre. The expence of a horſe-hoed acre of this land will be nearly as follows:

				l.	s.	d.
Twice ploughing in autumn, with three horſes, and harrowing - - -				0	3	0½
Seed three pecks (fifteen ſhillings and four-pence per coomb at a medium) and drilling five acres a day - - -				0	3	4½
Six hoe-ploughings, with three horſes				0	4	0
Hand-hoeing (at four ſhillings per acre, reckoned for turnips in the account) and weeding - - - -				0	1	8
Harveſting, three ſhillings and nine-pence: threſhing four coomb and a half, four ſhillings and ten-pence - -				0	8	7
Carrying out four coomb and a half, and at market - - - -				0	4	1½
Rent-charges - - -				0	15	0
Total expence per acre				1	19	9½
The three crops of wheat were ſold, at a medium, for fourteen ſhillings and five-pence and four ſevenths per coomb, which, for eighteen buſhels, comes to -				3	5	0½
Profit per acre				1	5	3
The twenty acres, in nine years, produced ſeven crops, valued at five hundred and three pounds; but in the ninth year, the crop of ſixty coomb is caſt by miſtake at eighty-ſeven pounds, which ſhould be but half that ſum; deducting therefore forty-three pounds ten ſhillings, the produce amounts to - - -				459	10	0
The expence of theſe twenty acres in nine years, as charged - - -	361	10	3	381	10	0
To which is to be added for four hundred loads of dung	20	0	0			
Remains the profit in nine years				77	19	9
Which is, per acre per annum, near				0	8	8

There were eight hundred loads of dung laid upon theſe twenty acres; but it is hardly to be ſuppoſed, that that half that quantity could be made from the ſeven crops; ſo that at leaſt four hundred loads muſt be had elſewhere; and the dung is at a high price in that neighbourhood. I have charged but a ſhilling a load for it.

But if it ſhould be ſuppoſed, that more than four hundred loads could be made from theſe ſeven crops, it muſt alſo be admitted, that a quantity in proportion would be made from the nine crops of wheat, which not being neceſſary in the hoeing culture, is worth, to be ſold, more per load than I have reckoned above; and the value of it ſhould then be added to the profit of the hoed crops.

Let us next compare the whole profit of theſe twenty acres in nine years, in both theſe methods of huſbandry.

	l.	s.	d.
The profit, in nine years, of the hoed crops, amounts to - - -	227	5	0
The profit in that time by the common huſbandry - - - -	77	19	9
Balance in favour of the New Huſbandry	149	5	3

Hence appears the great ſuperiority of the hoeing culture; and even allowing the clover had produced four buſhels of ſeed per acre, the New Huſbandry is ſtill by far the moſt profitable.

HYACINTH, the name of a very beautiful genus of flowers, of which ſeveral ſpecies are now cultivated in the Engliſh gardens.

All the different ſorts of hyacinths are propagated by ſeeds, or of ſets from the old bulbs; the former method has been but little practiſed in England till very lately; but in Holland and Flanders, it has been followed many years, and by this means they have obtained an amazing variety of the moſt beautiful flowers. Few floriſts in England think it worth while to wait four or five years for the flowers of a plant, which, when produced, might not perhaps deſerve to be preſerved; but they do not conſider that it is only the loſs of the firſt four or five years after the ſowing; for if they continue ſowing every year after they begin, there will be a ſucceſſion of flowers annually, which will conſtantly produce ſome ſorts different from what they were before poſſeſſed of; and new flowers being always the moſt valuable to ſkilful gardeners, they will always prove a ſufficient recompence for their trouble and loſs of time beſtowed on their culture.

The method of raiſing theſe flowers from ſeed, is as follows: Firſt, let a ſufficient quantity of good ſeed (which ſhould be ſaved either from ſemi-double, or ſuch ſingle flowers as are large, and have good properties) be provided: Secondly, One or more ſhallow boxes, or pots, ſhould be procured, which muſt be filled with freſh, light, ſandy ſoil, laying the ſurface very level, on which the ſeeds ſhould be ſown as equally as poſſible, and covered about half an inch thick with the ſame light earth: the time for this work is about the middle of Auguſt. Theſe boxes or pots ſhould be placed where they may enjoy the morning ſun only, till the latter end of September, at which time they ſhould be removed into a warmer ſituation, and about the latter end of October be placed under a common hot-bed frame, where they may remain during the winter and ſpring months, to be protected from hard froſts; but they ſhould be expoſed to the open air, when the weather is mild, by taking off the glaſſes. In February or March, the young plants will begin to appear above ground, at which time they muſt be carefully ſcreened from the froſts, otherwiſe they will be deſtroyed while ſo young; but they muſt not be covered at that ſeaſon, except in the night, or very bad weather; for when the plants are come up, they will, if too cloſe covered, draw up very tall and ſlender, and thereby prevent the growth of their roots. At the end of March, if the weather prove good, they may be removed out of the frame, placing them in a warm ſituation; and, if the ſeaſon proves dry, they ſhould now and then have a little water, and be kept very clear from weeds, which would ſoon overſpread the tender plants, and deſtroy them.

Towards the latter end of April, or the beginning of May, theſe boxes ſhould be removed into a cooler ſituation; for the heat of the ſun at that ſeaſon would be too great for theſe tender plants, cauſing their blades to decay much ſooner than they would, if they were ſcreened from its violence. In this ſhady ſituation they ſhould remain during the heat of ſummer, obſerving to keep them conſtantly clear from weeds; but you muſt not place them under the dripping of trees, &c. nor ſhould you give them any water after their blades are decayed; for that would infallibly rot their roots. About the latter end of Auguſt, you ſhould ſift a little light rich earth over the ſurface of the boxes, and then remove them again into a warmer ſituation, and treat them, during the winter, ſpring, and ſummer months, as was before directed; and the ſecond year, about the middle of Auguſt, ſhould be prepared a bed of light, rich, ſandy ſoil, in proportion to the quantity of ſeedling roots, the ſurface of which ſhould be very even; then take out the earth from the boxes in which the plants were raiſed, into a ſieve, in order to get out all the roots, which, by this time, if they have grown well, will be about the ſize of ſmall peaſe: theſe roots ſhould be placed upon the bed at about three inches aſunder, obſerving to ſet the bottom part of their roots downwards; then they ſhould be covered over two inches thick with the ſame light earth; but as it will be impoſſible to get all the ſmall roots out of the earth in the boxes, the earth ſhould be ſpread upon another bed equally, and covered over with light earth, by which method none will be loſt, be they ever ſo ſmall.

Theſe beds muſt be arched over with hoops, and in very hard froſty weather muſt be covered with mats, &c. to protect them from froſt; and in the ſpring, when the green leaves are above ground, if the weather ſhould be very dry, they ſhould have a little water ſparingly; for nothing is more injurious to theſe bulbs than too great quantities of moiſture. During the ſummer ſeaſon, the beds muſt be kept clear from weeds; but after the blades are decayed, the roots ſhould not have any water: in autumn the ſurface of the bed ſhould be ſtirred with a very ſhort hand-fork, being exceeding careful not to thruſt it ſo deep as to touch the roots, which, if hurt, are very ſubject to periſh ſoon after. Then a little freſh, light, rich earth, ſhould be ſifted over the bed about an inch thick, or ſomething more. In winter, the beds ſhould be covered again as above directed. In this bed the roots may continue two years; the third ſummer when the leaves are decayed, the roots ſhould be carefully taken up, and may be kept out of the ground till Auguſt, when they ſhould be planted into new beds, prepared as before, at the diſtance of ſix inches aſunder; in theſe beds the roots may remain till they flower, during which time they ſhould be treated as before, with this difference only, that inſtead of covering them with mats in the winter, the ſurface of the ground ſhould be covered with tanners-bark.

When the flowers begin to ſhew themſelves, thoſe which have good properties ſhould be marked, by thruſting a ſmall ſtick down by each root; which roots at the time of taking them up ſhould be ſelected from the reſt, and planted by themſelves, though it is by no means adviſable to reject any of the other roots till they have blown two years, before which their worth cannot be aſcertained. When the roots are taken up, they ſhould be laid into the earth again in an horizontal poſition, leaving the green leaves hanging downwards from the roots, whereby the great moiſture contained in their very ſucculent leaves and flower-ſtalks will be exhaled, and prevented from entering the roots, which when ſuffered to return into them, is very often the cauſe of their rotting. In this poſition the root ſhould remain until the leaves are quite dried off, when they muſt be taken up, and after being cleared from all manner of filth which would be hurtful to them, they muſt be laid up in boxes, where they may be preſerved dry until September, which is the proper ſeaſon for planting them again.

We ſhall now proceed to the culture of ſuch hyacinths as either have been obtained from Holland, or have been produced from ſeeds in England. The want of ſkill in this particular has occaſioned the ill-ſucceſs moſt people have had with them here, which has occaſioned their being ſo much neglected, ſuppoſing their roots to degenerate after they have flowered in England; which is a great miſtake, for were the roots managed with the ſame art as is practiſed in Holland, there is no reaſon to doubt but they would thrive full as well with us as there.

The ſoil in which theſe flowers ſucceed beſt, is a light, ſandy, freſh, rich, loamy earth, which may be compoſed after the following manner: take half freſh earth from a common, or paſture-land, which is of a ſandy loam; this ſhould not be taken above eight or nine inches deep at moſt; and if taken with the turf, or green ſward with it, it will ſtill be better, provided it has time to rot; to this ſhould be added a fourth part of ſea-ſand, and the other fourth part of rotten cow-dung: theſe ſhould be well mixed together, and thrown into a heap, where the whole may remain till wanted; but the whole ſhould be turned over once every month. If this compoſt be made two years before it is uſed, it will be much the better; but if uſed, ſooner, it ſhould be turned oftener, that the parts may the better unite.

This ſoil ſhould be laid two feet deep in the beds which are deſigned for hyacinths, and a little rotten cow-dung, or tanners-bark may be laid at the bottom, which will be within reach of the fibres, but ſhould by no means touch the bulb. If the ſoil be very wet where theſe beds are made, they ſhould be raiſed ten or twelve inches above the ſurface; but if it be dry, they need not be raiſed above three or four.

The beſt ſeaſon for planting theſe roots is towards the middle or latter end of September, according to the earlineſs or lateneſs of the ſeaſon, or the weather which then happens; but it is adviſable never to plant them when the ground is extremely dry, unleſs there be a proſpect of ſome rain ſoon after; for if the weather ſhould continue dry a conſiderable time after, the roots will contract a mouldineſs, which will certainly deſtroy them.

Theſe beds will require no farther care until the froſt comes on, at which time they ſhould have ſome rotten tan ſpread over the bed, about four inches thick; and if the alleys on each ſide of the bed are filled up, either with rotten tan, dung, or ſand, it will prevent the froſt from penetrating the ground to the roots, and ſecure them from being deſtroyed; but when the winters prove very ſevere, it will alſo be proper to have ſome peaſe-haulm, or ſuch like covering laid over them, which will keep out the froſt better than mats. But this covering ſhould be taken off whenever the weather is mild, and only continued on in very hard froſts; for where the beds are covered with tan or ſea-coal aſhes, no common froſt can penetrate through, ſo the other coverings are uſeleſs, except in very ſevere froſts. In February, when the leaves begin to appear, the beds muſt be arched over with hoops, that they may be covered either with mats, canvas, or ſome other light covering, to prevent the froſt from injuring the buds as they ariſe above ground; but theſe coverings muſt be conſtantly taken off every day when the weather is mild; otherwiſe the flower-ſtems will be drawn up weak, and the foot-ſtalks of the flowers will be ſlender, and ſo rendered incapable of ſupporting the bells, which is a great diſadvantage to the flowers. When theſe hoops are fixed over the beds, the rotten tan ſhould be taken off; in the doing of which, great care ſhould be taken not to bruiſe or injure the leaves of the hyacinths which are then coming up.

When the ſtems of the flowers are advanced to their height, before the flowers are expanded, ſhort ſticks ſhould be placed by each root, to which, with a wire formed into a hoop, the ſtem of the flowers ſhould be faſtened, to ſupport them from falling, otherwiſe, when the bells are fully expanded, their weight will incline them to the ground.

During their ſeaſon of flowering they ſhould be covered in the heat of the day from the ſun, and alſo from all heavy rains; but they ſhould be permitted to receive gentle ſhowers, as alſo the morning and evening ſun; but if the nights are froſty, they muſt be conſtantly defended therefrom. With this management the flowers may be continued in beauty at leaſt three weeks or a month, and ſometimes more, according to their ſtrength, or the favourableneſs of the ſeaſon.

When their flowers are quite decayed, and the tops of their leaves begin to change their colour, their roots ſhould be lifted with a narrow ſpade, or ſome other handy inſtrument: in the doing of this, the inſtrument muſt be carefully thruſt down by the ſide of the root, ſo as not to bruiſe or injure it, as alſo to put it below the bottom of the root; then by the forcing of this inſtrument on one ſide, the fibres of the roots are raiſed and ſeparated from the ground. The deſign of this is to prevent their receiving any more nouriſhment from the ground, for by imbibing too much moiſture at this ſeaſon, the roots frequently rot after they are taken up: about a fortnight after this operation, the roots ſhould be entirely taken out of the ground, and then the earth of the beds ſhould be raiſed into a ſharp ridge, layiag the roots into it in an horizontal poſition, with their leaves hanging out, by which means a great part of the moiſture contained in their thick ſucculent ſtalks and leaves will evaporate, which, if permitted to return back to the roots, would cauſe them to rot and decay after they are taken up, which has been the general defect of moſt of the hyacinths in England.

In this poſition the roots ſhould remain until the green leaves are entirely decayed, which perhaps may be in three weeks time. This is what the Dutch gardeners term, the ripening of their roots, becauſe by this method the roots become firm, and the outer cover is ſmooth, and of a bright purple colour; whereas thoſe roots which are permitted to remain undiſturbed, till the leaves and ſtalks are quite decayed, will be large, ſpongy, and their outer coats will be of a pale colour; for the ſtems of many of theſe flowers are very large, and contain a great quantity of moiſture, which, if ſuffered to return into the roots, will infallibly cauſe many of them to periſh. After they are ſo ripened, they may be taken out of the ground, and wiped clean with a ſoft woollen cloth, taking off all the decayed parts of the leaves and fibres, putting them into open boxes where they may lie ſingly, and be expoſed to the air; but they muſt be preſerved carefully from moiſture, nor ſhould they be ſuffered to remain where the ſun may ſhine upon them. In this manner they may be preſerved out of the ground until September, which is the ſeaſon for planting them again, at which time you muſt ſeparate all the ſtrong flowering roots, planting them in beds by themſelves, that they may make an equal appearance in their flowers; but the off-ſets and ſmaller roots ſhould be planted in another ſeparate bed for one year, in which time they will acquire ſtrength, and by the ſucceeding year will be as ſtrong as the older roots.

There are ſome perſons who let their hyacinth roots remain two or three years unremoved, by which they have a much greater increaſe of roots than when they are annually taken up; but the roots by this great increaſe are frequently degenerated, ſo as to produce ſingle flowers; therefore it is moſt adviſable to take up the roots every year, which is the moſt certain method to preſerve them in their greateſt perfection, though the increaſe may not be ſo great. Thoſe roots which are annually removed will be rounder and firmer, than ſuch as ſtand two years unremoved. *Miller's Gard. Dict.*

HYSSOP, a well known herb, cultivated in every kitchen garden.

It is propagated either by ſeeds, or ſlips; and if by ſeeds, they muſt be ſown in March, upon a bed of light, ſandy ſoil, and when the plants come up, they ſhould be removed to the places where they are to remain, placing them a foot aſunder, at leaſt, each way; but if they are deſigned to abide in this place for a long time, two feet diſtance will be little enough, for they grow pretty large, eſpecially if they are not freqUently cut to keep them within compaſs: they thrive beſt upon a poor, dry ſoil, in which ſituation they will endure the cold of our climate better than when they are planted in rich ground. If they are propagated by ſlips, they ſhould be planted either in ſpring or autumn, in a bed of light earth, where they will take root in about two months, after which they are to be tranſplanted where they are to continue, managing them as before directed for the ſeedling plants. *Miller's Gard. Dict.*

J.

JACK, an inſtrument for turning the ſpit; alſo a contrivance for ſupplying the place of a boy in pulling boots off. It alſo ſignifies a ſupport for ſawing wood upon.

JAMOCK, or *jannock*, oaten bread made into large loaves.

JARDON, a name given by farriers to a ſwelling on the out-ſide of the back of a horſe.

It generally proceeds from blows and kicks of other horſes; but frequently happens to managed horſes, by ſetting them on their haunches: it is ſeldom attended with much lameneſs, unleſs it has been neglected, or ſome little proceſs of the bone broken. It ſhould be firſt treated with coolers and repellents, ſuch as hot vinegar, verjuice, &c. but if any ſwelling continues hard and inſenſible, the beſt way is to bliſter or fire; but mild bliſters alone generally ſucceed. *Bartlet's Farriery, page* 263.

JAUNDICE, a diſtemper incident to horſes, and generally called, by farriers, the yellows.

Horſes are frequentty ſubject to this diſtemper, which is known by a duſky yellowneſs of the eyes; the inſide of the mouth and lips, the tongue and bars of the roof of the mouth looking alſo yellow. The creature is dull, and refuſes all manner of food; the fever is ſlow, yet both that and the yellowneſs increaſe together. The dung is often hard and dry, of a pale yellow, or light pale green. His urine is commonly of a dark dirty brown colour; and, when it has ſettled ſome time on the pavement, it looks red like blood. He ſtales with ſome pain and difficulty, and if the diſtemper is not checked, ſoon grows delirious and frantic. The off-ſide of the belly is ſometimes hard and diſtended; and in old horſes, when the liver has been long diſeaſed, the cure is ſcarce practicable, and ends fatally with a waſting diarrhæa: but when the diſtemper is recent, and in young horſes, there is no fear of a recovery, if the following directions are obſerved.

> Firſt of all, bleed plentifully; and give the laxative clyſter, as horſes are apt to be very coſtive in this diſtemper; and the next day give him this purge.
>
> Take of Indian rhubarb, powdered, one ounce and a half; ſaffron two drams, ſuccotrine aloes ſix drams, ſyrup of buckthorn a ſufficient quantity.

If the rhubarb ſhould be found too expenſive, omit it, and add the ſame quantity of cream of tartar, and half an ounce of Caſtile ſoap, with four drams more of aloes. This may be repeated two or three times, giving intermediately the following balls and drink.

> Take of Æthiop's mineral half an ounce; millepedes the ſame quantity, Caſtile ſoap one ounce; make into a ball, and give one every day, and waſh it down with a pint of this decoction.
>
> Take madder root and turmerick, of each four ounces; burdock root ſliced, half a pound; Monk's rhubarb four ounces; liquorice ſliced two ounces: boil in a gallon of forge water to three quarts; ſtrain off, and ſweeten with honey.

Balls of Caſtile ſoap and turmerick may be given alſo for this purpoſe, to the quantity of three or four ounces a day, and will in moſt recent caſes ſucceed.

By theſe means the diſtemper generally abates in a week, which may be diſcovered by an alteration in the horſe's eyes and mouth; but the medicines muſt be continued till the yellowneſs is intirely removed. Should the diſtemper prove obſtinate, and not ſubmit to this treatment, you muſt try more potent remedies, viz. mercurial phyſic, repeated two or three times at proper intervals; and then the following balls:

> Take ſalt of tartar two ounces, cinnabar of antimony four ounces, live millipedes and filings of ſteel, of each four ounces, Caſtile or Venice ſoap half a pound: make into balls of the ſize of pullets eggs, and give one night and morning, with a pint of the above drink.

It will be proper, on his recovery, to give him two or three mild purges, and, if a full fat horſe, to put in a rowel. *Bartlet's Farriery, page* 156.

ILES, or *oiles*, the beards or the ears of barley, wheat, &c.

INARCHING. *See* GRAFTING.

INCLOSURE, the ſeparation of common grounds into diſtinct poſſeſſions.

The incloſing of lands, and dividing them into different fields, paſtures, &c. is a moſt eſſential part of their real improvement, and attended with many very conſiderable advantages, of which we ſhall here mention only the following:

Incloſures aſcertain to every man his juſt and due property, and thereby prevent an infinity of treſpaſſes, injuries, and other ſources of ruinous litigation. They keep the land warm, and add to its fertility, by ſcreening it from violent and nipping winds, which otherwiſe frequently deſtroy whole crops; and they alſo defend it from thoſe drying and ſcorching winds, which ſo often blaſt at once the huſbandman's, till then well grounded, expectation. They afford ſhade in the ſummer, and ſhelter in the winter, for cattle, which would otherwiſe deſtroy more with their feet than they eat with their mouths, and which, for want of theſe, might, as Mr. Worlidge obſerves, loſe more of their fat or fleſh in one ſultry day, than they gain in three cold ones. Their cuttings afford fuel to the induſtrious huſbandman, and, if carefully planted and preſerved, they will here and there furniſh him with timber for his carts, ploughs, and other utenſils, beſides ſometimes uſeful fruits. They are an excellent encouragement to good huſbandry, and a great remedy againſt beggary, by employing many poor people in the labour which either the making, or the mending of them conſtantly requires, and which is amply repaid by the increaſe of crops: for it has been remarked, not only that well incloſed countries generally maintain treble the number of inhabitants, or more, than the champaign; but alſo, that thoſe inhabitants are much better fed and clad, than the common run of people in unincloſed lands. To be convinced of this, let any one but examine our vaſt downs, commons, heaths, waſtes, and unimproved foreſts, badges yet remaining, as Mr. Worlidge properly terms them, of poverty and idleneſs; but at the ſame time, thoroughly ſuſceptible of being converted, with proper care, into corn and paſture fields, meadows, gardens, orchards, and pleaſant groves, the marks of induſtry and good huſbandry. Let him but compare the naked parts of Wiltſhire, Glouceſterſhire, Hampſhire, Surry, &c. with the delightful parts of Kent, Herefordſhire, and other countries, and he cannot but be ſtruck with a demonſtration of the immenſely valuable improvements which may yet be made in very many parts of this kingdom. The now unimproved, un-occupied crown-lands, might alone, or even only a part of them, be rendered an inexhauſtible ſource of unequalled wealth to the ſovereign, of a vaſt increaſe of his ſubjects, and of happineſs to all.

The common objection againſt incloſures have been ſo well refuted by many very able writers, and are daily invalidated by that moſt unerring teſt, experience, that it would be needleſs for us to recapitulate them here: we therefore ſhall only point out one farther eſſential advantage attending this great improvement, which is, that it enables the farmer to act as is moſt agreeable to him in ſowing when, and what, he pleaſes.

Every gentleman, whoſe eſtate is not yet incloſed, and who is conſequently at liberty to chooſe the manner and means of doing it, will rationally begin with having a map of it drawn, that he may thereby be enabled to divide and portion it out, with the greater propriety and preciſion, ſo as to render it moſt pleaſing to the eye, and moſt convenient to each farmer. If he has a place of reſidence upon it, he may make the whole become ornamental to that reſidence, by a judicious diſpoſition of his hedges and plantations, as has been nobly done at Boughton, in Northamptonſhire, by the late duke of Montague, who, with a moſt refined taſte, and truly benevolent mind, diſdaining all the little and confined ornaments of a park, executed his fine improvements there in ſuch a manner, as to render them pleaſingly beneficial to all his neighbours, as well as to every perſon ſettled upon his land. Gubbins, in Hertfordſhire, the ſeat of Sir Jeremy Sambrook, is another charming example of elegance, though leſs extenſive than the former.

Ha-ha walls, and pieces of water, with rails running acroſs them, are an eaſy means of preſerving a fenced level.

The farms ſhould be ſo divided, that the dwelling of each tenant may be as contiguous to his land as conveniency will admit of, to prevent length of carriage, and to facilitate his due attendance.

Small farms have always been obſerved to yield the greateſt proportional rent, and ſmall incloſures conſtantly produce the moſt plentiful crops.

Incloſures for arable lands ſhould be larger than for paſtures, that the ſoil may be kept dry, and the corn be well aired. For the manner of making incloſures, *ſee the ataicle* FENCE.

ING, a common paſture or meadow.

INOCULATION, a very curious operation in gardening, otherwiſe called budding.

It is a kind of grafting practiſed in the ſummer months on ſeveral kinds of ſtone fruits, as peaches, nectarines, cherries, plums, apricots, &c. alſo upon oranges, jaſmines, and various other ſorts of plants, which ſucceed better by this practice, than by the common method of grafting. The operation is performed in the following manner:

Being provided with a ſharp knife, with a flat haft, made for this purpoſe, as alſo with the cuttings of the tree intended to be propagated, make choice of a ſmooth part of the ſtock intended to be inoculated; if deſigned to be dwarf, five or ſix inches from the ground: but if a ſtandard, it ſhould be budded at the height of five and a half, or ſix feet; then, with your knife, make an horizontal cut acroſs the rind of the ſtock, and from the middle of that cut make a ſlit downwards about two inches in length, being careful not to cut deeper than the thickneſs of the bark, leſt the ſtock is wounded; then having the cutting ready, cut off the leaf from the bud, leaving the foot-ſtalk remaining; cut the bud off lengthways, ſomewhat longer than the ſlit in the ſtock, with part of the wood to it; this done, with your knife ſlip the wood from the bark with a ſudden jerk, and obſerve whether the eye of the bud is left or not, for thoſe buds which loſe their eyes in ſtripping are uſeleſs; then with the handle of the knife gently raiſe the bark on each ſide of the ſlit in the ſtock, and inſert the bud therein, obſerving to place it ſmooth between the rind and wood of the ſtock, cutting off that part of the rind of the bud which may happen to be too long for the ſlit made in the ſtock; ſo having exactly fitted the bud to the ſtock, tie them cloſely round with wetted ſtrong baſs, taking care not to bind round the eye of the bud, which ſhould be left open. In about three weeks or a month, the buds will require to be looſened of the bandage, which, if not done in time, will be very injurious to them, but not to be intirely diveſted of the binding, as it is not amiſs to ſlightly tie them again, which will prevent the bark of the ſtock from flying open, as ſometimes happens, whereby the bud is much injured, if not entirely deſtroyed.

The March following, the ſtock ſhould be cut off about three inches above the place of inoculation, ſloping it the contrary way to the bud; this length is of uſe to faſten the ſhoot which proceeds from the bud, which otherwiſe might be blown out by ſtrong winds: but the autumn following, it ſhould be cut cloſe juſt above the bud, that the place of amputation may the more readily be barked over.

The time for inoculation, is from the middle of June to the latter end of Auguſt, according to the ſeaſon and the forwardneſs of the different ſorts of trees intended to be budded, which muſt be known by trying if the buds will ſeparate from the wood eaſily. The firſt ſort of fruit commonly inoculated, is the apricot, and the laſt the orange; although the orange is commonly budded in Auguſt, it is very proper to try the operation in July, and thoſe ſtocks which miſcarry may be budded the ſucceeding month, or even in September; but let it be done when it will, it is proper to place them in a gentle heat, giving them plenty of water, by which means there will be no reaſon to doubt of their ſucceſs.

In performing this operation, it will be neceſſary to take the opportunity of moiſt cloudy weather, as the bud and ſtock will more readily unite, being more replete with juices than in hot dry weather, when the ſtock will perſpire ſo faſt, as to leave the buds deſtitute of moiſture.

INOM, or *Innom barley*, ſuch barley as is ſown the ſecond crop after the ground is fallowed.

INSECT, a general name for the ſmaller kinds of animals.

With regard to the generation of inſects, the world is now in general convinced, that they are not bred from corruption, but from eggs, though the contrary was believed by the ancients.

Malpighi, Swammerdam, and Redi, have abundantly confuted the doctrine of equivocal generation, as well as the chimerical transformation of the caterpillar into the butterfly, and have ſhewn, that all the members of the butterfly were incloſed under the nympha or ſkin of the caterpillar, as the parts of a plant are in the ſeed.

Inſects take particular care to depoſit their eggs or ſemen in ſuch places where they may have a ſufficient incubation, and where the young, when hatched, may have proper food till they can ſhift for themſelves. Thoſe whoſe food is in the water, lay their eggs there; thoſe to whom fleſh is a proper food, in fleſh; and thoſe to whom the fruits or leaves of vegetables are food, are accordingly depoſited there, but conſtantly the ſame kind in the ſame tree. As for others that require a greater degree of warmth, they are provided by the parent with ſome place in or about the body of other animals, as the feathers of birds, hair of beaſts, ſcales of fiſh, in the noſe, in the fleſh, nay ſome in the bowels of man, and other creatures. And as for others, they make them neſts, by digging into the earth, wood, &c. carrying in and ſealing up proviſions that ſerve for the production of their young, and for their food when produced.

There is obſerved in flies, butterflies, &c. a kind of glue, by which the female faſtens her eggs to the beraing buds of trees, &c. ſo as not to be hurt by rain or froſt.

Mr. Andry, in his Treatiſe *De la Generation des vers dans le Corps de l'Homme*, takes notice, that the ancients were miſtaken in denying that inſects breathed, on account of their wanting lungs; for modern obſervations convince us, that inſects have a greater number of lungs than any other animals. They alſo thought that they had no blood, as many of them had no red liquor like ours; but it is not the colour, but the uſe of the liquor, that is to be regarded. They alſo believed that they had no hearts; whereas our microſcopes now diſcover that, when inſects have ſeveral lungs, they have alſo ſeveral hearts; and this in particular is obſervable in ſilk-worms, who have a continued chain of hearts from the head almoſt to the extremity of the tail; and, as is apparent from ſeveral inſects, who give ſigns of life, long after they are divided into ſeveral parts.

Inſects want no parts that are either neceſſary or convenient for their uſe, or to render them complete in their kind. Some affirm that earth-worms, and thoſe round-tailed worms, which are found in the inteſtines of men, horſes, &c. as alſo ſnails and horſe-leeches, are hermaphrodites; but that ſuch worms as become flies, and that ſilk-worms, are not ſo, being of no ſex, but neſts full of real animals, which in time come out with wings.

Several ſorts of inſects do irreparable injury to the huſbandman, though ſo very minute as hardly to be diſcovered.

Among others, a ſmall kind of worm gets into the roots, chiefly of oats, and, working upward, deſtroys all the inſide of the plant, which periſhes ſoon after. M. Duhamel ſuſpects it to have been an inſect of this kind that deſtroyed vaſt quantities of wheat in the neighbourhood of Geneva, and of which M. de Chateauvieux ſent him the following account. “Our wheat, ſays that illuſtrious huſbandman, in the month of May 1755, ſuſtained a loſs which even that cultivated according to the New Huſbandry did not eſcape. We found in it many little white worms, which afterwards became of a cheſnut colour. They poſt themſelves between the blades, and eat the ſtems. They are uſually found between the firſt joint and the roots. Every ſtalk which they attacked, grew no more, but became yellow and withered. The ſame misfortune befel us in the year 1732. Theſe inſects appeared about the middle of May, and made ſuch havock that the crop was almoſt deſtroyed.”

Mr. Liſle mentions, that on the 13th and 14th of June, in pulling up wheat in ear, and ſow-thiſtles, he obſerved among the upper part of the roots of moſt of theſe plants, knots or cluſters of graſs-lice, or green locuſts, as he calls them, which appeared whitiſh when they were but juſt come to their ſhape, and as yet under ground: and among moſt of theſe cluſters he obſerved a fly at her incubation, very turgid of a whitiſh matter; ſhe being then blowing theſe inſects. Her wings were black, and he thought her plainly the ſame as the locuſt, excepting that it had wings. He did not find more than one fly at any one root.

We too often find, in our kitchen-gardens, a ſort of vermin called vine-fretters. They fix upon the roots of leguminous plants, which afterwards gradually turn yellow, and die. M. Tillet ſays he has obſerved the ſame inſect in the roots of wheat.

The cuckow-ſpit, or ſpring-forth, as it is commonly termed, lodges itſelf principally in the joints of plants, ſeldom appears before the latter end of May, and is moſt common when rain has fallen after a ſeries of dry weather. M. Poupart, in his account of this little creature, ſays, that as ſoon as it is out of its egg, it goes to a plant, which it touches with its fundament, and faſtens there a white drop of liquor full of air; that it drops a ſecond near the firſt, then a third, and ſo on till it covers itſelf all over with a ſcum or froth, which keeps it from the heat of the ſun, or ſpiders that would ſuck it. But Mr. Liſle takes this liquid to be nothing but the nightly dew, which falls on the fork or joint of the plant, where the little inſect works it into froth with its proboſcis, as with a bellows. *See the article* Butterfly.

INSTEP, a name given to that part of a horſe's leg, which reaches from the ham to the paſtern-joint.

INUNDATION, a flood, or the overflowing of lands by a large collection of water. For the manner of guarding againſt the bad effects of inundations, *ſee the article* Banks.

JUG, a large drinking veſſel, with a gibbous or ſwelling belly.

JURNET, earth-nut.

K.

KEEVE, a fat in which beer is worked or fermented.

KELL, a web, or kind of bag, in which inſects are bred.

KID, a ſmall faggot of under or bruſh-wood.

KIDEROW, a place for keeping a ſucking calf.

KIDNEYS, two pretty large glandulous bodies ſituated in the cavity of a horſe's loins upon the two lowermoſt ribs.

Their uſe is to ſeparate the urine, which is of great importance to the health and preſervation of horſes, they being liable to many diſeaſes, which either take their origin from faulty kidneys, or have at leaſt ſuch ſymptoms, as plainly ſhew the kidneys to be more or leſs affected.

The ſigns of the kidneys being hurt or affected, are a weakneſs of the back and loins, difficulty of ſtaling, faintneſs, loſs of appetite, and deadneſs in the eyes; the urine is thick, foul, and ſometimes bloody, eſpecially after a violent ſtrain. A horſe diſeaſed in his kidney can ſeldom back, that is, move ſtrait backwards, without pain, which is viſible as often as he is put to the trial: the ſame thing is obſervable indeed in horſes, whoſe backs have been wrang and wrenched, but with this difference, that in the latter there is ſeldom any defect or alteration in the urine, except that it is higher coloured.

Bleeding is the prime remedy, and that plentifully, in order to prevent inflammation; and the more ſo, if a fever attends a difficulty in ſtaling, for then we may ſuſpect the kidneys already inflamed. A rowel in the belly has been found uſeful, and the following balls may be given twice or thrice a day, with a pint of marſhmallow decoction, in which half an ounce of gum-arabic is diſſolved, with an ounce of honey.

> Take lucatellus balſam one ounce, ſpermaceti ſix drams, ſal prunellæ half an ounce; mix into a ball with honey: if the urine is bloody, add half an ounce of Japan earth.

Should the fever continue, bleed largely, give emollient clyſters, and the cooling, opening drink, till it abates.

If the urine paſſes with difficulty and pain, notwithſtand theſe means, give this ball, and repeat it twice or thrice a day, till the horſe ſtales freer and without pain, his urine becomes of a right conſiſtence, and is free from any purulent ſettlement.

> Take balſam of copivi, or Straſbourg turpentine, and Venice ſoap, of each one ounce; nitre ſix drams, myrrh powdered two drams; make into a ball with honey, and waſh it down with the marſhmallow decoction.

But if this method ſhould not be ſucceſsful, and the urine continues turbid, grows coffee coloured or fœtid, the horſe loſing his appetite and fleſh, it is a ſure ſign of ulceration in the kidney; which if the above remedies do not ſoon remove, you may depend on it the horſe will go into a conſumption, and is incurable.

As a ſuppreſſion of urine ariſes ſometimes from an inflammation of the kidney; ſo at others, from a paralytic diſorder, diſabling them in their office of ſeparating the urine from the blood: in this latter caſe the bladder is uſually empty, ſo that a horſe will make no motions to ſtale, and if he continues a few days in this condition, his body will ſwell to a great degree, breaking out in blotches all over, and death will ſoon cloſe the ſcene.

If it ariſes from inflammation, bleed largely, and treat the horſe as above recommended; but if not, give ſtimulating clyſters, and ſtrong diuretics, ſuch as the following balls once in four hours; for if a horſe ſtales not in thirty hours, his danger muſt be great.

> Take juniper-berries powdered one ounce, ſal prunellæ ſix drams, ætherial oil of turpentine half an ounce, camphor one dram, oil of juniper two drams; make into a ball with honey, and give after it, three or four horns of the marſhmallow decoction and honey.

Or,

> Take ſquills powdered two or three drams, nitre half an ounce, or ſix drams; make into a ball with honey.

Or,

The following, which is more forcing, and ſhould be given with caution.

> Take cantharides well dried, from one ſcruple to half a dram; camphor diſſolved in oil of almonds, from one dram to two; nitre and Venice ſoap, of each an ounce; mix into a ball with ſyrup of marſhmallows.

When this laſt ball is given, the horſe ſhould be made to drink plenty of water, with gum-arabic diſſolved in it; the following clyſter may alſo be given at the ſame time.

> Take of Barbadoes aloes two ounces, the ſame quantity of Venice turpentine, beat up with the yolks of two eggs; jallap powdered two drams; juniper and bay-berries, each a handful, bruiſed and boiled in two quarts of a decoction of mallows; ſtrain off and mix by degrees with the above, to which add a pint of linſeed-oil.

If the complaint is not removed by theſe means, rub the horſe's reins well with two parts of oil of turpentine, and one of oil of amber; and apply a poultice of garlick, horſe-radiſh, muſtard-ſeed, camphor, and green ſoap, ſpread on thick cloth, over them. Give the horſe alſo two drams of calomel over night, and a moderate purge the next morning. Theſe, perhaps, are the chief and beſt remedies that can be given in this generally fatal diſorder.

When the ſtrangury in a horſe does not ariſe from wind, or dung preſſing on the neck of the bladder, the cauſe is from inflammation, or too long a retention of the urine. Such horſes make frequent motions to ſtale, ſtand wide and ſtraddling, are full, and have their flanks diſtended. In this caſe bleed largely; give the following drink, and repeat it every two hours, for two or three times, till the horſe is relieved.

> Take Venice turpentine broke with the yolk of an egg one ounce, nitre or ſal prunellæ ſix drams, half a pint of ſweet oil, and a pint of white wine.

If this drink ſhould not have the deſired effect, the diuretic ball above-mentioned may be given in the ſame manner, omitting the myrrh.

Give the horſe plenty of the marſhmallow decoction, in a quart of which diſſolve an ounce of nitre and gum-arabic, and two of honey.

Horſes ſubject to a diabetes, or profuſe ſtaling, if old, or of weak conſtitution, are ſeldom cured; they ſoon looſe their fleſh and appetite, grow feeble, their coat ſtaring, and they die rotten. Of a young horſe there are more hopes; but he muſt not be indulged with too much water, or moiſt food. Give him the following:

> Take jeſuits-bark four ounces, biſtort and tormentil-root, of each two ounces; boil in two gallons of lime-water to the conſumption of half, and give a pint three times a day.

Let the horſe drink two or three quarts a day of lime-water; and if theſe medicines ſhould not ſucceed, give a quart of ſtrong allum poſſet, three or four times a day.

This method is proper alſo for a horſe who ſtales blood; or the following balls may be given for that purpoſe, if the bleeding is profuſe.

> Take bole-armoniac one ounce, Japan earth half an ounce, roch-allum two drams, elixir of vitriol one dram; make into a ball with conſerve of roſes, and give it every ſix hours.

As this diſorder generally proceeds from too violent exerciſe, over-ſtraining, &c. repeated bleedings in ſmall quantities are abſolutely neceſſary, till the mouths of the veſſels cloſe up. *Bartlet's Farriery, pag.* 159.

KILN, a kind of ſtove for admitting heat, in order to dry any ſubſtance, as malt, hops, &c. *See the articles* MALT *and* HOPS.

KILN alſo ſignifies a fabric conſtructed for burning lime-ſtone, chalk, &c. into lime.

The kiln commonly uſed for this purpoſe is a large pit, generally round, and of a ſize proportioned to the quantities intended to be burnt. It is wideſt at the top, and narrower, by degrees, as it comes nearer the bottom. The inſide of this pit is ſometimes lined with a wall built of lime-ſtone; but more commonly, and more properly with bricks: at the outſide, near the bottom, is a hole, or door, by which the aſhes are taken out; and above that, ſome have an iron-grate, which comes cloſe to the wall round about: but others make an arch with ſtone, or large pieces of chalk; and upon this they lay a layer of ſtone, or of whatever elſe they burn in the kiln; upon this they place a layer of fuel, and ſo on, layer over layer, till the kiln is full; only obſerving that the outermoſt layer be always of the fuel, and not of chalk or ſtone. When the kiln is thus filled, fire is given at the hole underneath; and the lime is finiſhed in a different time, according to the nature of the ſubſtance. That made of chalk is generally burnt in twenty-four hours; but ſtone often requires ſixty hours. Ten buſhels of ſea-coal, or one hundred of faggots three feet long, will burn forty buſhels of chalk, which will yield thirty buſhels of unſlaked lime. Where chalk is ſcarce, the chalk rubbiſh is often worked up into a kind of paſte, with water, and made into a ſort of bricks, which are dried in the air, and then burnt into lime in the common way: but this is not quite ſo good as that which is burnt from the chalk-ſtone.

The experience of late years has ſhewn that it is more profitable to burn lime in kilns ſhaped like a hogſhead; that is, ſmall in circumference at the bottom, gradually wider towards the middle, and then contracting again upwards to the top. This kiln, as Mr. Lummis obſerves in his letter to the Edinburgh Society, publiſhed by Mr. Maxwell, ſhould be made entirely within the ſurface of the ground, on the declivity of a little hill, where that ſituation can be had, ſo as to allow free acceſs to the air-hole or furnace. At the bottom, about a foot from the ground, are iron-bars, placed horizontally aroſs, to give the kiln a good draught, and upon theſe bars are laid, firſt ſmall wood or furze, then ſmall coals, then ſtones about the bigneſs of an egg, then another layer of fuel, and ſo on, increaſing the ſize of the ſtones towards the middle of the kiln, where they may be as big as half a peck, and decreaſing their ſize gradually up to the top, obſerving to lay the ſmalleſt neareſt to the ſides. The ſtones need not be broken ſo ſmall for this kiln, as for thoſe above ground; they will be burnt more truly without raw ſtones, or running into cinders; and not above half the quantity of fuel conſumed in the common way, will be uſed in this.

The following method of conſtructing another kiln, is thus particularly deſcribed in Mr. Maxwell's Collection.

At bottom, the kiln muſt be three feet four inches wide; and at the height of two feet four inches, three feet ſix inches. At the depth of four feet and a half, it muſt be four feet and a half wide. A ſecond ſlope is then made five feet and a half higher, at the end of which, the kiln, then ten feet deep, ſhould be exactly ten feet wide within the walls. A third ſlope ſhould heighten it to 14 feet, where it ſhould be exactly 12 feet and a half wide, likewiſe, within the walls From thence it is run up to the height of nineteen feet, when it ſhould be rather leſs than fifteen feet wide. The ſlopes muſt be made as gradual as poſſible, and the inner ſurface of the kiln muſt be quite ſmooth, that its contents may fall down equally when the burnt ſtones are drawn out below. By extending a line from a pole fixed in the center of the bottom or floor of the kiln, to the ſides, workmen will eaſily be guided in making the above-mentioned ſlopes. This kiln has four vents, oppoſite to one another, and no croſs-irons whereupon to lay the coals and ſtones, they being ſupported by old timber, furze, broom, &c. above which the coals are laid: but if the kiln be built on the ſide of a hill, it can have but three vents. The firſt layer of ſtones above the vents ſhould be cloſely jambed in, and reſt againſt the ſides of the wall. A kiln of the above dimenſions will burn eighty buſhels of lime-ſtones in a day: but it may be made larger, without altering theſe dimenſions, by only adding two or three feet to the height, which will require ſtrong walls. This addition to the height need not be ſloped, but may be made perpendicular.

The late earl of Stair had a kiln at New Liſton, and others in Galloway, built in the ſhape of an egg, opened a little at both ends, and ſet upon the ſmalleſt. This kiln anſwered exceedingly well, and beſides lime-ſtone, burnt any kind of earth that was thrown into it.

Kilns thus built, ſwelling at or about the middle, and contracting again at the top, reverberate more ſtrongly, and make a more intenſe heat, than thoſe which grow wider and wider, and are not contracted.

When the kiln is filled, or finiſhed as it is commonly termed, it ſhould be covered over with ſods or ſtrong turf, to keep the heat as intenſe as poſſible, and hinder the wind from blowing the fire at the top, or rain from abating or extinguiſhing it. The ſtones muſt be broken in pieces before they are thrown into the kiln; otherwiſe the air contained in their cavities, being expanded by the heat, will often make them fly with ſuch violence as to damage the kiln. For this reaſon they ſhould be broken ſmaller for kilns that are above ground, than for thoſe which are underneath. The ſaving of this labour, and of near half the quantity of fuel, renders theſe laſt greatly preferable.

Lime is made of chalk, or of any ſtone that is not too cold, or ſandy, as free-ſtone and the like. All the ſoft ſtones that are of a tolerably cloſe texture, will burn to good lime, as will alſo marble, ſlate, ſea-ſhells, corals, and flints; but this laſt kind of ſtone is more difficult to be burnt into lime than the others, except in a reverberatory kiln, becauſe it is apt to run to glaſs. The hardeſt, firmeſt, and whiteſt ſtones make the beſt lime; and when it is made of chalk, that which is formed of the hardeſt, ſtony kind, is much better than that which is made from the ſoft; but the harder the ſtones are, the more fire it requires to burn them. Both ſorts may be burnt with wood, coals, turf, furze, or fern, which make a very fierce fire.

Theſe kilns ſeem to be intended for burning only one kiln full at a time: but where large quantities of lime are wanted, perpetual kilns, that is, kilns where the fire is kept conſtantly burning, are conſtructed on nearly the ſame principles. Here the iron bars at the bottom are abſolutely neceſſary, in order to take out the lime as ſoon as it is burnt. When ſtone-lime, which requires the moſt violent fire, is burnt in theſe kilns, vents are made near the bottom to be opened occaſionally, according as the wind ſits, that a ſtronger current of air may quicken the fire, and thereby give it the more power. *See the article* LIME.

KILN-ASHES, the aſhes made in kilns where wood, ſtaw, furz, &c. are burnt. Theſe aſhes are a good manure for almoſt any kind of ſoil. In the weſt of England, the farmers ſiſt them over their corn and graſs; but this muſt not be done in windy weather, becauſe they are ſo very light, that they would eaſily be blown away. They ſucceed beſt when laid on juſt before rain or ſnow.

KINNEL, a powdering-tub.

KIT, a milking-pail, in the form of a churn, with two ears and a cover.

KNAPWEED, the ſame with blue-bottle. *See* BLUE-BOTTLE.

KNOT-GRASS, the ſame with couch-graſs. *See* COUCH-GRASS.

KNOLL, a little round hill.

KNOLLS, a term uſed in ſome counties of England to ſignify turneps.

L.

LACTARY, a milk-houſe.

LADIES-SMOCK, *Cuckow-flower*, or *Canterbury-bells*, a perennial weed, and common in paſture grounds. The ſtalk is upright, round, and ſmooth. The leaves are winged, with the lobes of the lower ones roundiſh, and of thoſe on the ſtalk oblong. The flowers are large, handſome, and white, or purpliſh, conſiſting of four obtuſe veined petals. The ſeeds are contained in erect compreſſed pods, about an inch in length, divided into two cells, which, when ripe, burſt with a touch, and throw out their ſeeds to a conſiderable diſtance.

LAIRE. *See* LAYER.

LAMB, the young of the ſheep-kind. *See the article* SHEEP.

LAMENESS, in horſes. *See the article* STRAINS.

LAMPAS, an excreſcence in the roof of a horſe's mouth, which is ſometimes ſo luxuriant, that it grows about the teeth, and hinders his feeding.

The cure conſiſts in lightly cauterizing the fleſh with a hot iron, taking care that it does not penetrate too deep, ſo as to ſcale off the thin bone that lies under the upper bars; the part may then be anointed with burnt allum and honey, which is proper for moſt ſores in the mouth. *Bartlet's Farriery, page* 282.

LAND. *See the article* GROUND *and* SOIL.

LARCH-TREE, a genus of trees, whoſe leaves, which are long and narrow, are produced out of little tubercles, in form of a painter's pencil: the cones are produced at remote diſtances from the male flowers on the ſame tree: the male flowers are very like ſmall cones at their firſt appearance, but afterwards ſtretched out in length.

Theſe trees are propagated by ſeeds, which ſhould be ſown in the beginning of March, upon a bed of light ſoil, expoſed only to the morning ſun: or otherwiſe they may be ſown in pots or boxes of light earth, and placed near a hedge, where they may have the morning ſun only. The ſeed ſhould be covered about half an inch thick with fine light earth, and in very dry weather ſhould be gently refreſhed with water. In about ſix weeks, if your ſeeds were good, your plants will come up, at which time you ſhould carefully guard them againſt the rapacious birds, which would otherwiſe pull off the heads of the plants, as they thruſt themſelves out of the ground with their covers on them: and obſerve to refreſh them with water in dry weather, eſpecially if they are ſown in pots or boxes; as alſo to keep them clear from weeds, which, if ſuffered to grow among the young plants, will ſoon deſtroy them: nor ſhould they be too much expoſed to the ſun, or ſtrong winds, both which are very injurious to theſe plants while they are young: but in October you ſhould, if they are in boxes or pots, remove them into a ſituation where they may be defended from ſharp winds, which are ſometimes hurtful to them, while young; but afterwards, they will indure the ſevereſt weather of our climate.

Theſe trees are very proper for the ſides of barren hills, where few other ſorts will thrive ſo well; nor is this tree very delicate in its ſoil, but will grow much better on poor, ſtrong, ſtony land, than in rich ground; and, during the ſummer, they appear very beautiful; but in autumn they caſt their leaves, whereby ſome people have been deceived, by ſuppoſing them dead, and have deſtroyed them.

From the wounded bark of this tree exudes the pureſt Venice turpentine; and on the body and branches of it grows the agaric, which is a drug uſed in medicine.

LARKSPUR, a genus of plants, whoſe flower conſiſts of five unequal petals, diſpoſed circularly: of theſe the upper one is anteriorly more obtuſe than the others, and is emarginated, and extended behind into a tubulated horn, which is ſtraight, long, and obtuſe. The two ſide petals are nearly of the ſize with the upper; and the two lower are leſs, and ſpread open. The ſtamina are numerous; and the fruit conſiſts of three capſules, of an ovate-ſubulated figure, joined together, which are filled with a number of angulated ſeeds.

There are ſeveral ſpecies of larkſpur; but the ſort which is well known, and common in gardens (particularly thoſe with double flowers of various colours) is much in eſteem, and extremely beautiful.

Theſe are annual, and may be ſown in autumn or ſpring. Where the land is light and dry, the autumn ſowing is to be preferred; for if the plants withſtand the ſeverity of winter, they blow much earlier than thoſe ſown in the ſpring, and their ſpikes of flowers are conſiderably larger. In order to continue their plenitude, all plants with ſingle flowers ſhould be deſtroyed ſo ſoon as they appear, reſerving for ſeed thoſe only which are very double.

They flower in July and Auguſt, and are great ornaments to the pleaſure garden.

LATH, a long, thin, and narrow ſlip of wood, nailed to the rafters of a roof or cieling, in order to ſuſtain the covering.

Theſe are diſtinguiſhed into three kinds, according to the different kinds of wood of which they are made, viz. heart of oak, ſap laths, and deal laths; of which the two laſt are uſed for ceilings and partitions, and the firſt for tiling only.

Laths are alſo diſtinguiſhed according to their length, into five feet, four feet, and three feet laths; though the ſtatute allows but of two lengths, thoſe of five, and thoſe of three feet, each of which ought to be an inch and a half in breadth, and half an inch in thickneſs; but they are commonly leſs.

LATH-BRICKS, bricks much longer than ordinary, uſed inſtead of laths, for drying malt; for which purpoſe they are extremely proper, as not being liable to catch fire, and retaining the heat much longer than thoſe of wood; ſo that a very ſmall fire will ſerve after they are once heated.

LATHE, a word uſed in ſome counties in England, to ſignify a barn.

LAVENDER, a well known plant cultivated in moſt gardens, and of which there are two ſorts, diſtinguiſhed by the names of lavender ſpike, and common narrow leaved lavender. They are both propagated by cuttings or ſlips of a year's growth. Theſe ſhould be planted in March, in a ſhady ſituation, or at leaſt they ſhould be ſhaded with mats till they have taken root. They may then be expoſed to the ſun; and after they have acquired ſufficient ſtrength, they ſhould be removed to the places where they are to remain. The broad lavender does not often produce flowers; but when it does, they appear towards the latter end of July, at which time the ſpikes of the common ſort, which bloſſom the earlier of the two, and which is the kind cultivated for medicinal uſes, are fit to be gathered. Both theſe ſorts will grow beſt in the ſummer, if planted in a rich and moiſt ſoil; but then they ſeldom bear the inclemency of the winter: nor will they have half ſo ſtrong an aromatic ſcent, nor laſt near ſo long, as thoſe ſituated on a dry, gravelly, or ſtony ſoil. In ſuch land, or even on a barren rocky ſpot, they will reſiſt all the ſeverity of our hardeſt winters.

LAWN, a large plain in a park, or adjoining to ſome grand ſeat. The moſt convenient ſituation is on the ſouth, or ſouth-eaſt-ſide of the houſe. If the lawn be a ſquare, three avenues may break out from three of the angles, and meet in the fourth angle oppoſite to the houſe: it may be bounded with walks or a ſingle row of lime trees, ſet at a good diſtance from one another. A circle is a good figure for a lawn, but muſt break off before it comes againſt the front. A triangle is a very proper figure, but ſhould be obtuſe or right-angled next the front.

Many perſons have preferred the lime-tree for this purpoſe, on account of their regular growth: but as the leaves of this tree often change their colour, and begin to fall very ſoon in the autumn, occaſioning a great litter in the garden; and from the end of July the trees make but an indifferent appearance, ſo they are not to be eſteemed for theſe plantations.

The elm, oak, beech, and cheſnut, among the deciduous trees, are to be preferred to all others, as they keep their leaves late in autum: and theſe are all of them large growing trees; ſo are very proper for this purpoſe.

If there are ſome clumps of ever-green trees intermixed with the deciduous trees in this plantation, it will add to the beauty of it, eſpecially in the winter ſeaſon: the beſt ſorts for this purpoſe, are the lord Weymouth's pine, the ſilver and ſpruce firs, which will grow faſt, and become large trees; and as the two latter ſorts always grow pyramidically, ſo they will have a good effect to the ſight, when properly diſpoſed with the diciduous trees: but as theſe generally feather out their branches near the ground, they ſhould be planted where they do not obſtruct the view of any diſtant objects.

But as moſt perſons who take pleaſure in beautifying their ſeats in the country, are in haſte for ſhade, they generally plant the trees too cloſe together, and often in ſuch a manner, as to render it difficult, when the trees are advanced, to reduce their number, without injury to the deſign: therefore thoſe trees ſhould be firſt planted, which are deſigned to remain; and then there may be ſome few others planted for preſent ſhade, which may afterwards be taken away. When perſons, who are beautifying their ſeats, meet with full grown trees on the ſpot, it is a great pleaſure; for theſe ſhould not be deſtroyed, if they can poſſibly ſtand. *Miller's Gard. Dict.*

LAYERS, the ſmall tender ſhoots or twigs of trees, laid or buried in the ground, till having ſtruck root, they are ſeparated from the parent-tree, and become diſtinct plants. The manner of performing this operation is as follows:

1. Take ſome of the boughs, and lay them into the ground, about half a foot deep, in fine freſh mould, leaving them with the end of the layer, about a foot, or a foot and a half out of the ground, and keep them moiſt during the ſummer-ſeaſon, and they will probably have taken, and be fit to remove in autumn; and if they have not by that time taken root, they muſt lie longer.

2. Tie a piece of wire hard round the bark of the bough, at the place you intend to lay in the ground; and twiſt the ends of the wire, ſo that they may not unite; and prick the place above the wire, through the bark, with an awl in ſeveral places; and then lay it in the ground, as before directed.

3. Cut a ſlit upwards at a joint, as is practiſed in laying of carnations, which, by gardeners, is called tonguing the layers.

4. Twiſt the place which you deſign to lay in the ground like a withy, and lay it into the ground, as directed in the firſt way of laying.

5. Cut a place round about the bough that is deſigned to be laid, an inch or two, at the place that is moſt convenient to lay into the ground, and manage it as is directed in the firſt method of laying.

The ſeaſon for laying hardy trees that ſhed their leaves, is in October; but for ſuch as are tender in March; for ever-greens, June or Auguſt are good ſeaſons.

Though layers may be laid at any time in the year, the before-mentioned ſeaſons are moſt proper, for the reaſons following; becauſe they have the whole winter and ſummer to prepare and draw root; for at theſe times of the year, the ſun has ſufficient power on the ſap of the tree to feed the leaf and bud, but has not power ſufficient to make a ſhoot.

And if that ſmall quantity of ſap that does ariſe be hindered, as it will by ſome of the preceding ways of laying, the leaves and buds will gently crave of the layer, and by that means will prepare the layer to take root, or put forth roots a little to maintain itſelf, finding it cannot have it from the mother-plant.

And therefore becauſe it wants but little nouriſhment at that time of the year, it is better to lay layers of trees, or to ſet cuttings, than at other times, either in the winter, when the ſap ſtirs but little, or in the ſummer, when the ſap abounds, or in the ſpring, when it begins to riſe; becauſe it is then apt to come too ſuddenly to draw ſap from the layer, before the layer has drawn or prepared for root.

However, the ſpring or ſummer may do well for ſmall plants; becauſe ſuch plants, being but ſhort-lived, draw root the quicker.

If you would lay young trees from an high ſtandard, the boughs of which cannot be bent down to the ground, then you muſt make uſe of oſier-baſkets, boxes, or pots, filled with fine ſifted mould, mixed with a little rotten willow-duſt, which will keep moiſture to aſſiſt the layer in taking root: this baſket, box, &c. muſt be ſet upon a poſt or treſſel, &c. and the bough muſt be laid according to either of the four firſt ways of laying; but too much head muſt not be left on, leſt that be injured by the wind, or by its own motion rub off the tender root; and the ſmaller the boughs are, the leſs way they ſhould be ſet out of the ground, and care muſt be taken to keep them clear from weeds.

The harder the wood is, the better will the young wood take root; but if the wood be ſoft, the older boughs will take root the beſt. *Miller's Gard. Dict.*

LEAF, a part of a plant, commonly very thin and flat, growing in the ſpring, and falling off in the autumn.

Leaves are the ornament of the twigs, and conſiſt of a very glutinous matter, being furniſhed every where with veins and nerves. Their office is to ſubtilize the nouriſhing ſap, and convey it to the little buds; and likewiſe they ſerve to cover the flowers and fruits with their ſhade, and keep them from other inconveniences; they are to trees what hair is to the human body.

Dr. Grew obſerves, that the fibres of leaves conſiſt of two general kinds of veſſels, namely, for ſap and for air; and are ramified out of greater into leſs, as veins and arteries are in animals.

Mr. Frederick, of Augſbourg, a celebrated gardener, took from the tree a leaf of the opuntia or Indian fig-tree; and ſetting it in the earth, it immediately took root, and produced bloſſoms and fruit.

The diſtinction of leaves, made by thoſe who have written on botany, are the following.

A ſimple leaf is that which is not divided to the middle.

A compound leaf is divided into ſeveral parts, each reſembling a ſimple leaf, as in liquorice, &c.

A digitated leaf is a compound leaf divided into ſeveral parts, all of which meet together at the tail, as in the hemp, black hellebore, &c.

A trifoliated leaf is a digitated leaf, conſiſting of three fingers, as the trefoil, &c.

A quinquefoliated leaf is a digitated leaf, conſiſting of five fingers, as in the quinquefolium.

A pennated leaf is a compound leaf divided into ſeveral parts, each of which is called a lobe, placed along the middle rib, either alternately, or by pairs. When the middle rib is terminated by an odd lobe, it is ſaid to be unequally pennated, as in the goats rue, &c. and equally pennated, when it is not terminated by an odd lobe, as in the caſſia; when the lobes are all nearly of the ſame form and bigneſs, it is called an uniform pennated leaf, as in the liquorice; when they are not ſo, it is ſaid to be difform, as in the agrimonia.

A winged leaf is, as it were, divided into ſeveral pennated leaves, as in the orobus, &c.

A ramoſe leaf is that which is ſtill farther divided than the winged leaf, as in the oſmund royal, female fern, &c.

An entire leaf or lobe is that which has no diviſion on its edges, as in the apple-tree, &c.

A ſinuated leaf is that which is cut about the edges into ſeveral long ſegments, as in common mallows.

A ſerrated leaf is that which is cut about the edges into ſeveral acute ſegments, reſembling the teeth of a ſaw, as in the nettle, &c.

A crenated leaf is that which is cut about the edges into ſeveral obtuſe ſegments, as in the betony, &c.

A lacinated or jagged leaf is that which is cut about the edges into ſeveral pretty deep portions, in an irregular manner, as in the horned poppy, &c.

If the ſurface of leaves are altered, by reverſing the branches of trees on which they grow, the plants are ſtopped in their growth, until the footſtalks are turned, and the leaves recover their former poſition. This ſhews how neceſſary it is to ſupport all thoſe weak ſhoots of plants, which are naturally diſpoſed for upright growth, which either twine about the neighbouring trees for ſupport, or that put out claſpers, by which they take hold of whatever trees or plants grow near them, and are thereby ſupported; and, on the contrary, how abſurd is that practice of tying up the ſhoots of thoſe plants which are naturally diſpoſed to trail upon the ground, for in both theſe caſes nature is reverſed, and conſequently the growth of both ſorts of plants is greatly retarded.

This is one of the great functions for which the leaves of trees and plants are deſigned; but, beſides this, there are others of equal importance to the well-being of plants and fruits; the firſt is, that of the footſtalks and leaves nouriſhing and preparing the buds of the future ſhoots, which are always formed at the baſe of thoſe footſtalks, and during the continuance of the leaves in perfect health, theſe buds increaſe in their magnitude; and, in the deciduous trees, are brought to maturity before the footſtalks ſeparate from the buds in autumn; but if by accident the leaves are blighted, or if the entire ſurface of the leaves are cut off, and the footſtalks are left remaining, the buds will decay for want of that proper nouriſhment which is conveyed to them from the leaves; ſo that whenever trees are diveſted of their leaves, or thoſe leaves are cut, or otherwiſe impaired, though it may in either caſe happen when the buds may be nearly formed, yet if it is before the footſtalks ſeparate naturally from their branches, the future ſhoots will be weakened in proportion to the time when this is done; therefore from all the experiments which have been made in order to know how ſerviceable the leaves of trees and plants are to their well-being, it has been found, that when the plants have been diveſted of their leaves, or their leaves have been eaten or cut, during their growth, the plants have been remarkably weakened thereby. This ſhould teach us not to pull or cut off the leaves of trees, or plants, on any account, while they retain their verdure, and are in health; and this ſhews how abſurd that common practice is, of feeding down wheat in the winter and ſpring with ſheep; for by ſo doing, the ſtalks are rendered very weak, and the ears are in proportion ſhorter; nor are the grains of corn ſo plump and well nouriſhed, as that which is not fed down upon the ſame ground: this is a fact which we can aſſert from many years experience. It is very evident, that graſs which is often mowed, the blades will be rendered finer in proportion to the frequency of mowing it, yet the ſpecies of graſs is the ſame with that on the richeſt paſtures; ſo that although this may be a deſirable thing for lawns, &c. in gardens, yet where regard is had to the produce, this ſhould be avoided.

Another principal uſe of the leaves, is to throw off by tranſpiration what is unneceſſary to the growth of the plants, anſwering to the diſcharge made by ſweat in animal bodies; for as plants receive and tranſpire much more, in equal time, than large animals, ſo it appears how neceſſary the leaves are to preſerve the plants in perfect health; for it has been found by the moſt exact calculation, made from repeated experiments, that a plant of the ſun-flower receives and perſpires, in twenty-four hours, ſeventeen times more than a man.

We ſhall beg leave to mention a few, out of the many experiments which have been made by M. Bonnet, of Geneva, to prove that moſt leaves imbibed the moiſture of the air on their under ſurface, and not from their upper; they are as follows:

He gathered the leaves of ſixteen ſorts of herbaceous plants when fully grown; of each he put ſeveral leaves upon the ſurface of water in glaſs vaſes, ſome were poſited with their upper ſurface, and others with their under ſurface upon the water; theſe were adjuſted exactly to the ſurface of the water, with great care not to let any moiſture reach their oppoſite ſurfaces, and the ſame care was taken to prevent their footſtalks from receiving any moiſture. The glaſſes in which theſe leaves were thus placed, were kept in a cloſet, where the air was very temperate; and as the water in the glaſſes evaporated, there was, from time to time, a ſupply of freſh, which was added with a ſyringe, ſo that the leaves were not diſturbed. The leaves were taken from the following plants; the plantain, the mullein, the wake Robin, the great mallow, the nettle, the marvel of Peru, the kidney-bean, the ſun-flower, the cabbage, the baum, the cock's-comb, the purple leaved amaranth, ſpinach, and the ſmaller mallow.

Six of theſe ſorts he found continued green a long time, and theſe were with different ſurfaces upon the water: they were of the following ſorts, the wake Robin, the kidney-bean, the ſun-flower, the cabbage, the ſpinach, and the ſmall mallow; among the others, the following ſorts were found to draw the moiſture better with their upper than with their under ſurface, the plantain, the mullein, the great mallow, the nettle, the cock's-comb, and the purple amaranth.

The leaves of the nettle, whoſe under ſurfaces were placed upon the water, were decayed in three weeks; whereas thoſe whoſe upper ſurfaces touched the water, laſted three weeks.

The leaves of the mullein, whoſe under ſurfaces were next the water, did not continue freſh more than five or ſix days; whereas thoſe whoſe upper ſurfaces were next the water, laſted five weeks.

The leaves of the purple amaranth, whoſe upper ſurfaces were next the water, continued freſh three months; whereas thoſe whoſe under ſurfaces touched the fluid, were decayed in a week.

The leaves of the marvel of Peru and the baum, appeared to have the advantage, whoſe under ſurfaces were next the water.

The leaves of the wake Robin, and of the cock's-comb, whoſe footſtalks only were put into the water, continued freſh a longer time than thoſe which were placed with either ſurface upon the water.

The leaves of the great mallow, the nettle, the ſun-flower, the marvel of Peru, and the ſpinach, whoſe footſtalks were plunged into the water, continued freſh a ſhorter time, than thoſe which had either of their ſurfaces upon the water.

The leaves of the mullein, plantain, and amaranth, which received the water at their footſtalks, continued freſh much longer than thoſe whoſe under ſurfaces touched the water.

It is not difficult to explain the reaſon of this fact; for the orifices of the ſap-veſſels in the footſtalks are much larger than thoſe of either ſurface, ſo that the water inſinuates itſelf in greater quantities, and with more eaſe, in the firſt than by the ſecond way.

After this the ſame gentleman made experiments on the leaves of ſixteen ſorts of trees and ſhrubs, of the following ſorts: the lilac, the pear-tree, the vine, the aſpin, the laurel, the cherry-tree, the plum-tree, the horſe-cheſnut, the white mulberry, the lime-tree, the poplar, the apricot, the walnut, the filbert, the oak, and the creeper.

Among theſe ſpecies he found, that the lilac, and the aſpin, imbibed the water equally with either their upper or under ſurface; but in all the other ſorts, the under ſurfaces imbibed it in much greater quantities than the upper. The difference was very remarkable in the leaves of the white mulberry, for thoſe whoſe upper ſurfaces were laid upon the water, faded in five days; whereas the others, whoſe under ſurfaces were next the water, preſerved their verdure near ſix months.

The vine, the poplar, and the walnut, afforded very remarkable inſtances, how little diſpoſed the upper ſurfaces of the leaves of ligneous plants are to imbibe the moiſture: for the leaves of theſe three ſorts, whoſe upper ſurfaces were applied to the water, decayed almoſt as ſoon as thoſe which had no nouriſhment.

In all the experiments made by this curious gentleman upon the various leaves of trees and herbs, it is remarkable that all thoſe leaves, which imbibed their moiſture by their upper ſurface, were ſuch as had that ſurface covered over with hairs or down; and, on the contrary, where the under ſurface was garniſhed with either hairs or down, the nouriſhment was imbibed by that ſurface. He alſo mentions many experiments made by himſelf, and alſo by M. Duhamel de Monceau, of the Royal Academy of Sciences at Paris, in rubbing the leaves over with varniſh, oil, wax, and honey, to ſee the effect of theſe upon various leaves, ſome of which were rubbed over on both ſurfaces, others only upon one; ſome only a part of the ſurfaces, others the edges of the leaves were rubbed over, and in ſome only the footſtalks of the leaves. They likewiſe anointed the trunks of ſome trees and ſhrubs, leaving the leaves and branches in their natural ſtate.

The reſult of theſe experiments was, that where the leaves were covered with varniſh on both ſides, they preſently decayed; and where they were anointed with other things, the leaves continued a ſhorter time than others, in proportion as the things were more penetrating; and where one ſurface only was anointed, they continued much longer than thoſe which were anointed on both; and where the pedicle alone was anointed, they continued ſtill longer: but the anointing of the trunks made no ſenſible alteration, except in very hot weather; when they were both of opinion the anointing them were of ſervice, by hindering the too great tranſpiration, which tend to weaken the trees: for they obſerved, that thoſe trees which were varniſhed, ſuffered leſs from the violent heats, than the trees which were left in their natural ſtate.

M. Bonnet alſo obſerved, that the tender parts of the leaves which were varniſhed were deſtroyed by it, and the tough fibres only left remaining.

We may therefore reaſonably conclude, that one great uſe of leaves is what has been long ſuſpected by many, viz. to perform, in ſome meaſure, the ſame office for the ſupport of vegetable life, as the lungs of animals do for the ſupport of animal life: plants, very probably, drawing through their leaves ſome part of their nouriſhment from the air. *Miller's Gard. Dict.*

LEAP, or *Lip*, half a buſhel.

LEASE, *Lea*, *Lay*, or *Ley*, implies graſſy ground, meadow ground, or unploughed ground, kept for cattle.

LEASE alſo ſignifies the letting of lands, tenements, &c. unto another for life; a term of years, under a reſerved rent.

LEEK, the name of a well-known herb, cultivated in every kitchen-garden.

Leeks are raiſed by ſowing their ſeeds in the ſpring, in the ſame manner as onions (*ſee the article* ONIONS) with which theſe are commonly ſown, the two ſorts of ſeeds being mixed according to the proportion which is deſired of either ſort, though the moſt common method is to mix an equal quantity of both; for the onions will greatly out-grow the leeks in the ſpring; but theſe being drawn off, the leeks will have time to grow large afterwards, ſo that there may be a moderate crop of both ſorts. Many perſons, however, ſow their leeks in beds in the ſpring; and in June, after ſome of their early crops are taken off, they dig up the ground, and plant their leeks out thereon, in rows a foot apart, and ſix inches aſunder in the rows, obſerving to water them until they have taken root; after which they will require no farther culture but to keep the ground clear from weeds. The leeks thus planted will grow to a large ſize, provided the ground be good, and therefore this is a very proper method for thoſe who have but little room.

If you would ſave the ſeeds of this plant, you ſhould make choice of ſome of the largeſt and beſt you have, which muſt remain in the place where they grow until February, when they ſhould be tranſplanted in a row againſt a warm hedge, pale, or wall, about eight inches aſunder; and when their ſtems advance, they ſhould be ſupported by a ſtring, to prevent their being broken down, to which they are very liable, eſpecially when in head, and the cloſer they are drawn to the fence in autumn, the better the ſeeds will ripen; for it ſometimes happens in cold ſummers or autumns, that thoſe which grow in the open garden, do not perfect their ſeeds in this country, eſpecially if there are ſharp froſts early in the autumn, which will entirely ſpoil the ſeed.

When it is ripe (which may be known by the heads changing brown) you ſhould cut off their heads with about a foot or more of the ſtalk to each, and tie them in bundles containing three or four heads, and hang them up in a dry place, where they may remain till Chriſtmas or after, when you may threſh out the ſeeds for uſe. The huſk of theſe ſeeds is very tough, which renders it difficult to beat out the ſeeds; ſome, therefore, who have but a ſmall quantity, rub it hard againſt a rough tile, which will break the huſks, and get the ſeeds out better than moſt other methods. *Miller's Gard. Dict.*

LEES, the more groſs and ponderous parts of liquors, which, being ſeparated by fermentation, fall to the bottom.

The lees of wine, beer, ale, and oil, are excellent manures.

LEET, a little court held within a manor, and called the king's court, on account that its authority to puniſh offences originally belonged to the crown, and from thence deſcended to inferior perſons.

LEMON, *Limon*, in botany, a genus of trees with large ſtiff leaves like the citron, without any appendage at the bottom; the flower conſiſts of many leaves, which expand in form of a roſe: the fruit is almoſt of an oval figure, and divided into ſeveral cells, in which are lodged hard ſeeds, ſurrounded by a thick fleſhy ſubſtance, which, for the moſt part, is full of an acid juice.

All ſorts are propagated by budding or inarching them either on ſtocks of lemons or citrons produced from ſeeds, but they will not readily unite on orange ſtocks; for which reaſon the citrons are preferable to either oranges or lemons for ſtocks, as they readily join with either ſort; and being of larger growth, cauſe the buds of the other ſorts to be much ſtronger than if they were on ſtocks of their own kind.

The culture of the lemon is the ſame with that of the orange-tree, with this difference only, the former being hardier than the latter, will conſequently bring their fruit to maturity with us much better than the orange will, and therefore require to have a greater ſhare of freſh air in winter; for which reaſon they ſhould always be placed near to the doors or windows of the green-houſe: and in ſome curious gardens theſe trees have been planted againſt walls, where, by covering them with glaſſes in winter, and protecting them from ſevere froſts, they have produced plenty of large fruit: as theſe trees do generally produce ſtronger ſhoots, ſo they require more water to be given them than the orange; but as to the tender ſorts, they muſt be treated with a little more care, otherwiſe their fruit will fall off in winter, and come to nothing. *See* ORANGE.

LENTIL, or *bitter Vetch*, the name of a plant of the vetch or tare kind, cultivated in ſome parts of England as fodder for cattle.

Lentils grow to a foot or a foot and a half high, with ſtalks and leaves like thoſe of tares, but ſmaller; and like them they bear their ſeeds, generally three or four in little pods. Theſe ſeeds are round, hard, ſmooth, and flat, but thicker at the ſides. There are two ſorts of lentils, the white and the yellow; but the latter affords the greater quantity of fodder.

The ſeeds of this plant are commonly ſown in March, where the land is dry, but in moiſt ground the time is in April. The uſual quantity of ſeed allowed to an acre of land is from one buſhel and a half to two buſhels. If theſe are ſown in drills in the ſame manner as peaſe, they will ſucceed better, than when they are ſown broad-caſt. The drills ſhould be a foot and a half aſunder to allow room for the hoe to clean the ground between them; for if the weeds are permitted to grow among them, they will get above the lentils, and ſtarve them. *Miller's Gard. Dict.*

LETTUCE, the name of a well known genus of plants cultivated in kitchen-gardens.

Lettuces of all kinds are multiplied only by their ſeeds, which they produce the firſt year, and then die, if they have not been tranſplanted. The ſorts generally cultivated in the kitchen-garden, are 1. The common or garden lettuce. 2. The cabbage lettuce. 3. The Celicia lettuce. 4. The brown Dutch lettuce. 5. The Aleppo lettuce. 6. The imperial lettuce. 7. The green Capuchin lettuce. 8. The Verſailles, or upright white cos-lettuce. 9. The black cos. 10. The red cos. 11. The red Capuchin lettuce. 12. The Roman lettuce. 13. The prince lettuce. 14. The royal lettuce. 15. The Egyptian cos-lettuce.

The firſt of theſe is moſt commonly ſown for very early uſe, to mix with other ſmall ſallad herbs. It is only a degeneracy of the cabbage lettuce, or the latter an improvement of the former by repeated good culture; for the ſeeds of cabbage lettuces which have not cabbaged cloſely, will produce the former ſort, which gardeners diſtinguiſh particularly by the name of lapped lettuce. Theſe may be ſown at any time of the year, only obſerving to make choice of ſhady borders in hot weather, of warm ſituations in the ſpring and autumn, and to ſow under glaſſes in the winter, becauſe ſevere froſts will kill the young plants.

The cabbage lettuce is likewiſe ſown at ſeveral different times, in order to have a ſupply of it throughout the ſeaſon. The firſt crop of this is generally ſown in February, upon an open warm ſpot of ground. When the plants are come up, they ſhould be thinned to the diſtance of about ten inches aſunder every way, either by hoeing them, if their ſuperfluous numbers be not wanted, or by drawing them up by hand where they ſtand too cloſe, and tranſplanting thoſe which are thus removed into other good mould, likewiſe at the diſtance of about ten inches from each other. If this is done before the plants are too large, they will thrive well; though the tranſplanted ones will ſeldom grow ſo big as thoſe which were not removed: but, in return, they will come ſomewhat later, and thereby anſwer the purpoſe of thoſe who do not repeat this ſowing every fortnight.

In proportion to the advance of the ſeaſon, the ſubſequent crops ſhould be ſown in a more ſhady and moiſt ſituation, but by no means under the drip of trees, leſt the plants ſhould run up to ſeed before they cabbage, eſpecially in the heat of ſummer. The laſt crop of theſe lettuces, which are to ſtand all the winter, ſhould be ſown by the middle of Auguſt, pretty thin, upon a good light ſoil, warmly ſituated; and when the plants are come up, they muſt be well weeded, and thinned, by hoeing, ſo that they may not touch each other. The beginning of October will be a proper time for tranſplanting them into warm borders, where they will reſiſt the winter, if it be not very ſevere: but, to guard againſt its inclemency, and thereby be ſure of a crop, it will be adviſable to tranſplant ſome of this growth into a bed which may be arched over with hoops, and covered with mats, ſtraw or peaſe-haulm, in hard weather. They may be ſet pretty cloſe together; and if they are re-tranſplanted in the ſpring, into a warm and rich ſoil, at the diſtance before-mentioned, they will do very well; though they will not cabbage ſo ſoon as thoſe which may have been left un-removed under a warm wall, if theſe laſt eſcape the winter, and if the neceſſary caution has been obſerved, of not placing them too cloſe to the wall; for this ſituation would make them run up in height, and conſequently prevent their growing large or hard.

To have good ſeeds of this ſort of lettuce, the plants ſhould be looked over when they are in perfection, and the largeſt, hardeſt, and loweſt growing of them ſhould be marked out by ſticks thruſt into the ground cloſe to them. All the reſt ſhould be carefully rooted out as ſoon as they begin to run up, leaſt the farina of the flowers of theſe inferior ones ſhould intermix with the others, and thereby occaſion a degeneracy of their ſeeds.

The beginning of February is alſo the firſt ſeaſon for ſowing the Cilicia, the imperial, the ſeveral kinds of cos, and the other ſorts of lettuces above-mentioned: but this early ſowing ſhould be upon a gentle hot-bed covered with a frame. The ſecond ſeaſon for theſe, is the latter end of February, or beginning of March, upon a border of light earth, and in a warm expoſure, and open ſituation, that is to ſay, in a ſituation not ſhaded by trees. When the plants come up on the hot-bed, plenty of freſh air ſhould be admitted to them, to prevent their being drawn up weak; and when they have got five or ſix leaves, they ſhould be tranſplanted into another hot-bed, to bring them forward: but this laſt need only be arched over with hoops, and covered with mats; for they ſhould not be kept too warm there. When they are removed from thence, and planted out for good, which ſhould be as ſoon as they are ſtrong enough to bear it, they ſhould be ſet ſixteen inches aſunder every way, in a well-looſened ſpot of fine good earth. Thoſe which were ſown in the warm borders ſhould alſo be tranſplanted into a ſimilar ſpot, and ſet at the ſame diſtances as the former. If the ſeaſon is dry, care ſhould be taken to water both the one and the other till they have taken root, and then to keep them conſtantly clear from weeds. This is the only culture that any of them will require, except the black cos lettuces, which ſhould be tied up when they are full grown, to whiten their inner leaves, and render them criſp; for they ſeldom cabbage well without this aſſiſtance.

To continue theſe lettuces through the ſeaſon, other crops of them muſt be ſown in April, May, and June; obſerving, for the reaſons before given, to ſow the lateſt in the moſt ſhady ſituation. Towards the middle or latter end of September, ſhould be the laſt ſowing, and the plants produced thereby ſhould be tranſplanted, either under glaſſes, or into a bed arched over with hoops and covered in the winter, to prevent their being deſtroyed by the froſt: but as much free air as poſſible ſhould be admitted to them when the weather is mild, and they ſhould be covered only in hard rains, or when it freezes; for if they are too cloſely covered they will grow mouldy, and ſoon after rot. In the ſpring, they ſhould be removed into a rich light ſoil, and there ſet at leaſt eighteen inches aſunder every way: for if they are planted too cloſe, they will be apt to run up in height, and not to cabbage well.

This is the crop from which it will generally be moſt proper to ſave the ſeeds of theſe lettuces, if they ſucceed well: though it will be right alſo to mark out ſome of the fineſt plants of the crop ſown in the ſpring; becauſe thoſe of this laſt ſowing may ſometimes fail, through the wetneſs of the ſeaſon, even when they are in full bloom, and the others may do well by having more favourable weather: but if both ſhould ſucceed, there will be no room for complaint, ſince the ſeeds of lettuces will grow perfectly well after they are two years old, and, if they have been ſaved with due care, even at the end of three years. Very great caution ſhould be uſed here, not to let any of the common ſorts ſeed among or near theſe more valuable plants; not only for the reaſons before aſſigned, but becauſe they are naturally the moſt apt to degenerate in this country. The beſt way therefore is to keep the plants of each ſort which are intended for ſeed, as ſeparate as poſſible from all others; and to ſuffer none of them to perfect their ſeeds, except ſuch as are entirely approved of.

The Egyptian green cos, the white cos, the Cilicia, and the red cos, are the moſt valuable of all the ſorts of lettuce cultivated in England. The royal and imperial lettuces are very good; but not ſo generally eſteemed. The white cos uſed to be preferred to all others, till of late years, that the Egyptian green cos, and the red cos, have been found to be by far the ſweeteſt and tendereſt. Theſe will endure the common cold of our winters full as well as the white cos: but they are more apt to rot, if the ſeaſon of their cabbaging be very rainy.

The green capuchin and the brown Dutch lettuces are very hardy ſorts, and may be ſown at the ſame ſeaſons as the common cabbage lettuce. They are very proper to plant under a hedge, or other fence, to ſtand the winter; becauſe they will often live there, when moſt of the other ſorts are deſtroyed. They will alſo bear more heat and drought, and therefore are very fit for late ſowings: nor do they run up to ſeed ſo ſoon as the other ſorts, after they are cabbaged. If ſome of them are planted upon a gentle hot-bed in autumn, and well covered with a frame, they will cabbage ſo as to be fit for uſe in February and March, and may be continued till thoſe in the open air are ready for the table. All theſe qualities render them valuable: eſpecially as, in conſequence thereof, they may be had at a time when there are but few others. To prevent their degenerating, none but the largeſt and beſt cabbaged of theſe plants ſhould be ſet apart for ſeed; and all the cautions before given, in this reſpect, ſhould be carefully obſerved here.

Beſides the general rule before-mentioned, of not ſuffering two different ſorts of lettuces ever to ſtand near each other when they bloſſom, leſt the mixing of their farina ſhould make both of them vary from their original, and partake of each other; it is neceſſary, eſpecially for thoſe which run up high, ſuch in particular as the Cilicia, the cos, and the other large growing ſorts, to thruſt down by the ſide of each, a ſtake to which its ſtem ſhould be tied, to prevent its being broken, or blown out of the ground by the wind. The ſeed-branches ſhould be cut as faſt as the ſeeds ripen, without waiting to have the ſeed of the whole plant together; for there will be frequently a fortnight or three weeks difference between the ripening of one part and that of another: and when they are cut, they muſt be ſpread upon a coarſe cloth, in a ſunny place to dry the ſeeds yet more. The ſeeds ſhould then be beaten or rubbed out, dried again in the ſun, and afterwards laid up in a dry place, where neither mice nor other vermin can get at them; for if they do, they will ſoon eat them up.

LIFT, a ſtile that may be opened like a gate.

LILAC, the name of a flowering ſhrub, cultivated in the Engliſh gardens, and ſuppoſed to grow naturally in ſome parts of Perſia, but is ſo hardy as to reſiſt the greateſt cold of this country.

There are three varieties of this ſhrub commonly cultivated here, which differ in the colour of their flowers, and alſo in that of their ſhoots and leaves; one of theſe has white flowers, one blue, and the third has purple flowers; the latter is commonly known by the title of Scotch lilac, to diſtinguiſh it from the other. This is the moſt beautiful of the three, and is probably called the Scotch lilac, becauſe it was firſt mentioned in the catalogue of the Edinburgh garden.

Theſe ſhrubs grow to the height of eighteen or twenty feet in good ground, and are divided into many branches; thoſe of the white ſort grow more erect than the other, and the purple or Scotch lilac has its branches more diffuſed than either. The branches of the white are covered with a ſmooth bark, of a grey colour; thoſe of the other two are darker. The leaves of the white are of a very bright green, but thoſe of the other are of a dark green; their ſhape and ſize are ſo near as not to be diſtinguiſhed thereby. They are heart-ſhaped, and are placed oppoſite. The buds of the future ſhoots, which are very turgid before the leaves fall, are of a very bright green in the white ſort, but thoſe of the other two are of a dark green. The flowers are always produced at the ends of the ſhoots of the former year, and below the flowers come out ſhoots to ſucceed them; for that part upon which the flowers ſtand, decays down to the ſhoots below every winter. There are generally two bunches or panicles of flowers joined at the end of each ſhoot; thoſe of the blue are the ſmalleſt, and are placed thinner than either of the other. The bunches on the white are larger; the flowers are cloſer placed, and larger than the blue; but thoſe of the Scotch are larger, and the flowers are fairer than thoſe of either of the other, ſo make a much finer appearance. The panicles of flowers grow erect, and being intermixed with the fine green leaves, have a fine effect; and if we add to this the fragrancy of their flowers, it may be ranged among the moſt beautiful ſhrubs which now decorate the Engliſh gardens. They flower in May, and when the ſeaſon is cool, theſe ſhrubs will continue three weeks in beauty, but in hot ſeaſons the flowers ſoon fade. Their ſeeds are ripe in September, which if ſown ſoon after, the plants will come up the following ſpring; but as their roots ſend out great plenty of ſuckers annually, ſo few perſons ever take the trouble to propagate theſe plants by ſeeds. I have raiſed ſeveral plants of the three ſorts from ſeeds, and conſtantly found them prove the ſame as the ſhrubs from which the ſeeds were taken. Theſe plants do generally flower the third year from ſeed; and I have always found them not ſo apt to ſend out ſuckers, as thoſe plants which were produced by ſuckers, ſo are much more valuable; for the others put out ſuch plenty of ſuckers, as that if they are not annually taken from the plants, they will ſtarve them.

Theſe plants thrive beſt upon a light, rich ſoil, ſuch as the gardens near London are for the moſt part compoſed of; and there they grow to a much larger ſize, where they are permitted to ſtand unremoved, than in any other part of England; for in ſtrong loam, or upon chalky land, they make little progreſs. If the ſuckers are ſmall, when they are taken from the old plants, they ſhould be planted in a nurſery, in rows three feet aſunder, and one foot diſtance in the rows, where they may ſtand a year or two to get ſtrength, and then they ſhould be removed to the places where they are to remain. The beſt time to tranſplant theſe ſhrubs is in autumn. *Miller's Gard. Dict.*

LILY, the name of a large genus of plants, with a kind of bell-faſhioned flower, and is compoſed of ſix leaves, which are more or leſs expanded and bent back. The piſtil ſtands in the center of the flower, and finally becomes an oblong and trigonal fruit, which is divided into three cells, and contains a number of marginated ſeeds, arranged in a double order one on another. To this muſt be added, that the root is of a bulbous form, and is compoſed of a number of fleſhy ſcales affixed to an axis.

All ſorts of lilies and martagons are propagated by ſowing their ſeeds; and if the ſeeds are carefully ſaved from good flowers, the martagons very frequently afford very beautiful varieties.

The manner of ſowing them is this: ſome ſquare boxes ſhould be provided of about ſix inches deep, with holes bored in the bottoms to let out the wet; theſe muſt be filled with freſh, light, ſandy earth, and the ſeeds muſt be ſown on them pretty thick in the beginning of Auguſt, ſoon after they are ripe, and covered over about half an inch deep with light ſifted earth of the ſame kind. They ſhould be then placed where they may have the morning ſun; and if the weather prove dry, they muſt be watered at times, and the weeds carefully picked out. In the month of October, the boxes are to be removed to a place where they may have as much ſun as poſſible, and be ſecured from the north and north-eaſt winds. In the ſpring the young plants will appear, and the boxes are then to be removed into their former ſituation: they ſhould be watered at times during the ſummer, and in Auguſt the ſmalleſt roots are to be emptied out of theſe boxes, and ſtrewed over a bed of light earth, and covered with about half an inch depth of light earth ſifted over them; they muſt here be watered and ſhaded at times, and defended from the ſeverity of the winter, by a light covering of ſtraw, or peaſe-haulm, in the hardeſt weather. In February, the ſurface of the bed ſhould be cleared, and a little light earth ſifted over it. When the leaves are decayed, the earth ſhould be a little ſtirred over the roots, and in the month of September following, a little light earth ſifted on. In the September of the following year, the roots muſt be tranſplanted to the places where they are to remain, and ſet at eight inches diſtance, the roots being placed four inches below the ſurface: this ſhould be done in moiſt weather. They will now require the ſame care as in the preceding winters; and the ſecond after they are tranſplanted, the ſtrongeſt roots will begin to flower. The fine ones ſhould then be removed at the proper ſeaſon into flower-beds, and planted at great diſtances from one another, that they may flower ſtrong. *Miller's Gard. Dict.*

LIME, a ſoft friable ſubſtance, obtained by calcining or burning ſtones, ſhells, and the like.

The moſt certain way to know whether any ſort of ſtone be fit for making lime, is to drop upon it a little aqua-fortis, ſpirit of ſea-ſalt, or oil of vitriol. All ſtones on which the above, or any other ſtrong acid efferveſces or riſes in bubbles, are lime-ſtones, or will burn to lime; and the ſtronger the efferveſcence is, the fitter they are for that purpoſe. All country gentlemen ſhould keep ſome ſuch ſprit by them, to try the nature of the ſtones that may be found on their eſtates.

All lime is a very good manure, but that made of ſtone is much better than what is made of chalk. It makes the greateſt improvement upon light ſandy ſoils, or upon a dry gravel: wet and cold gravel is leſs benefited by it, and cold clay the leaſt of all. The common allowance is a buſhel to a pole ſquare, or a hundred and ſixty buſhels to an acre. Mr. Lummis laid after the rate of three hundred buſhels on an acre, and found it anſwer extremely well: but that was upon a ſtrong clay. His method of uſing it, as communicated to the Edinburgh Society, and the reſult, he ſays, of what he has experimented to be beſt, is as follows:

In the month of October, he lays together three or four of the largeſt ſtones (burnt into lime) on the ſward or turf of a ſtrong clay ground; or, as many of the ſmall ſtones as are equal to the large ones, ſo that ſeventy or eighty bolls (two hundred and eighty, or three hundred and twenty buſhels) may complete an acre. If rain falls, it melts immediately; if not, it will melt or flake in forty eight hours, or leſs, according to the moiſture of the air. He then ſpreads it directly, leaving no part of it upon the ſpot where the ſtones were laid. This done, he lets it lie twelve months, or till the month of November after the October twelve months, when he ploughs it in, and lets it remain in that ſtate all the winter, during which froſt and rains mellow and prepare the ground for the next ſpring ploughing, and render it fit for barley. He prefers this method to laying the lime on in powder, becauſe, in this laſt way, it is apt to be blown about with the wind, to the great detriment of both men and horſes, ſuch as ſpoiling the mens eyes, hair, and cloaths, and the eyes and hair of the horſes, making their coats look dry and ugly, beſides loſing much of the lime.

The lime laid in the month of October, as above directed, on a ſtrong arable land, which has been ſome years under graſs, and continuing ſpread for about twelve months before it be ploughed in, has been found ſo to alter the graſs to a fine natural clover, that, by feeding of ſheep or black cattle upon it, it has paid the whole charge the firſt year by the graſs; and cattle will chooſe rather to feed on this ground than any other, and grow fatter. If the ground be looſe and open, it may be ploughed in the enſuing March, if limed in October. In either way, it ſo far meliorates the ſward, and the ſoil, that the beſt of crops may be expected for three or four years; and by laying ſome dung upon it the 4th or 5th year, two or three crops more may be obtained; after which the ground will be in excellent order to lay down with graſs ſeeds.

Notwithſtanding that lime is ſo very good a manure, Mr. Lummis prefers marle, if it can be had within the ground, or near the place where it is to be uſed; for tho' it be more chargeable at firſt, yet, laſting five times as long, it is in the end much cheaper. He generally lays near two hundred loads of it upon an acre, at about ſeven or eight buſhels to the load.

Mr. Evelyn adviſes mixing the lime with the turf or ſward, laying them alternately, turf on lime, and lime on turf, in heaps for ſix months; by which means it will become ſo rich and mellow, as to diſſolve and run like aſhes, and carry a much more cheriſhing vigour, than if uſed alone in a greater quantity, and without danger of burning out and exhauſting the vegetative virtue which it ſhould preſerve. It is likewiſe greatly bettered by being mixed with dung, or with mud drawn from the bottom of ponds or rivers. In Weſtmorland, they reap fine crops of barley from their ſandy lands, by manuring them with lime and cow-dung mixed together.

The nature of lime on land is like that of chalk: it works downwards, as the farmers expreſs it, and is therefore beſt treated in the ſame manner, laying it upon a lay the year before it is to be ploughed up. When uſed on land which lies upon a deſcent, it ſhould by all means be mixed with dung, and laid principally on the higher part of the land; the conſequence of which will be, that the rain will waſh out the virtues of the lime and dung together, and carry them to the lower parts as it runs down. In fact, it does better on any land, when mixed with dung, than either of them alone. This is particularly obſerved in Shropſhire, where they lay dung and lime together, about twenty load of the former, and only twenty buſhels of the latter, on an acre of ground. In Leiceſterſhire, they ſow or ſcatter the lime on wheat land when they ſow the wheat; but on barley-land, the laſt earth but one, leſt it ſhould burn the barley if ſowed with it in the ſpring. They allow five quarters to an acre of each, reckoning by the meaſure in which it comes from the kiln; for after it is ſlaked, thoſe five quarters will make near ten.

Lime is thought to make corn grow with a thin huſk. It is a great deſtroyer of moſs and ruſhes, even after it has been ſlaked; as quick lime is of the remnants of furzes, after the old buſhes have been grubbed up. Its hot quality renders it apt to over-burn dry ſoils. It certainly is moſt efficacious when ſpread directly from the kiln.

Mr. Liſle, whoſe account of lime is almoſt unintelligibly perplexed and confuſed, thinks it is beſt, eſpecially on lands that work mellow, to ſpread and plough it in this manure as ſoon as it is ſlacked, rather than to let it lie long in heaps covered with earth. He very properly gives it as a rule to all huſbandmen, to be cautious of liming ground, and then ploughing out the heart of it; the bad conſequences of which he himſelf experienced. “I limed, ſays he, ſome years ago, in Wiltſhire, ſeven acres for an experiment, and laid down one acre to its own natural graſs. In two years time this graſs was, and ſtill is, worth forty ſhillings an acre. The third year, I laid down another acre, which is ſtill worth thirty ſhillings a year. The reſt, which I ploughed five or ſix years longer, is not worth fifteen groats an acre. I have experienced the like in burn-baking ground.”

The practice of Lower Normandy, where lime is chiefly uſed on lands newly broken up, is thus related by M. Du Hamel.

After giving theſe lands a ſhallow ploughing, they carry on the lime as it comes from the kiln, and lay about an hundred weight of it in a heap on every ſquare perch; ſo that the heaps lie at a perch diſtance from one another; they then raiſe the earth all round the heaps, like ſo many baſons: the earth which forms the ſides of theſe baſons ſhould be a foot thick: and, laſtly, they arch the heaps over with earth, ſix inches thick. The lime ſlakes under this covering, and is reduced to powder; but at the ſame time it increaſes in bulk, and thereby cracks the earth. If theſe cracks be not carefully ſtopped, rain will get through them, and reduce the lime into a paſte, or kind of mortar, which will not mix with the earth, or anſwer the end propoſed. Farmers are therefore very careful to examine the heaps from time to time, and ſtop the cracks. Some only preſs down the top of the heap with the back of a ſhovel: but this method is liable to a conſiderable inconvenience; for if the lime be in a paſte within the heap, it is by this means beat together in ſuch manner, that it becomes ſtill more difficult to mix it with the earth: for which reaſon it is better to ſtop the crevices, by throughing a little freſh earth over the heap.

When the lime is thoroughly ſlacked, and reduced to powder, the heaps are cut with a ſhovel, and the lime is mixed as well as poſſible with the earth that covered it. This mixture is then thrown up in heaps again, and left expoſed to the air for ſix weeks or two months; for then the rain will not hurt it.

About the beginning of June, this compoſt of lime and earth is ſpread upon land; but not by throwing it about unequally, or at random: on the contrary, it is taken up by ſhovelfuls, and diſtributed in little heaps, at equal diſtances, on each perch of ground, it having been obſerved, that theſe little heaps promote vegetation, more than if the manure was ſpread uniformly all over the field; nor is it at all heeded, if ſmall intervals remain unlimed between each ſhovelful. The field is afterwards ploughed, for the laſt time, very deep: then, towards the end of June, it is ſowed with buck-wheat, which is covered with a harrow; and if any clods remain, they are broken with a hoe.

Buck-wheat occupies the land about a hundred days; ſo that this grain, ſown about the end of June, is gathered about the end of September. When the ſtalks and roots of this plant are dead and dried, the ground is ploughed up, and immediately ſowed with wheat, which is harrowed in. After the wheat has been reaped, the land is ploughed as ſoon as poſſible. It is ploughed for the laſt time, in February or March, in order to ſow oats; or in April for barley: but in this caſe it is turned up two or three times, to make it fine. All theſe different grains are harrowed in. A roller is paſſed over the oats when they are come up; and if any clods remain in the barley, they are broken with a hoe.

In the next February or March, the land is ploughed again, in order to ſow it with grey peaſe or vetches: and after theſe pulſe have been reaped, one or two ploughings are given, to prepare it for wheat in the enſuing autumn.

The next year, oats are ſowed, ſometimes mixed with a little clover; and then the ground is laid down to paſture for three or four years.

Sometimes no buck-wheat is ſowed on land newly broken up; but it lies fallow, from the month of March, when it was firſt ploughed, till October, when it is ſowed with wheat, after receiving ſeveral ploughings during the intermediate time. Theſe lands being, by this means, brought to a tolerable tilth, not above three quarters of the quantity of lime above-mentioned is uſed on them, and they generally bear a better crop than thoſe which are firſt ſowed with buck-wheat.

Some farmers think a perch too great a diſtance for conveniently ſpreading the lime. They therefore make the heaps leſs, and increaſe their number in proportion. Others lay the lime in ridges, from one end of the field to the other; which facilitates the ſpreading of it. Being perſuaded that lime is moſt efficacious when it lies ſhallow in the ground, they firſt plough it in, and then give a ſecond ploughing before they ſow, which brings it again near the ſurface.

Lime is commonly ſaid to enrich land greatly at firſt, but afterwards, when its efficacy is exhauſted, to leave the ground more barren than it was before. Lime readily unites with every unctuous ſubſtance, and renders it more ſoluble in water. By this means, all ſuch particles mixed with the ſoil may be more ſpeedily converted to the nouriſhment of vegetables, than they might otherwiſe be. Indeed, if the farmer's avarice, or want of judgment, tempt him to over-crop the ground, it may be left without matter fit to nouriſh plants, till a freſh ſupply is brought: but if it be judiciouſly cropped, and left in good heart under graſs, or any other produce which does not impoveriſh the ſoil, the effect of the lime will be more durable, and more advantageous than is generally imagined.

LIME-KILN. *See the article* Kiln.

LIME-STONE, a ſpecies of ſtone which will burn into lime. *See the article* Lime.

LIME-TREE, or *Linden-Tree*, a beautiful tree for walks, and other decorations, in parks, &c. and of which Mr. Miller has enumerated four ſpecies.

All the ſpecies of the lime-tree are eaſily propagated by layers, which will, in one year, take good root, and may then be taken off, and planted in a nurſery, at four feet diſtant row from row, and two feet aſunder in the rows. The beſt time to lay them down and to remove them, is, when their leaves begin to fall, that they may take root before the froſt comes on, though they may be tranſplanted any time from September to March, in open weather; but if the ſoil be dry, it is much the better way to remove them in autumn, becauſe it will ſave a great expence in watering, eſpecially if the ſpring ſhould prove dry. In this nurſery they may remain four or five years, during which time the ground ſhould be dug every ſpring, and conſtantly kept clear from weeds, and the large ſide ſhoots pruned off, to cauſe them to advance in height; but the ſmall twigs muſt not be pruned off from the ſtems, becauſe theſe are abſolutely neceſſary to detain the ſap, for the augmentation of their trunks, which are apt to ſhoot up too ſlender, when they are entirely diveſted of all their lateral twigs. If the ſoil in which they are planted, be a fat loam, they will make a prodigious progreſs in their growth, ſo that in three years time they will be fit to tranſplant out where they are to remain.

They may alſo be propagated by cuttings; but as this method is not ſo certain as by layers, the other is generally practiſed. In order to obtain proper ſhoots for laying down, a lime-tree is cut down cloſe to the ground, from the roots of which a great number of ſtrong ſhoots are produced the following year; theſe will be large enough to lay down the ſucceeding autumn, eſpecially if the ſmalleſt of them are cut off cloſe early in the ſpring; for when too many ſhoots are ſuffered to grow during the ſummer, they will be much weaker, than if only a ſufficient quantity be left. For the manner of laying down theſe ſhoots, *ſee the article* LAYER.

The timber of the lime-tree is uſed by carvers, it being a ſoft, light wood, as alſo by architects for framing the models of their buildings; the turners likewiſe uſe it for making light bowls, diſhes, &c. but it is too ſoft for any ſtrong purpoſes. *Miller's Gard. Dict.*

LINDEN-TREE. *See the preceding article.*

LING, heath.

LINSEED, the ſeed of the flax. *See the article* FLAX.

LIQUORICE, a plant propagated for medicinal uſes. It grows to about four or five feet high; its ſtalks are hard and woody; its leaves ſmall and roundiſh, ſtanding together on the two ſides of a rib, and making what botaniſts call a winged leaf.

A correſpondent of the editors of the Muſeum Ruſticum has given the following directions for cultivating this plant, founded on a long ſeries of experience.

" The common culture of liquorice is not difficult to be learned; and this, with proper attention, will enable any thinking farmer, that knows his buſineſs, to cultivate it to advantage.

" This plant thrives beſt on a deep, looſe, rich mould; and if it is freſh land, that has not for many years borne corn, the profit will be the greater, as the crop will be larger, and the roots of a finer quality.

" A rich ſandy ſoil, provided it is deep, will do well for this plant; and it muſt always be remembered, that too much moiſture is its greateſt enemy: let no one therefore attempt to plant it on a damp clay, leſt the whole crop be cankered.

" Land cannot be made too fine, nor dug too deep, for liquorice: it ſhould be, at leaſt, moved with the ſpade to the depth of two feet and a half, and if a little deeper, ſo much the better.

" If the land, on which the liquorice-ſets are to be planted, is freſh, rich, and in good heart, it needs no manure for the firſt crop; but if it has been for ſome years in tillage, the planter will do well to give it, in the ſummer time, a good dreſſing of very rotten dung, lime, and coal-aſhes or ſoot, mixed together, ſome months before, in a compoſt: the quantity muſt be regulated by the ſtate of the land, always remembering that this plant requires a great deal of nouriſhment, and is a great impoveriſher of land, though it extracts much of its nouriſhment, or food, from a conſiderable depth, at a diſtance from the ſurface; ſome of the roots running five or ſix feet, at leaſt, into the ground.

" When the ground is properly prepared, reduced to a very fine tilth, and laid level, ſome liquorice runners, or ſets, are to be procured. Theſe muſt be cut into pieces, about eight or nine inches long each, and planted in rows, with dibbers armed with iron points. I make my rows two feet aſunder, put my ſets fifteen inches from each other, and when three rows are planted on a ſix-feet bed, I allow two feet more of interval betwixt bed and bed.

" When I put in my ſets with the dibber, I leave the upper end of each ſet juſt level with the ſurface of the ground: I ſhould have obſerved, that I have all my ſets carefully inſpected before they are carried into the field, to ſee that each of them has one, if not two eyes, or buds, without which they would make no ſhoots.

" When the whole ſpot of ground is planted, I make my labourers dig up the intervals one ſpit deep, and ſpread the earth on the beds: this raiſes them about two inches above the head of the ſets, and by lowering the intervals, ſerves in wet ſeaſons to drain the beds. I generally contrive to get this work done by the laſt week in September; but in favourable years, the middle of October is not too late.

" If the weather proves mild, I have no farther trouble with them during the winter; but if it is likely to freeze hard, I cover the beds with peaſe-haulm, or long dung, or ſome ſuch matter, to forward the growth of the roots in the ſpring, and protect them, during the winter, from the froſts.

" Early in the ſpring, on the firſt appearance of the weeds, I allow my liquorice a thorough hoeing; and this is ſeveral times repeated in the dry weather of the ſummer.

" The winter following, I again cover them with long dung, and in the ſpring, before the roots begin to ſhoot, I have the ſpaces betwixt the rows on the beds looſened with a ſpade, and the intervals are well dug: immediately after which, I give the land a ſlight dreſſing of coal-ſoot, ſown by hand: it ſhould be thick enough to make the land look black: this the firſt rains waſh in, and it greatly warms and invigorates the plants.

" The ſecond and third ſummers, all I have to do, is to keep my crop clear of weeds: this, indeed, is very neceſſary, and the hoeings for this purpoſe muſt be more or leſs frequent, according to the ſeaſon; generally, three times in the ſummer are quite ſufficient, eſpecially if the land was well prepared before the ſets were planted.

" Many good ſenſible farmers, whom I have known to cultivate this plant, in autumn have a practice of cutting down the ſtalks, whilſt they are in full ſap, thinking thereby to ſtrengthen the roots. I differ from them, however, in opinion, and am rather apt to imagine, that this cutting of the ſtalks, whilſt the ſap is in motion, muſt be prejudicial to the roots. It is, therefore, my cuſtom, always to defer cutting off the ſtalks, till they are withered, and begin to decay; nature then indicating, that an abſtraction will be of ſervice.

" Theſe roots ſhould have three ſummers growth before they are fit to take up: it is very ſeldom that they have attained a proper ſize at two years end; and if you leave them longer than three years in the ground, the roots are apt to grow ſticky, and loſe a part of their ſaccharine quality.

" I never take them up till the ſap is entirely at reſt, and the leaves and ſtalks are withered: they are then in prime order, and fitteſt for ſale.

" If theſe roots are taken up while the ſap is in motion, either early in the autumn, or late in the ſpring, they are apt to ſhrivel, and loſe much of their weight, and are, beſides, more diſpoſed to ferment and periſh.

" The beſt way of taking them up is, to dig the ground over as deep as the principal roots run, having pickers ready to gather up the roots as faſt as they are thrown up by the ſpade.

" My general practice is to get rid of my roots as ſoon as I conveniently can: and I find it better ſo to do, than to wait for the riſing of the markets. I have had, from one acre of fine, freſh, rich land, above 3000 pounds of ſaleable root, which has produced me above ſixty pounds; but this many years ago, my crops not being general now ſo large.

" When I have taken up a crop of this root, if it was planted on freſh land, I generally prepare the ſame ground to yield me another crop; and this takes me near a year.

" I, in the firſt place, give it, during the winter froſts, a thorough good dreſſing of well-rotted dung, mixed with lime: of this I lay on large quantities, ſtill having regard to the condition of the ſoil, and ploughing it well in the enſuing ſummer.

" In ſuch looſe ſoils, as are proper for this plant, there is no occaſion to dig the land for this crop, the taking up the roots having ſtirred it to a great depth: this, with three or four ſummers ploughings, is ſufficient.

" As to the reſt, I manage the ſame as I did for the preceding crop.

" If the land, which has borne me a crop of liquorice-root, was not freſh land when it was planted, but had been any time in tillage, I ſcarcely ever chuſe to plant it again with the ſame crop, without allowing ſeveral years of interval, at leaſt ſeven; but in this caſe, I frequently ſow oats in the ſpring, to abate the rankneſs of the ſoil; and it will then, with a very ſlight dreſſing, give me a good crop of wheat.

" In my method of cultivating this plant, I always allow ſpace enough for the roots to extend in ſearch of food; and this is my reaſon for planting my rows at two feet diſtance: I am, beſides, very careful of keeping them clear of weeds, and that, particularly, during the firſt ſummer; being very ſenſible that, without this precaution, they would be in great danger of being choaked up, and robbed of their proper ſhare of nouriſhment; particularly, they would receive no benefit from the dews, which are ſo friendly to vegetation; and even the ſun's warmth would be, in a great meaſure, kept from the roots by the ſhade of the weeds.

“ Many, who plant liquorice, allow much leſs ſpace than I do betwixt the rows, and will yet, the firſt ſummer, take off a crop of onions, or ſpinage, or young carrots, and think it ſo much clear profit; but the queſtion is, whether theſe crops may not, during the time they are on the ground, be, to all intents and purpoſes, deemed weeds, having nearly, if not altogether, as bad effects, as weeds would if have permitted to grow with the crop.

“ Some, worſe farmers, continue this practice two years of its growth; but it is quite needleſs to condemn this method of culture, as it cannot but ſtand ſelf-condemned.

“ In the dreſſings I give my land, for preparing it to receive this plant, experience has convinced me that lime is a much ſweeter manure than ſtable-dung: in fact, this laſt is not, on any account, to be uſed till it is quite rotten, and then lime is very properly added to it as a corrector.

“ Some friends of mine, who live very near London, have attempted to cultivate this plant on their lands; but they find it does not anſwer; and this, on account of the great richneſs of the ſoil, owing to the great quantity of London dung laid on it. It is true, the roots were at three years end larger than mine; but they were not ſo bright, but had a blacker coat, and were deemed greatly inferior in quality.

“ Should any of your readers be inclined to cultivate this plant, by following theſe directions, not implicitly, but according to their diſcretion, the circumſtances of their ſoil, &c. conſidered, they cannot well fail ſucceeding.” *Muſeum Ruſticum, vol.* I. *pag.* 252.

LITTER, the ſtraw laid under horſes, &c.

LIZENED *Corn*, leſſened, ſhrunk, or lank corn.

LOAM, an earth compoſed of diſſimilar particles, hard, ſtiff, denſe, and rough to the touch, and compoſed of ſand and a tough viſcid clay.

LOE, a little round hill, or heap of ſtones.

LOG, a large, ſhapeleſs piece of wood.

LOOP, a hinge of a door.

LOP, a flea.

LOPPED *Milk*, ſuch as ſtands till it ſours and curdles of itſelf.

LOPPING, the cutting off the ſide branches of trees.

It is very obſervable that moſt old trees are hollow within; which does not proceed from the nature of the trees, but is the fault of thoſe who have the management of them, who ſuffer the tops to grow large before they lop them; as the aſh, elm, hornbeam, &c. and perſuade themſelves, that they may have the more great wood; but in the mean time, do not conſider that the cutting off great tops endangers the life of a tree; or, at beſt wounds it ſo, that many trees yearly decay more in their bodies than the yearly tops come to; and at the ſame time that they furniſh themſelves with more great wood, they do it at the loſs of the owner. And, indeed, though the hornbeam and elm will bear great tops, when the body is little more than a ſhell; yet the aſh, if it comes to take wet at the head, very rearely bears more top after the body of the tree decays. Therefore, if once theſe trees decay much in the middle, they will be worth little but for the fire; ſo that if you find a timber-tree decay, it ſhould be cut down in time that the timber be not loſt.

The lopping of young trees, that is, at ten or twelve years old at moſt, will preſerve them much longer, and will occaſion the ſhoots to grow more into wood in one year, than they do in old tops at two or three. Great boughs, ill taken off, ſpoil many a tree; for which reaſon they ſhould always be taken off cloſe and ſmooth, and not parallel to the horizon; and cover the wound with loam and horſe-dung mixed, to prevent the wet from entering into the body of the tree.

When trees are at their full growth, there are ſeveral ſigns of their decay; as the withering or dying of many of their top branches; or if the wet enters at any knot; or they are any wiſe hollow or diſcoloured; if they make but poor ſhoots; or if woodpeckers make any hole in them.

This lopping of trees is only to be underſtood for pollard-trees; becauſe nothing is more injurious to the growth of timber-trees, than that of lopping or cutting off great branches from them. Whoever will be at the trouble of trying the experiment upon two trees of equal age and ſize, growing near each other, to lop or cut off the ſide branches from one of them, and ſuffer all the branches to grow upon the other, will in a few years, find the latter to exceed the other in growth every way; and this will not decay near ſo ſoon.

All ſorts of reſinous trees, or ſuch as abound with a milky juice, ſhould be lopped very ſparingly; for they are ſubject to decay when often cut. The beſt ſeaſon for lopping theſe trees is ſoon after Bartholomew-tide; at which time they ſeldom bleed much, and the wound is commonly healed over before the cold weather comes on. *Miller's Gard. Dict.*

The generality of the world are againſt pruning timber trees at all, and where they naturally grow ſtraight and regular, it is much better let alone. But all common faults in ſhape may be regulated by this lopping them while young, and it can be attended with no ill conſequence to the timber; for the cut not lying near the timber pith cannot affect it, when grown up, and ſquared in the working for beams and other uſes, or to be quartered; for all the defects occaſioned by ſuch wounds, are in the ſuperficial parts, and all the four quarters are perfectly ſound within.

As to the large foreſt trees, they ſhould not be lopped at all, except in caſes of great neceſſity, and then the large boughs muſt not be cut, but only the ſide branches; and even theſe muſt be cut off cloſe, that the bark may ſoon cover the wound, and yet a little ſlanting, that the water may run off, not lodge upon the cut part.

If there is a neceſſity of cutting off a large bough, as by its being broken or cankered, let it be cut off ſlanting at about four feet diſtance from the body of the tree, and that if poſſible near ſome place where there is a young ſhoot from it, which may receive the ſap, and grow up in its place. No ſtump muſt be left ſtanding out farther than this, becauſe they are wounded parts which never can heel, and which will always be letting in the water, and will ſerve as pipes to convey that water into the heart of the body of the tree, and by degrees will utterly ſpoil it. All that grow upright, whether they be large or ſmall branches, muſt in cutting be taken off ſlanting, never evenly, for the ſame reaſon; thoſe boughs that bear from the head are to be cut with the ſlope on the lower ſide, and on any occaſion that great wounds are given to a tree, they ſhould be covered with a mixture of clay and horſe-dung, which will make them heal much ſooner than they otherwiſe would do. *Mortimer's Huſbandry, vol.* II. *page* 91.

To LOWK, to weed corn.

LUCERN, a plant frequently cultivated in the manner of clover, and known among botaniſts by the names of medica and medicago.

It is the alfaſa of the Spaniards, and the lucern grand treffle, or fænum Burgundiacum, as ſome botaniſts call it, of the French. It has a perennial root, and an annual ſtalk, which riſes full three feet high in good land, and is garniſhed at each point with trifoliate leaves, whoſe lobes are ſpear-ſhaped, about an inch and a half long, and half an inch broad, ſawed towards the ſtalks. The flowers grow in ſpikes, which are from two to near three inches in length, ſtanding upon naked footſtalks two inches long, riſing from the wings of the ſtalks: they are of the pea-bloom, or butterfly, kind; of a fine purple colour, and are ſucceeded by compreſſed moon-ſhaped pods, which contain ſeveral kidney-ſhaped ſeeds. It flowers in June, and its ſeed ripens in September.

There are the following varieties of this ſpecies of lucern, viz. one with violet-coloured flowers; another with yellow flowers; a third with yellow and violet flowers mixed; and a fourth with variegated flowers: but, as Mr. Miller obſerves, theſe are only variations of the ſame plant, ariſing accidentally from the ſeed. However, neither the yellow nor the variegated flowered lucern, is ever ſo ſtrong as that with purple flowers; nor is it, conſequently, ſo profitable to the huſbandman.

Columella calls this the choiceſt of all fodder, becauſe it will laſt ten years, and will bear being cut down four, and ſometimes ſix times in a year; it enriches the land on which it grows, fattens the cattle fed with it, and is a remedy for ſick cattle. About three quarters of an acre of it is abundantly ſufficient to feed three horſes during the whole year. Yet, notwithſtanding it was ſo much eſteemed by the ancients, and hath been cultivated to great advantage in France and Switzerland for many years, it has not yet found ſo good a reception in England as it juſtly deſerves; nor is it cultivated here in any conſiderable quantity, though it will ſucceed as well in this country as in either of the laſt mentioned; being extremely hardy, and reſiſting the ſevereſt cold of our climate.

Mr. Rocque lays it down as a maxim in his practice, that lucern will grow on any ſoil, provided it be not ſo wet as to rot the roots.

The ſtrongeſt land is however to be preferred, and the deeper the ſoil, the better will be the crop, as the roots will have room to extend themſelves.

The land ſhould be prepared in the ſame manner as for barley, being ploughed, harrowed, and cleaned from all ſorts of weeds; and the ſtronger the land is, of courſe the more ploughing and harrowing it will take to mellow it, ſweeten it, and bring it to a fine tilth.

When this work is done, the lucern ſeed muſt be ſown broad-caſt, (not in drills) in fine weather, after the rate of about fourteen pounds to an acre.

This allowance of ſeed will be ſufficient to ſupply the number of plants that will be wanted to yield a full crop; but they will not ſtand ſo thick as to ſtarve one another, though there is ſome allowance for part of the ſeed failing.

But ſhould every ſeed take, the method of culture hereafter recommended will ſufficiently reduce the number of the plants, and, without the trouble and expence of the New Huſbandry, give each plant ſpace enough to extend its roots, and collect the neceſſary quantity of nouriſhment.

To return to the culture, before the laſt ploughing, the land ſhould be manured, not with old rotten ſtuff, as is uſual; but with freſh ſtable-dung, that has been thrown up in a heap three or four weeks to heat and ferment. This will enable the young plant to puſh forth its leaves and ſtalks with luxuriance, and get forward in its growth the firſt ſummer.

When the dung is in full fermentation, it is to be laid on the land, and ploughed in as ſoon as poſſible, that the ſalts of the dung may not have time to evaporate: the land muſt then be harrowed and ſown, and afterwards again harrowed with a light or buſh-harrow; and, laſtly, rolled to ſettle the ground and break the clods.

If corn is to be ſown amongſt it, it ſhould be only half a crop; otherwiſe it will be apt to deſtroy the lucern, eſpecially if it proves a wet ſeaſon, and the corn is rank: but if no corn is ſown amongſt it, the lucern will thrive much better.

Lucern may be ſown from the beginning of March to the end of May; but April, in dry weather, is the beſt time.

If much rain falls on the new-ſown lucern, it will be apt to ſwell too faſt, and burſt; but if it holds fine three or four days, it will be in no danger.

Mr. Rocque does not approve of drilling the lucern, becauſe the roots are too much confined in the drills: they ſay it is to clean the lucern between the rows that they drill it; but it is for want of knowing the nature of lucern, and it diſcourages people from ſowing it, drilling and hoeing being very expenſive ways; the quickeſt and cheapeſt, and by much the beſt way, being to ſow it broad-caſt, like clover, as the roots will ſtand nearly at equal diſtances one from another every way.

Lucern requires, it is true, a great deal of nouriſhment from the earth; but there is no occaſion this nouriſhment ſhould be ſupplied by the ſurface. It is well known that the roots of lucern will run to a great depth in the ground, from whence they muſt of courſe extract a large quantity of food: this ſpares the ſurface; and in fact the land where lucern grows requires only that the natural graſs ſhould be prevented from getting to a head, which it is in our climate very apt to do, and if let alone would ſoon choke up the lucern.

It is mentioned above, that if corn is ſown with lucern, it ſhould be only half a crop: ſome of your readers may not, perhaps, readily comprehend the meaning of this expreſſion; therefore, to render it more clear, I ſhall here obſerve, that when barley or oats are to grow with lucern, a buſhel only of either, according to Mr. Rocque's method, is to be ſown firſt on an acre, then fourteen pounds of the lucern.

One thing is to be obſerved; that if the corn, notwithſtanding its being ſown ſo thin, ſhould grow ſo rank as to endanger the lucern, it will be much beſt to mow it before the harveſt, as it is better to loſe the crop of corn than to kill the lucern.

The barley, or oats, however, need not be entirely loſt, as they may, when mown, be given green to cattle; or, if the weather is fine, will make excellent hay, provided they are properly dried; and it is beſt to do it in the ſwarth, as the rich juices are in that manner leſs exhauſted. To ſow it later than May is dangerous, for fear of a dry ſeaſon, or its being eat up by the fly.

Lucern will not grow on freſh-broke up land; it muſt be tilled a year or two: peaſe and beans, for one year, will prepare the ground; but above all, potatoes excel for ſweetening and mellowing of land: the next ſeaſon a fallow for turnips; and when the turnips are fed off with ſheep, it will greatly enrich the land, which ſhould then be prepared for lucern.

In regard to the tillage, and time of ſowing the lucern-ſeed, the nature of the ſoil muſt be conſidered. Heavy ſtrong land will require more ploughings and harrowings, and to be later ſown; light land will need fewer harrowings and ploughings, and to be ſown earlier, that the young plants may have ſtrength to ſend their roots deep into the ground, before the hot dry weather comes on to hurt them; and if, for the firſt time, the land had a trench-ploughing, it would be of great advantage.

In Languedoc they ſow no corn with the lucern; and when it is ſix or ſeven inches high, they mow it; by which all the ſeeds of annual weeds are cut off and killed.

In Normandy, the climate being much the ſame as in England, they ſow corn with it.

In Picardy, and about Paris, they ſow it, ſome with, others without corn.

At Avignon, when their lucern begins to decline, they manure their ground and plough afreſh, and ſow it with corn and lucern; and the old roots, growing again with the ſeed, make another fine crop: the ploughing will not hurt the old roots.

If a full crop of barley is ſown with lucern, and the barley grows very ſtrong, the beſt way is to mow the barley when it is in the ear.

If forward peaſe are ſown on new-broke-up land to prepare it for lucern, it may be done in one year, and turnips ſown on it as ſoon as the peaſe are off: the turnips may be fit to feed off by Chriſtmas; and as ſoon as the turnips are off, the land ſhould be ploughed, and lie fallow till a proper time to ſtir it again; or it may have a trench-ploughing, as before directed.

This method of giving land a trench-ploughing, to prepare it for lucern, is much to be recommended, as it ſtirs the earth almoſt as deep as if it was dug with a garden ſpade: of what advantage this muſt be to a plant that ſends its roots deep for nouriſhment, need not be mentioned, as it cannot but be obvious to every reader.

Was labour cheaper than it is in England, it would doubtleſs be much the beſt way to dig by hand all the land that was deſtined to lucern: many advantages would reſult from this method of tillage, and particularly the weeds and graſs would not be ſo apt to grow as in ploughed land.

I would heartily recommend it to ſome of the gentlemen in Ireland, to ſow with lucern ſome of their land that has borne a crop of potatoes; it could not fail ſucceeding, and they would have a fair opportunity of trying what crops this plant will, when beſt cultivated, yield.

I cannot but think, that on good land that had borne potatoes, there might be five good mowings in a year, particularly in Ireland, where the climate is rather milder than in England; and this without injuring the roots. An eaſy experiment would, however, ſoon make this matter known: I therefore heartily recommend it to the attention of your Iriſh readers; they are every day improving their lands, and will, doubtleſs, not ſuffer this hint to paſs unnoticed.

When we conſider the many advantages reſulting from the culture of this plant, it is aſtoniſhing that it ſhould ſo long eſcape our regard: the hint was given us by the Roman writers on the ſubject of agriculture, but we were too much attached to old cuſtoms to improve it.

In hot ſummers the ſeed may be ſaved in England, but not from the firſt growth; that being generally too rank, and ſubject to rot at bottom.

In Languedoc they ſave it from the third growth; but as this climate is colder, it will not have time to ripen, unleſs ſaved from the ſecond growth.

A dry ſoil is beſt to ſave the ſeed upon, as it is not ſo apt to grow rank; and then it may poſſibly do from the firſt growth.

As lucern, if the land is good, will bear ſeveral crops in one year, like clover; what Mr. Rocque means by the firſt, ſecond, and third growths, are, he ſays, the different crops it produces in one ſummer, which are three, four, and ſometimes five mowings, in caſe no ſeed is ſaved from it; if ſeed is ſaved, it muſt be from the ſecond growth: the ſeed will be ripe in September, and muſt be gathered by hand.

When the plants are one year old, it will be proper with a large harrow, to go over your land as often as is ſufficient to root up annual weeds and graſs.

The harrow will not hurt the lucern, the roots of it being very tough: this muſt be done in dry weather, before it begins to ſprout, which is very early in the ſpring, that the weeds and graſs may die; and if there are any patches of ground where the ſeed miſcarried, a little ſeed muſt be ſown, and the ſpot harrowed: a dreſſing with rotten-dung, at the ſame time, will repay the expences of it by a larger crop: if the harrow ſhould cut or wound any of the roots, they will ſprout and grow notwithſtanding.

The ſecond ſpring, after ſowing, it will be proper to plough the ground, where the lucern grows, with a drill-plough, with a round ſhare, without a fin or feather, and without a coulter, to prevent the roots being too much hurt. It ſhould lie rough a few days to dry and mellow; then, in fine weather, be harrowed down, to mow it the cloſer.

One, not uſed to the culture of this plant, will be apt to think, that ploughing will deſtroy the lucern; but any gentleman, that will take the trouble to call at Mr. Rocque's, may be convinced that experience teaches the contrary.

To make hay of lucern, it ſhould be mowed as ſoon as the bloom appears, or rather ſooner: it muſt not be ſpread, like common graſs, but lie in the ſwarth, like clover, and turned in the ſame manner; or the leaves, which are moſt nutritive, will drop off.

If ſuffered to ſtand too long before it is mowed, the ſtalks will be too hard for the cattle to eat it, and it loſes much of its goodneſs.

The hay is good for all ſorts of cattle; and when horſes are fed with it, they ſhould not have their full allowance of corn; the lucern anſwering, in a great meaſure, the purpoſe of both corn and hay.

It is alſo the moſt profitable of any ſort of fodder to feed horſes with in the ſummer, by mowing and giving it to them green.

If the land is good, the produce is incredible; and according to the goodneſs and depth of the ſoil, ſo will the crops be.

Mr. Rocque ſays he has ſeen lucern mowed five times in a ſeaſon; yielding, at the five mowings, nearly eight loads of hay per acre.

The ſpring ploughing amongſt the lucern muſt be annually repeated: it kills the graſs and weeds, and makes the ground ferment, which promotes vegetation; and the oftener it is refreſhed with a little dung on the ſurface, the better it will pay for the trouble of cultivating it. If the dung is laid on before the winter, that the ſalts may be waſhed in by the rain and ſnow, and ploughed in, in the ſpring, it will greatly add to the profit.

This is the ſubſtance of Mr. Rocque's account of the culture of lucern; but as different ſorts of ſoil may require different methods of tillage, he has ſubjoined the idea of a harrow, with two handles like a plough, which may ſerve in light land inſtead of the plough, and will ſave ſome labour.

The teeth muſt be ſet at ſeven or eight inches apart in the firſt row, and about five inches long without the wood. The ſecond row muſt be placed nine or ten inches behind the firſt, and ſo that the teeth of the ſecond row may be againſt the ſpaces of the firſt row; and they muſt be an inch longer than thoſe in the firſt row, ſo that the ground, being looſened a little by the firſt row, the teeth of the ſecond row may go ſomething deeper; and the teeth of the third and laſt row muſt be an inch longer than thoſe of the ſecond, and placed ſo as that they may go in the ſame tract with the teeth of the firſt row.

The harrow muſt be made of one ſolid piece, four or five inches thick, and the lower ſide muſt be rounded off towards the hinder part where the teeth are longeſt; whereby the perſon that holds it by the handles, preſſing down a little, may force the ſecond and third rows of teeth deeper than the firſt; and, by bearing up a little, he may prevent any but the firſt row from working. A very little practice will be ſufficient to make any one uſe it as occaſion requires; and it will be ſo ſteady that no unevenneſs of the ground will be able to throw it out of its work, as a clod or ſtone will a common harrow.

. . . . .
 . . . . } The manner the teeth are to be placed in.
. . . . .

Let it be remarked, that the foremoſt row of teeth are placed in a line acroſs near the middle of the block or plank; the other two rows behind that; and the fore part of the harrow ſhould be heavier than the hind part when the weight of the harrow is ſuſpended on the firſt row of teeth. The teeth ſhould be pretty ſtrong, and round; their being ſquare, as uſual, may hurt the roots a little, which is to be avoided as much as poſſible, though the conſequence would not be very great.

Farmers are fond of ſowing broad-caſt, it being no eaſy matter to make them comprehend the utility of a drill-plough on any occaſion: the ſight of ſo complicated an inſtrument terrifies them; they think it moves by clock-work: and as to the labourers, it is a very difficult matter indeed to get them to hold it.

I am fully ſenſible, as I have already obſerved, of the good effects of ſowing corn and pulſe regularly with intervals, but cannot approve of this method when applied to artificial graſſes; and it would be well if we were to improve our old practices, before we ſhould even attempt to bring the new methods into general uſe. *Muſeum Ruſticum, vol.* I. *page* 78.

In the ſucceeding volume of the above work, another correſpondent has made the following remarks on the above method delivered by Mr. Rocque.

This gentleman, ſays our author, owns he is againſt innovations in huſbandry, becauſe it is difficult to bring the farmer from the old methods; and therefore ſeems to conclude, new ones are not to be attempted; at leaſt, that ſeems to be his reaſon for being againſt what he calls innovations.

Under “ reſtrictions, &c.” he approves of the new culture, but thinks it “ prepoſterous to extend it to artificial graſſes;” adding, “ the only benefit lucern can receive from the horſe-hoe, is, that it keeps down the natural graſs.” This gentleman cannot be a practical cultivator of lucern; neither can he know the uſes of the hoe-plough; if he did, he could not aſſert a fact ſo contradictory in itſelf!

To inaccurate obſervers the ſeedling plant of lucern may appear to have no lateral roots; but a careful examiner will find a great number of ſmall ones, every one, or moſt, of which are furniſhed with freſh nutriment by the operation of the hoe-plough.

We ſhall not contend about Mr. Rocque's ſuperior profit: his ſituation gives him advantages ſuperior to a diſtant reſidence; and therefore that ſhould not be mentioned by a generous writer.

I am a favourer and practiſer of the New Huſbandry; and I do deny that it will be more expenſive than Mr. Rocque's method, but, on the contrary, it will eventually be cheaper.

By his method he may, for a few years, have pretty good crops; but at length his plants will be found to dwindle, and his crops will leſſen, unleſs he annually adds ſeed to the ground; whereas, in the new culture, the crop will be continually improving: as to the quality being inferior, that will be the fault of the owner, if he lets it grow too rank. This argument of your writer makes againſt himſelf, as thereby he admits the ſuperior luxuriance of the plants cultivated by the horſe-hoe.

I have ſown lucern in broad-caſt more than once, and have ſeen others do it; and it ever failed.

Mr. Rocque's rule, as this gentleman ſays, is, “that lucern will grow on any land, if not wet:” this is certainly premature: it ſurely muſt have the occupation of a dry, rich ſoil, or I am ſure, from practice, it will not ſucceed; and as to “the ſtrongeſt being preferred,” I believe every one, who tries the cultivation of it on ſuch, and upon light ground, will find the latter beſt adapted to it.

But the notion of ſowing corn with lucern is quite as “prepoſterous,” I think, as the new culture for it; and how a man of Mr. Rocque's famed abilities ſhould adopt ſuch a method, I am at a loſs to gueſs. Neither ſhould lucern be ſown in March, as in its infant ſtate it is very tender, and timid of froſt.

This gentleman ſays, “it is for want of knowing the “nature of lucern, that they drill it.” I might retort upon him; but his miſtaken zeal, I fear, will more injure the cauſe he means to promote, than I hope it will diſcourage the practice of drilling this valuable plant, as, by all men who adhere to rational principles, that hath been found the moſt ſucceſsful method. See Tull, Duhamel, &c. I ſhould be glad to know what “the ſurface of the ground is to be ſpared for:” is it to give life to the natural graſs, that common and deſtructive enemy of this excellent plant?

Our author mentions the cultivation of it in France, &c. If he was ever at Paris, with his preſent attention, he muſt have ſeen, that after a few years they always plough up the promiſcuous ſown lucern, in order to prepare the ground again for that, or ſome other crop, when the lucern begins to dwindle by the weeds or natural graſs robbing it of its nutriment.

How much more muſt that be the fate of promiſcuous ſown lucern in theſe kingdoms, where he admits graſs is apt to get a-head? That is not the caſe in France, and yet even there promiſcuous ſown crops are ſhort lived.

I know not whether he be as converſant with potato-ground in Ireland as I am; but I cannot omit to inform you the tillage will not do for lucern: for this plant the ground ought to be well pulverized; whereas, in the general potato tillage of this kingdom, not more than about two feet in nine of the ground is cultivated.

The manner of harrowing the lucern, practiſed by Mr. Rocque, although the teeth be round, muſt wound many of the roots: that might be well, as it would thin them; but repeated harrowing will, in time, wound them all; and notwithſtandig they will afford graſs afterwards, yet, when the winter rain comes on, lodgments of water will be made in thoſe wounds, which will bring on putrefaction, to the deſtruction of the plants, unleſs Mr. Rocque has the art of conducting the harrow-pins always in the ſame direction: and, could that be the caſe, what would deſtroy the graſs where they did not paſs?

The manner of ploughing the lucern, practiſed by Mr. Rocque, is ſtill approaching the horſe-hoe, though by no means ſo effectual. I wonder to ſee our author even favour that, ſince it may be deemed an “innovation.” This ploughing is to be repeated every year, and harrowing alſo: to this dung is to be added, “as often as may be.” I am willing to believe this gentleman knows nothing of the expence which attends theſe operations, *i. e.* ploughing, harrowing, and, above all, dunging, beſides the value of the dung, which would always be acceptable for other grounds; whereas, in the drill way of ſowing lucern, when the land is once put in good order, it may ever be kept ſo by the hoe-plough.

Lucern is a graſs of ſuch ineſtimable value, that it will anſwer almoſt any expence; yet if the moſt certain method to obtain ſucceſs ſhall be found the cheapeſt, there can be no reaſon for purſuing one more precarious and more expenſive, which will be found when Mr. Rocque's method, or at leaſt that ſo warmly recommended by your correſpondent, who aſſerts it to be Mr. Rocque's, is compared in practice with the one I venture to recommend to the practice of my countrymen, which I take upon me to ſay will command ſucceſs, if purſued.

The land ſhould be a flexible loam, dry, deep, and rich, either by nature, or made ſo by art; not but it will ſucceed to admiration ſhould a quarry be under. It ſhould be well pulverized by plough and harrow, laid as flat as poſſible, and cleared of all weeds, particularly ſcutch-graſs: when the ground is in this form, let a ſmall plough, with two mould-boards, be run up and down the field, at every three foot upon the flat ſurface: this will compleatly form three foot ridges. If a pair of drill-harrows be not at hand, let the crown of every ridge be carefully raked clean and even with an iron rake, and one row of ſeed drilled very thin, about half an inch deep, along the middle of every ridge, the middle or latter end of April, (the beginning of May may do) and be carefully covered. This ſowing of the ſeed may be done by hand, if a drill-plough be not ready. By a maſter's attendance, a great deal may be done in a day.

Thus it may remain till weeds begin to appear, when the hoe-plough, or a ſmall common one, ſhould take away every alternate ſide of the ridges, as near the lucern as can be with ſafety. (I go within two or three inches of my drilled crops.) In three or four days, return the mould to the former places with the plough, and then proceed to take off the other ſides of the ridges in like manner, and return it as before.

If the ground be made in good condition before ſowing, a crop may be mowed in July, the produce of which will ſurpriſe any one who is not acquainted with the plant.

In September it will be fit to cut again; but if in the intermediate time weeds ſhould appear, let the hoeing be repeated: thus the weeds will be deſtroyed the firſt year.

After the ſecond cutting, ſend in the plough again, and take off the ſides of every ridge within about ſix inches of the plants, and ſo let them remain till February, when the plough ſhould return the mould to every ridge; and in May the graſs will be ready for cutting, and will continue to afford a crop every month during the ſummer.

The hoeing ſhould be repeated, as before directed, as often as weeds appear; but obſerve never to horſe-hoe it when the ground has any adheſion.

The hoeing before the winter is to keep the plants dry during that ſeaſon, and to meliorate the ſoil of the alleys by the influence and mechanical operation of the winter froſts.

To keep my letter within reaſonable compaſs, I have been ſhort in my directions, but to practical farmers, I hope, ſufficiently plain; if not, any neceſſary explanation I ſhall chearfully furniſh.

Your readers will pleaſe to obſerve, that after the firſt preparation of the ground, if they horſe-hoe the crop regularly every year, the dung which Mr. Rocques's friend recommends (as it may be got eaſily at in London) may be ſaved for other purpoſes, as by this method of managing lucern, the crop and ground will be improving every year.

I appeal then to every impartial judge, whether this method is not cheaper than the ploughing, harrowing, and dunging, ſo warmly recommended by your correſpondent. It is almoſt unneceſſary to urge, that a crop raiſed in this way will, ever after the firſt year, be equal, if not ſuperior, to Mr. Rocque's, as the gentleman admits as large crops may be raiſed in the drill way.

I am a ſtranger to Mr. Rocque and his fried. I have no other motives in troubling you on this ſubject, than a public benefit to mankind, and a gratitude to the memory of Mr. Tull, whoſe ſuperior ingenuity, I bluſh to own it, hath ſhone in France, to the reproach of Engliſhmen. And were we all to join in opinion with your correſpondent (who ſays, “It would be well were we to improve our old practices, before we even attempt to bring the new ones into general uſe”) we ſhould indiſcriminately merit the pity of all nations for our perverſeneſs. Perhaps, had Tull been a foreigner, his ſyſtem would have been eſtabliſhed amongſt us long ago.

The author of the former account not being ſatisfied with the reaſons offered by his antagoniſt, made the following reply; which we thought neceſſary to inſert, that our readers may judge for themſelves, and follow the method that ſhall appear to them the moſt rational.

I troubled you the beginning of laſt year with a letter on the ſubject of lucern, which you were ſo obliging as to inſert in your firſt volume, page 339.

I am ſtill an advocate for Mr. Rocque's method of culture in preference to Mr. Miller's, as far as regards this plant; and that for this plain reaſon, becauſe I imagine the farmer will be much more likely to adopt the firſt than the laſt; and the culture of lucern can produce very little advantage to the nation, unleſs it is generally adopted by the common farmers.

My reaſon for troubling you, or your readers, at this time, is to remind you, that Mr. Rocque's ſmall tract, lately publiſhed, contains ſome particulars reſpecting lucern, which were not noticed in my former letter, and therefore may, with great propriety, be now laid before your readers.

The firſt of theſe partitulars relates to the manner of ſowing the lucern; and in this Mr. Rocque differs widely from Mr. Miller, as he thinks it ſhould not be ſown without corn; but I will give you Mr. Rocque's own words, as they carry great weight with them. "You muſt not ſow lucern without corn, unleſs your ſpot of land is too ſmall to uſe a harrow in: in that caſe, you muſt ſow it in drills, and keep it very clean hoed. The drills for ſuch ſmall ſpots are to be ten inches diſtant; if wider, it lodges in the drills. The reaſon I recommend ſowing corn with it, is, to prevent the weeds choaking it; but, you muſt ſow only for half a crop; otherwiſe your corn will be apt to deſtroy your lucern, eſpecially if it proves a wet ſeaſon, and your corn is ſtrong. If there is no corn ſown amongſt it, you muſt be obliged to mow the weeds, and run a chance of cutting the lucern with them: and, being very ſappy, you cannot imagine how detrimental it is to bleed it, when young; but, when the corn will be fit to mow, the lucern alſo may ſafely be cut."

As the duration of lucern has been a queſtion long agitated, and not, that I know of, finally determined, it will not be amiſs to mention a fact related by this able cultivator, as it will be an encouragement to the planters of lucern.

"As to the duration, it will laſt as long as the ground is kept clean. I ſaw ſome at Mr. Middlemar's, at Grantham, in his garden, that was forty years old; and it was very fine. To keep it thorough clean, you muſt harrow it every time it is mowed; and, if requiſite, at Michaelmas, and in February and March. If you once leave it foul, it will be very expenſive to clean. You muſt make uſe of the drill-plough; but let the harrow be ever ſo ſtrong, you need not fear its hurting it."

In my letter to you, above-mentioned, it is obſerved, that in preparing land for lucern, a trench-ploughing would be of great advantage: but in the piece lately publiſhed, Mr. Rocque ſays, "In caſe you are not well acquainted with the ſtate of your ground, you muſt trench-plough it twice, according to the directions for ploughing, which are in my Hints upon Burnet; whereby the roots will run down the ſooner out of the reach of dry weather: and if the ſoil, that is turned up, be ever ſo ſour, future ploughings, harrowings, and manurings, will ſweeten it ſufficiently for the reception of the ſeed."

Mr. Rocque adds, in this place, that "Lucerne will grow very well in clay land, with proviſo the ground works well. The difficulty in theſe lands lies in the harrowing; in dry weather the ground being ſo very hard, the harrow can do but little good, unleſs you take the ſeaſon between wet and dry to harrow it, which you certainly muſt."

It is alſo obſerved, that in the province of Languedoc, in France, the inhabitants mow their lucern when it is ſix or ſeven inches high, in order to kill the annual weeds. Of this practice Mr. Rocque now ſays, "By my own experience, I find they are in the wrong; for it bleeds it, ſo that the plants make but little progreſs when cut ſo young, and are a long time in recovering it. It ought never to be cut but when in bloom."

A great many imagine that the ſeed might profitably be ſaved in England; but Mr. Rocque is of a different opinion, and indeed I am inclined to join with him in this reſpect, as in this iſland it is at beſt but a precarious crop, and can be imported ſo cheap, that the ſeedſman can afford to retail it at nine-pence per pound, at which price it was this year advertiſed. Mr. Rocque's obſervation on this point is as follows: "In hot ſummers the ſeed may be ſaved in England, but not from the firſt growth, that being generally too rank, and ſubject to rot at bottom: though I think it is needleſs attempting to ſave any of the ſeed in England; for, in the year 1761, which was a very fine ſummer, I tried to ſave the ſeed of the ſecond growth, on light land, but made nothing of it; not ſaving above thirty pounds of ſeed, upon four acres and a half. I alſo tried, that ſame ſummer, to ſave ſome off ſtiff land; but that proved ſtill worſe."

I have only now to give you Mr. Rocque's thoughts on the value of this graſs, which, in my opinion, deſerves to be preferred to almoſt all others.

This practical cultivator ſays, "I have already obſerved, it ought not to be cut but when it is in bloſſom; and that is but three times a year: but after mowing the third crop, you may, inſtead of mowing the fourth, feed it: but when froſts come, you muſt take your cattle off; becauſe there are always young ſhoots, which would be bruiſed, if the cattle were not taken off. If it is rank in September, it is dangerous for cows, being too feeding; but turn horſes and ſheep upon it. As there is no graſs, as has yet come to our knowledge, which gives the cows ſo much milk, you may let them graze about an hour, at moſt, in the afternoon, when the dew is off. When made hay, it is likewiſe the beſt for milk: whereever it is much cultivated, they prefer it to all other kind of hay.

When I was at Monoſque, a city in Provence, which was about twenty-ſeven years ago, the carriers fed their horſes upon it, preferably to any other, without corn; and the mules looked fat and in fine order. Six mules which I hired there, to carry my ſeeds at Nimes, fed on nothing elſe, and yet carried their load all day long, without unloading. They have the cuſtom of hanging little bags to their horſes or mules heads, wherein they put lucern, on which they feed as they go.

It is acknowledged by all connoiſſeurs to be the moſt feeding of all paſture, either green or in hay. I truſt not barely to report, but have experienced it to be ſo myſelf. I had colonel Vernon's horſe ſent to me from the country, in a very poor condition; and, in fourteen days, he was in very good order. The colonel was ſurprized to ſee how he had throve in that ſhort ſpace of time.

Many are apt to condemn it, but it is for want of knowing its good qualities. It has been introduced for a long ſeries of years; but ſo little noticed, that one and twenty years ago there was not two hundred weight of lucern graſs ſeeds to be ſold amongſt all the ſeedſmen here in London; and I had much ado to re-introduce it; but now, within theſe three or four years, there is a prodigious conſumption of it.

One Mr. Beadle, a farmer in Kent, has fourteen acres of it, for which he had a premium. When I called upon him, which was in the beginning of May laſt, he had mowed his lucern, and ſold it upon the ſpot, for three pounds or three guineas a load. I blamed him for cutting it ſo young; but he told me he was compelled to it, to get fodder for eight hundred head of ſheep, that he had; but that, a little while after, it grew ſo faſt, that he could turn his ſheep upon it. Thoſe that bought his hay muſt needs be well acquainted with the goodneſs of it, to fetch it on the ſpot, though they were ten or twelve miles diſtant.

It is not foggy, like clover or tares. Horſes will work with it green, as well as with hay or corn: they do not ſweat with it, as they do with other green fodder. I have been told, one of our poſt-maſters kept his horſes both winter and ſummer with it, and that his horſes were the beſt on the road. They object, the hay of it is difficult to make: it is no more difficult than clover. All hay is difficult to make in wet weather: but when it is a bad ſeaſon to make hay, do as Mr. Allen does; put it up in ricks when dry, and between every bed of hay, of any kind, put a layer of ſalt, and that will recover all the damage the rain can have done.

I have done it myſelf, this very laſt year, with a rick of burnet: to about twelve loads I have put a ſack of ſalt amongſt it; and every time my horſe comes near it, he eats it very eagerly, though he can get but at the outſide of it. It will keep in ricks as long as any hay.

Multitudes, at preſent, are pretty well acquainted with the excellence of both theſe graſſes: but if any doubt the truth of what I aſſert, let them take the trouble to enquire into it, of Mr. Shennelly, the tobacconiſt, at Houndſditch; to whom I have ſent a load of lucern, and am to ſend another load of the ſame, and half a load of burnet hay.

Thoſe who are not ſatisfied with the theory, may be convinced of the practical part, by ſeeing a field of mine of lucern, of four acres and a half, at Batterſea, and the manner of working the harrow."

From what has been ſaid on the ſubject of lucern, I hope your farming readers will be induced to adopt the culture of it; as, if they are not blind to their intereſts, they cannot but be convinced of the many advantages which would reſult to them from ſo doing. Mr. Rocque's method of cultivating this plant differs but little from the manner in which they raiſe clover; and the profit to the landholder will be abundantly greater. *Muſeum Ruſticum, vol.* iv. *p.* 259.

The following method of cultivating lucern, is extracted from a very ingenious performance, entitled, *Eſſays on Huſbandry*, the principal intention of which is to recommend a newly diſcovered method of cultivating this plant.

Mr. Rocque, as may be ſeen above, has adopted the old Roman method of ſowing it, broad-caſt, and harrowing the land from time to time by way of deſtroying the weeds. Mr. Miller recommends the new, or drill, huſbandry for the culture of lucern; but the author of the Eſſays above-mentioned differs from both theſe practical cultivators, and raiſes his lucerne in a nurſery; after which he removes the young plants, and having cut off their ſtalks and tap roots, tranſplants them, with great regularity, into the field where they are to ſtand for a crop.

I ſhall not pretend to decide which is the beſt method; yet I may venture to ſay, that I know it may be raiſed to conſiderable profit, both in Mr. Rocque's way, and according to the rules laid down in the new, or horſe-hoeing, huſbandry.

I have no doubt but it may ſucceed by tranſplantation; yet I greatly fear that the expences in this method will, when applied to any conſiderable extent of land, greatly exceed the worth of the crop.

Theſe Eſſays being too learned for the honeſt farmer's reading, it is very improbable they ſhould ever fall into his hands; yet, as it is a great pity he ſhould not be permitted to judge for himſelf in a matter which may turn out ſo much to his advantage, we have taken the trouble of tranſcribing a few pages of the ſecond Eſſay, which more immediately treats of the culture of lucern by this new method of tranſplanting.

In this extract we have omitted all reaſonings that might render the narration obſcure to the farmer; not that we had ourſelves any objection to them, or did not approve of them, but as we were willing the honeſt cultivator ſhould have as much of this matter laid before his view, in a plain manner, as was neceſſary for him to underſtand it: when this is done, he may judge for himſelf; and if on trial he finds the method here recommended anſwer, his beſt way will be to adopt it in his future practice.

Whoever propoſes to ſow a lucern-nurſery, or engages in any larger undertaking of cultivating whole fields of ſainfoin, trefoil, buck-wheat, ſpurrey, fenugreek, ſweet, melilot, &c. would be no ways ill-adviſed, if he prepared a bit of ground, and ſowed a ſpoonful of the ſeeds about a fortnight before he propoſed to ſow his larger quantity; ſince, from the good or bad ſucceſs of this little attempt, he may be enabled to judge, whether the ſeedſman has ſupplied him with ſeeds fit for vegetation. Without ſuch precaution, a whole year may be loſt; which is a mortifying circumſtance in matters of huſbandry.

In the end of March, 1757, a common day-labourer was ordered to ſow a pound and a half of lucern-ſeed, and keep the ground clear from weeds. The ſeed was ſown on one of the leaſt promiſing pieces of land in all the neighbourhood; but this was done by expreſs order; for it was thought unfair to make the experiment on a better ſoil than the commoneſt ſort of graſs-fields. The ſpot of earth ſet apart for the purpoſes, both of nurſery and tranſplantation, was, in former times, a kitchen-garden: but the good ſoil, to the depth of eighteen inches, had been removed for the ſake of manuring a corn-field. [To which we ſhall juſt add, that the attempt was made in an hilly country, where the ſtaple earth is naturally ſhallow.] What remained was a cold, yellow, clammy ſtratum, which the country people looked upon as mere clay; but, its nature having ſince been better examined, it appears to be a mixture of imperfect clay, and imperfect marle. No manure worth mention was uſed upon it, as will appear by the ſequel.

To all ſeeming appearance, little, or next to nothing, could be expected from a piece of ground of ſuch an unpromiſing caſt; but, upon the whole, the experiment proved ſucceſsful and eaſy.

By the middle of Auguſt, the plants were, ſome of them, eighteen inches high; and many of them branched out, ſubdivided themſelves, and made very fine ſide-ſhoots: upon which it was reſolved to venture upon the ſecond part of the experiment, according to the accounts given by M. de Chateauvieux; therefore taking the advantage of a moiſt ſeaſon, in the beginning of September, (which ſeaſon, by the way, did not laſt long) we performed the work in the following manner. [But here let it be juſt obſerved, in paſſing along, that the time of the year, pitched upon for tranſplanting, was, at leaſt, three weeks too late for England, though, perhaps, highly proper for the territory of Geneva, or the ſouthern parts of France. This therefore is ſet down as one of the *mutatis mutandis* ſo indiſpenſibly neceſſary in matters of agriculture, when the practice of one country is copied in another.

Firſt the roots were dug up carefully; orders being given before-hand not to attempt drawing them, even with the ſmalleſt degree of violence, till the earth was entirely looſened at top and at bottom. In the next place, the long tap-roots were cut off eight, nine, or ten inches, diſcretionally, below the crown of the plant (the ſciſſars being generally applied juſt beneath the forks of the root, if it be a branching root:) then the ſtalks were clipped about five inches above the crown of the plant; and the remaining plant, after theſe amputations, (which may appear, at firſt ſight, to be very bold ones) was thrown into a large veſſel of water which ſtood by for that purpoſe, in the ſhade. Such refreſhment is no ways unneceſſary; for this plant is very impatient of heat and ſunſhine after it is taken up; nay, to ſuch a degree, (at leaſt the firſt half year of its growth) that one may almoſt call it a ſenſitive plant. The ſame day, making uſe of a dibble, or ſetting-ſtick, and filling every hole with water before the roots are put in, we tranſplanted them in rows, two feet aſunder, and each plant ſix inches apart in the rows; having firſt made little drills, or channels, and ſprinkled, or half filled, them with ſea-ſand and wood-aſhes kept dry (two parts of the former to one of the latter;) which was done with a view of looſening the ſoil, and giving a little warmth to a piece of ground which was naturally cold and clayey; nor was any other manure uſed. The drills were afterwards once watered, to take off the dryneſs and heat of the aſhes. The roots were placed firmly in the ground, and two inches of the ſtalks covered with mould.

Yet here it muſt be freely acknowledged, that the hopes of poſſeſſing a large crop occaſioned one miſtake, which we chuſe rather to mention than ſuppreſs, as many people may happen to entertain the ſame falſe expectances. The miſtake was, that we made our rows two feet aſunder, which was over-narrow; and placed the plants, in the lines, only ſix inches apart, which brought them nearer together than they ought to have ſtood, even though the ground was very poor: nor did we foreſee, that horſe-hoe ploughing is five times more efficacious, as well as cheaper, than hand-hoeings.

Therefore, after frequent experiments, ſince made, it appears beſt to make the lines three feet four inches diſtant from each other: and if the ſoil is good, it may not be amiſs to allow each plant a foot diſtance one from another in the lines, for thus the hand-hoers will work more commodiouſly, and a little hoe-plough may be guided ſafely up and down the intervals, which will ſave a great deal of trouble: nor will the future crops be leſſened, by ſuch thin tranſplanting, half ſo much as may be imagined; but, on the contrary, the plants will be larger, more juicy, and better taſted; which circumſtance may be extended in favour of the New Huſbandry in general. Space and culture improve the herbage and ſeeds of plants; in proof whereof I have been aſſured, from good authority, that all the corn, raiſed by M. de Chateauvieux, ſells at an advanced price; being larger, brighter, and healthier than common corn, and, conſequently, more fit for ſowing, or making bread.

But, by way of confirming the neceſſity of allowing lucern roots a good ſhare of ſpace, a friend of the author's filled an acre with plants, according to the firſt directions; but, the ſoil proving extremely good, and free from weeds, it ſoon appeared that the roots ſtood too cloſe: in conſequence whereof, every other plant was taken up the next autumn, and, a freſh acre of land being properly prepared to receive them, he thus gained a new plantation of lucern, at a ſmall expence, with little trouble: and, what is more remarkable, it is thought the ſecond acre bore a larger quantity of herbage than the firſt would have done, if the plants had continued as they were, without being thinned, to the amount of one half. Of courſe, there is reaſon to conclude, that this ſlight hint, which took its riſe from mere accident, ought not to be looked upon as quite unuſeful, ſince two acres may be raiſed with almoſt the ſame expence as a ſingle acre.

In ten days, though a drought ſucceeded, ſome tranſplanted plants made ſhoots of three inches height; which vigorous growth gave better hopes than had been conceived at firſt.

It was alſo ſome encouragement to the undertaker, that he found wild lucern within two muſquet-ſhots of the place where the nurſery was formed. Theſe plants were certainly *aborigines*; for they grew in a part of the kingdom where the name of lucern had rarely been heard of, except by gentlemen. Beſides, no perſon curious in huſbandry would have ventured ſowing the ſeeds in ſuch an unpromiſing piece of ground; for the field, where the wild lucern grew, was a ſort of coarſe, uncultivated moraſs, and valued only at about two ſhillings and ſixpence an acre.

Yet ſtill the approach of winter made many perſons doubtful concerning the ſucceſs of this new plantation; nevertheleſs, it was ſome ſatisfaction to recollect, that there is leſs harſh, ſevere cold in England (and that almoſt by one third) than in the territory of Geneva, where the original experiment was made, and where the plant we are ſpeaking of has been known to thrive ſo extremely well.

At length the winter paſſed over, and, out of four thouſand roots, only thirty or forty periſhed, whether by froſts, immoderate rains, or any other accident, is hard to ſay: but the labourer filled up all the vacant ſpaces from the nurſery in about an hour, and in April, 1758, moſt of the plants were nearly equal in ſize and ſtrength; of a deep juicy verdure, with few or no diſcoloured ſickly leaves: but, May the eighth, people counted ſixty ſtems from one particular root, and the ſtalks and leaves of ſome choſen plants weighed near half a pound at one cutting. Yet we learn, by experience, that lucern muſt only be conſidered as in a progreſſive ſtate, till the third ſummer after tranſplanting; and then M. du Hamel aſſures us, that one flouriſhing plant will produce a pound of well-dried hay; which is ſaying a great deal, and much more than I could ever verify; for, if a ſingle plant produces one pound of hay, it muſt have weighed four pounds when it was green. Yet I have received an account from an eminent phyſician in our own country, (who planted two acres of lucern by my directions) that many of his plants, in the ſecond year, yielded near half a pound of hay each plant.

As an acre of lucern, thus managed, will contain more roots than one is apt to imagine at firſt gueſs, how great muſt the produce be of four or five cuttings every year, and thoſe confeſſedly the moſt nouriſhing and palatable food that cattle can eat! For thus much is certain, amongſt other advantages, that, if a field be induſtriouſly hoed, ploughed in the intervals or ſpaces, and hand-weeded in the rows, for the firſt two or three years, it is almoſt ſure, that horſes, cows, or ſheep, will hardly find a ſingle weed in a large quantity of green food.

We will now mention the ſtate of our tranſplanted lucern in its ſecond year, namely, 1758.

And here let it be remembered, that what cultivators call a proper time for cutting is, when the plants are about fifteen or ſixteen inches high, at an average, throughout the field: but this muſt be underſtood in a relative ſenſe, for ſome plants will be two or three feet high, and others may not be above ten inches, or one foot, in height, according to the circumſtances of health, ſpace, ſituation, &c. of the ſeveral roots.

The cuttings of the year 1758 were as follow: May 8th, June 7th, July 12th, Auguſt 20th, and October 1ſt.

In the year 1759, it was cut five times, and ſix times in 1760; which made ſixteen cuttings in three years. Nay, by the ninth of April, in 1760, ſome of the lucern plants were near ſeventeen inches high, at a time when no field in the neighbourhood had graſs of four inches height, though you took five or ſix acres together. The ſame lucern was cut twice, before any hay-making began in the country round it, if we except ſome few meadows lying near market-towns.

Having carried on my firſt experiment thus far, upon almoſt as unpromiſing a piece of land as could be found, and being ſenſible I had made ſome miſtakes from want of experience, (having as yet never ſeen any tranſplanted lucern in England) I gave directions for making a ſmall plantation in Berkſhire, but ſtill took care to chuſe a field that could hardly be called middling land. It was over-run with coarſe weeds, had been long out of tillage, and the earth, in moſt places, was hardly four inches above a bed of chalk; which (let farmers ſay what they pleaſe of it, in reſpect to ſaintfoin) is no ways favourable to the growth of lucern, eſpecially if the latter be tranſplanted; for the chalk flakes, when thaws and rains come on; and it either heaves the plants out of the ground, or expoſes the fibres of the roots too much to the cold. Yet upon this I ventured with my eyes open; for Pliny (whoſe authority I ſcruple not to take, when I have no other) had given me a caution concerning lucern raiſed upon chalky lands: but what induced me to make the attempt was, that the goodneſs of the ſoil might not lead me to ſay more concerning the ſucceſs of an experiment than other people may hope to find.

The little field, or cloſe, conſiſted of one rood of ground, or a quarter of an acre; which we threw into fifty-four rows, each row containing one hundred and ten plants, or five thouſand nine hundred and forty in the whole. In the ſecond year after tranſplanting, (and lucern is not then arrived to its due ſize) and at the firſt annual cutting, (which is not the beſt cutting, as the herbage ſuffers much from the winter) I weighed, out of curioſity, a parcel of the prime plants, which, one with another, weighed about one pound and a quarter each. But ſuppoſing that every plant weighed only one quarter of a pound, and admitting we give up the ſixth cutting, (which is more than one needs to do) then the crop of forty perches, or one fourth of an acre, amounts to a very conſiderable return of ten tons, at leaſt, of green lucern per acre.

An acre of tranſplanted lucern, rightly managed, will bring in five pounds a year, free and clear from all expences, and that for a conſiderable tract of time. Now certainly this advantage deſerves well to be conſidered; for the huſbandman is ſaid to be a good manager who makes three rents each year; a firſt for the landlord, a ſecond for labour, &c. and a third for himſelf: but an acre of lucern will for ſeveral years produce five rents, clear of all out-goings for rates, rent, workmen, manure, &c. ſuppoſing the land to let at fifteen ſhillings an acre, as uſually happens in moſt eſtates that lie at ſome diſtance from cities and market towns. On the contrary, if land be dearer near rich populous places, the ground will be better, and the produce more advantageous. This gives lucern its value near towns and cities, where two or three acres may be rented, but ten or twenty cannot; and ſure it is ſome advantage in huſbandry to make one acre ſupply the place of two or three, and eſpecially where it is difficult to rent land, even at a very high price.

It is certain, that the profits ariſing from tranſplanted lucern have been no ways exaggerated in my account; for by ſome collateral obſervations it may be eaſy to carry the value of an acre ſomething higher than has been here repreſented. Suppoſe green vetches (which are rarely cut more than once) and green lucern to be of equal value as food for horſes (which is making a ſuppoſition no good writer on huſbandry will allow to the diſadvantage of lucern;) now a perch of green vetches (if the crop be good) ſells for ſixpence at ſeventy miles diſtance from London, and a perch of tranſplanted lucern will weigh as much, or very nearly as much, at two cuttings, out of the four or five annual cuttings; which (every circumſtance being duly conſidered) brings an acre of lucern (to ſay the leaſt of its advantages in huſbandry) to be of equal value with two acres and a half of vetches; not to mention that lucern is a perennial plant, and vetches are annual; which, upon the whole, makes a new difference in point of profit.

As I think it unfair to ſuppreſs any unſucceſsful circumſtances in matters of huſbandry, I will here ingenuouſly confeſs, that the moſt material of my miſtakes were theſe: I followed my foreign inſtructions (which, at that time, were but few) with too much diffidence, and in too literal a manner. I was not enabled, through want of experience, to adapt the huſbandry practices of other nations to the Engliſh climate. I tranſplanted too late, filled my rows too full, and allowed not ſufficient ſpace for the intervals. By following the French directions over cloſely, I cut the tap-roots too ſhort in the beſt plants, and knew not (as it is a point unmentioned by any cultivator of lucern) how to manage a root that was very ſmall. The means of avoiding and rectifying all which miſtakes and difficulties are, by the help of ſubſequent experience, carefully pointed out.

And here it may be worth conſidering how to apply a field of lucern, carefully and induſtriouſly cultivated, to the greateſt advantage. In ſuch a caſe, let us ſuppoſe the plantation to conſiſt of two acres, and that four large horſes are to be ſupplied with green fodder, from the end of April till Michaelmas. Now, in order to manage this affair with dexterity, count the number of rows or lines in the lucern field, and place in one of the head-lands thirty land-marks, at equal diſtances; and thus, having cut a proper portion, day by day, you will be ready to begin afreſh, after the laſt cutting.

When I ſay you will be ready to begin afreſh at the end of thirty days, I muſt deſire to be underſtood, with a ſmall degree of latitude: for phyſical accidents are ſo numerous and unavoidable in regard to the growth of plants, (though lucern is liable to fewer checks and miſcarriages than moſt other cultivated field vegetables) yet ſtill the nature of the thing will not allow us to predict the time of each and every periodical cutting with much certainty; nevertheleſs, thus much may be depended upon, even for ſome years ſucceſſively, that, after the firſt annual cutting, our directions, here given, will be attended with no inconvenience to the owner; for there will rarely be more than three or four days difference between the times of the ſecond, third, and fourth cuttings: nor will the want of lucern fodder, during ſuch ſhort intervals, be of the leaſt ill conſequence; for, ſurely, that huſbandman muſt be a very improvident manager who has not other graſs fields by way of a momentary ſupply.

The times, therefore, of the ſecond, third, and fourth annual cuttings, are tolerably certain; but the firſt cutting, according to the nature of the winter, may be accelerated, or retarded, a fortnight, three weeks, and, perhaps, a month.

The time of the fifth cutting is alſo, in ſome degree, variable and uncertain, as the ſolar heat decreaſes, and the days grow ſhorter. A ſixth cutting, which is ſeldom of much conſequence, chiefly depends on a fortunate ſeaſon, in conjunction with the induſtrious good management of the cultivator.

From this ſucceſſion of freſh green food appears one ſingular advantage in raiſing lucern: and in the next place care muſt be taken, that your plantation be always proportionable to your number of cattle; or, in other words, let it be a rule to you to have rather over much lucern, than too little; for then one cutting may be ſet apart for hay, which may be given occaſionally to favourite horſes and ſick cattle. But, in caſe no hay is made, the owner of the ground, even then, by means of the ſupplies he derives from green lucern, will be enabled to ſpare a large quantity of other graſs for hay-making; and thus two acres of lucern will give him the power of ſaving two or three tons of hay more than he could have ſaved otherwiſe; conſequently lucern, in effect, helps to keep cattle both in winter aud ſummer.

By ſuch ſort of huſbandry, and provident management, the ſtock of hay for winter will be conſiderably encreaſed, and the owner enabled, for the ſpace of five months at leaſt in the other parts of the year, to allow his horſes very nearly the ſame quantities of green food each day; all equally freſh, wholeſome, and well taſted: which ſingle circumſtance, (if it related to horſes only) gives lucern the preference over all other ſorts of green fodder hitherto known, and in proceſs of time may be applied (as has been experienced with much ſucceſs) to the fatting of horned cattle, provided ſuch cautions are uſed as ſhall be ſpecified hereafter, and which ought always to be remembered. Now whatever encreaſes the number of cattle, augments the quantity of dung neceſſary for carrying on the more ſucceſsful cultivation of arable lands; and whatever, by multiplying the number of cattle, affords more animal food to man, will of courſe contribute towards leſſening the price of meat, which will aſſiſt ſociety in general, and more particularly the manufacturer and peaſant; for the grand ſecret of well-managing a trading populous country is to ſupply the inhabitants with fleſh and corn upon eaſy terms; for then mankind will multiply of courſe (ſuppoſing the government to be mild and equal;) nor will other nations underſel us in the commodities we export to foreign markets.

Now lucern, in matters of huſbandry, comes the neareſt of any article yet known, towards attaining the points here propoſed; foraſmuch as one acre of land, thus cultivated, will ſupport as many cattle in ſpring, ſummer, and a part of autumn, as four acres of common, natural, upland graſs did before. But this uſe of lucern is greater, if land be ſcarce; or if the nation be populous, and the ſoil has been cultivated to the extent of the old huſbandry: for then the introducing this plant is, in effect, the ſame as creating new land, if the ſuperior produce of lucern, both in quantity and quality, be fairly conſidered by us.

Yet one thing muſt be well underſtood in the new practice of raiſing lucern. Negligent huſbandmen, and ſuch as expect good crops without labour, expence, frequent ploughings, weedings, &c. would act a wiſe part in not attempting to cultivate the plant here mentioned: nor is it adviſable for gentlemen of fortune to commit this part of huſbandry to bailiffs and ſervants, who (be their maſters advantage ever ſo great) will not like the labour (though they are well paid for it) of turning fields into a ſort of gardens, and, beſides all this, may conceive a prejudice againſt improvements, and take ſome ſmall delight to ſee them miſcarry: ſo that all random, careleſs, and inſincere methods of culture muſt have nothing to do with raiſing plants, which, though hardy and long-lived after they attain a certain age, yet are ſurpriſingly delicate and tender when they are young, or when firſt tranſplanted; and more eſpecially if wild couch-graſs and other weeds ſhould ſpring up amongſt them.

For theſe reaſons, at firſt ſetting out, I muſt adviſe every good cultivator to be particularly induſtrious in the extirpation of weeds, and that he over-burdens not the ſtrength of the earth from a principle of avarice, but allows her the juſt refreſhments of manures, and gives her at leaſt ſome breathing ſpace of eaſe and repoſe.

It is highly unreaſonable to expect ſucceſs in the management of this plant without care, and highly improbable (if the ſeeds are good) to miſcarry with due care. It is true, many people have failed in the proceſs of this experiment; but then one is generally enabled to point out the error, as likewiſe the cauſe of ill ſucceſs, with tolerable exactneſs. To begin well in cultivating this plant is doing but little; rules and directions muſt be cautiouſly obſerved for three, or two years at leaſt. Few people make miſtakes in the beginning of an experiment: but, generally ſpeaking, after three or four months are expired, the maſter's attention and keeneſs wear off, and the bailiff or gardener, (as ſometimes the raiſing of a lucern nurſery fall in the province of the latter) are extremely glad not to refreſh his memory: for the ones does not like an additional trouble out of his department (a punctilio which has great weight with all ſervants;) and it is a maxim with the other, never to admit any thing new in matters of huſbandry, but admire thoſe ſorts of crops which Columella deſcribes; crops that can hold up their heads and proſper under all the negligence of a pretending cultivator.

It is true, many difficulties and diſcouragements attend making experiments. The continuance of life is as ſhort as that of art is permanent; and few huſbandry experiments can be made oftener than once in a year: nor muſt we reaſon too much by analogy, from ſucceſs in one production, to ſucceſs in another of a different ſpecies. Attention alſo is required, and that even to the minuteſt circumſtances: and again, too many experiments die with the obſerver; which, though highly uſeful, did not appear conſiderable enough for human vanity to eſtabliſh a ſyſtem thereon.

Yet ſtill all theſe difficulties and diſcouragements may be counter-balanced by the advantages which reſult afterwards to ſociety.

Lucern cannot eaſily be freed from manifeſt diſadvantages by any other method of culture than what is here recommended. That it has uſually miſcarried, when ſown with ſpring-corn, after repeated trials in this kingdom, from the year 1577 to 1764, is well known to many readers; for common wild graſs, and particularly couch-graſs, may be called its deſtruction, if not its poiſon, principally indeed by ſtarving the roots of it, but probably from its effluvia too. This likewiſe I have always obſerved in plants of a different ſpecies that ſtand too near each other; they immediately, as it were by a declaration of war, contend for maſtery: the roots are conſtantly attempting depredations and encroachments upon each other; whilſt the ſtalks, eſpecially thoſe of weeds, make the ſame efforts in longitudinal ſhoots; and that plant, which over-tops the other, provided the ſhoots are equally thick and ſtrong, always gains the victory, and, by overſhading and dripping upon its antagoniſt, forces it to dwindle away and periſh. This ſtruggling for life and maſtery draws up the plants too weak and ſpindling, and the conquered plant uſually dies. Now weeds, generally ſpeaking, are more hardy, ſavage, and hungry, than manured vegetables. If ſuch be the caſe, where is there a country to be found that abounds with foul graſs and weeds more than England? So that, if lucern be ſown in the uſual way amongſt corn, like ray-graſs, clover, and hop-trefoil, no care can keep an acre clean. It may laſt two years, (only one crop being tolerable) and then muſt periſh in the common courſe of nature. A gentleman very lately made this experiment (in good meaſure againſt his judgment) for the ſake of farmers, in hopes of finding out a cheap, eaſy, and compendious method of raiſing lucern; but the crop, at the end of fifteen months, was as near being overpowered and ſtarved as can be imagined; which made him venture to take up and tranſplant the few good roots that remained, which, being freed from the bad neighbourhood and incumbrance of coarſe graſs and other weeds, appeared to proſper very well. Again, if lucern be raiſed in drills, according to the beſt directions hitherto given by our ingenious countrymen, Tull and Miller, (who, to do them juſtice, were the firſt perſons, amongſt our modern writers, that ſaw the great advantage of this graſs, and preſſed the culture of it ſtrongly on the Engliſh nation) certain it is, that ſuch a method will greatly exceed the promiſcuous ſowing of lucern with ſpring-corn. Yet ſtill, in the practice of drilling, a conſiderable part of the ſeeds may be faulty, and then the rows will appear naked and unſupplied with herbage: nor can the hopper be ſuppoſed always to drop the little grains at preciſe diſtances plant from plant. Nevertheleſs, ſuch perſons as prefer drilling may fill up all the vacant ſpaces with tranſplanted roots.

In the method of cultivating lucern, which is here recommended, an acre will be found to contain about ſuch a number of choſen healthy roots as the ground is capable of ſupporting, and admit a greater number of them than the reader will be apt to imagine, *prima facie*; for it will hold, according to my firſt experiment, about twenty-ſix thouſand plants: but, if the ground be clean, rich, and well conditioned, it may be more adviſable to obſerve the greater diſtances already mentioned; upon which principle, the acre will contain about thirteen thouſand plants; and this is the number, all things conſidered, I am moſt inclined to recommend; for the produce of ſuch an acre will be full as large and profitable as the former, and the ground will be managed with leſs expence and more convenience.

It may be obſerved farther, that, in tranſplanting lucern, there will be one advantage (and that no ſmall one) which can never be obtained in drilling, or promiſcuous ſowing; each root will ſtand at a proper diſtance from its neighbour, and receive its allowance of food in due quantity, without diminution. In the next place, you will ſeldom ſee a plant wanting, and rarely (except by miſtake) a plant ſupernumerary: but, if a few ſets ſhould chance to die, it will be eaſy to ſupply the vacant ſpaces from the nurſery, and that, as people find by experience, in any moiſt day, from April till the middle of September.

There is another advantage which ariſes from tranſplanting lucern; for, by cutting the tap-root, you prevent its penetrating ten or twelve feet perpendicular into the ground, which the plant naturally does in three or four, years, except it be obſtructed by a ſtratum of rock, or chilled at root by weeping ſprings, or finds admiſſion in a bed of cold watery clay. Then the crop makes a poor appearance, or, perhaps, goes off all at once.

People who hand-hoe or horſe-hoe lucern, need not give themſelves much pain about breaking or cutting off a lateral root accidentally; not but that ſome care and caution muſt always be uſed: however, what ſeems to injure the parent-plant proves, in the end, no-ways diſadvantageous to it; for horizontal, or ſide roots, thus cut, or broken, puſh forth new roots and filaments laterally; and thus the ſuckers, or tubes that ſuck nouriſhment, are multiplied by a cauſe which had the appearance of leſſening their number. Yet tranſplanted lucern will no-ways bear ſuch rude treatment as the antients ſometimes gave to untranſplanted lucern, when they thought fit to make it undergo the diſcipline of harrowing.

How long lucern may laſt cannot be known by the experiments which are here related, namely, from the ſpring of 1757 to the beginning of the year 1764; but ſome perſons of credit have obſerved the plants to continue in good ſtrength and health near twenty years. [I ſuppoſe they mean here and there particular plants, and not a whole plantation.] Tull, indeed, tells us that, except lucern be choaked or ſtarved by graſs and weeds, he hardly knew when to ſay it will die a natural death; and probably it may not prove the leſs long lived for being tranſplanted; ſince hand-hoeings, horſe-hoeings, and digging, will give new ſtrength and health to the plants. The ſpreading of the roots will be facilitated by looſening the ſoil, and letting in the good influences of the atmoſphere: their growth alſo will be augmented by giving them that additional nouriſhment of which the weeds defrauded them: and, in the laſt place, all manures will more eaſily reach them; for thus much is a certain fact in huſbandry, that, when the ground is rendered clean, light, and penetrable, the roots love to expand themſelves, in order to procure a greater quantity of nouriſhment.

I fairly acknowledge that I am not enabled, from my own experience, to fix the common duration of lucern, whether tranſplanted or drilled (and that from no difficulty in the thing itſelf, but becauſe a ſufficient number of years has not elapſed ſince making my experiments;) but thus much I can take upon me to ſay, from my own knowledge,

ledge, that lucern ſown at random, or by what we call promiſcuous ſowing, as the ploughman ſows rye-graſs and clover, (whether with or without ſpring-corn) will not laſt to any tolerable purpoſe above two years, or three at moſt. But, as this plant is of the greateſt uſe and value, where land is dear and ſcarce, as near cities and towns, I ſee no reaſon to doubt, but that the ſame ſpot of ground may be continued as a lucern plantation for half a century at leaſt: for if the rows are three feet four inches wide, (which I look upon to be a *ſine qua non)* then, whenever the old lucern decays, new lines may be planted in the middle of each interval, which has lain fallow, and alſo been manured and pulverized for a conſiderable number of years; and thus progreſſively, *vice verſa*, to a long continuance.

Not being able therefore to give poſitive ſatisfaction concerning the continuance of lucern rightly managed, I ſhall propoſe ſomething that is not merely a query, and which, perhaps, may give the reader an equivalent information. In a few words, it is as follows: when lucern is grown old, and the owner propoſes to break up the plantation, layers might be made from all the principal ſtalks, and removed into freſh ground. Theſe layers, in all probability, may ſucceed extremely well, according to ſome few experiments made abroad in the years 1755 and 1756.

As to the expence and riſque of cultivating ſmall quantities of ground, agreeably to the method here laid down, it is to be hoped that curious gentlemen will not be deterred by ſome few minute difficulties or objections, but give the preſent experiment fair, patient, and repeated trials; for neither the out-goings nor the hazard will be very conſiderable. But at preſent it is no-ways our intention to perſuade farmers (at leaſt ſuch as are in low circumſtances) to quit their little certainty for an advantage which may appear to them quite uncertain.

Let them wait, at leaſt for a few years, in hopes ſome cheaper and more compendious method may be diſcovered for their ſakes; and if, at preſent, they make any experiments, let them be in ſmall.

The firſt point of conſideration, when I undertook to recommend tranſplanted lucern to the public, from my own experiments, was to bear conſtantly in mind whether the profit counterbalanced the expences and labour of culture, and that in a double, or even treble, proportion; ſince, otherwiſe, I was doing little more than poſtponing utility, for the ſake of introducing a new ſort of huſbandry, which only deſerved to be called ingenious.

We all know that the farmer expends much money, and gains very little from a crop of wheat at the expiration of his twelve months; but if we take ten years together, and compare the profits of lucern on the one hand, and wheat, barley, oats, and clover, on the other, the balance will certainly turn in favour of the lucern-crops, and that in a proportion of three, or two, to one, at leaſt.

The expence of raiſing an acre of lucern in the manner which we recommend, (and ſuppoſing even digging to be made uſe of inſtead of ploughing) amounts, as nearly as I can remember, to the following ſums:

	l.	s.	d.
Fine-digging and picking thirty perches for a nurſery - - - - - - - - - - - -	0	12	0
Seed - - - - - - - - - - - - - -	0	7	0
Hand-weeding the nurſery twice, and tranſplanting into vacant patches ſuch plants as ſtand too thick. - - - - - - - - - - -	0	13	0
Digging an acre for receiving the roots - -	2	10	0
Tranſplanting - - - - - - - - - -	1	5	0
Hand-weeding and hand-hoeing the rows, with a four-inch hoe that cuts downwards, and then with a larger plantation-hoe which cuts horizontally - - - - - - - - -	1	0	0
Two horſe-hoeings - - - - - - - - -	0	5	0
Total	6	12	0

It is true, the expences of raiſing lucern, in this manner, will vary, when applied to parts of England different from thoſe where the experiment was made, as the price of labour may be dearer, and rents run higher; but then the ground ought to prove better, which will balance the difference.

This plantation of lucern may be cut three times the firſt year after tranſplanting, as ſome repayment for the out-going expences: next year the profit will be more conſiderable.

On the other hand, thoſe who prefer the drill-method of raiſing lucern, as leſs expenſive, may ſeem to ſave about two pounds, or more, upon an acre, at the firſt appearance of things; but then the rows, in caſe the crop ſucceeds (which is a doubtful point) muſt be thinned with good judgment, which will coſt money; and the vacancies in them muſt be filled at laſt with tranſplanted roots: nay, M. de Chateauvieux aſſerts, that drilled lucern will rarely be ſo large and flouriſhing as the tranſplanted; for the effects of horſe-hoeing, and the influence of manures, may prove of leſs ſervice to the roots of the former, at a depth of twelve or thirteen feet, than to the roots of the latter, whoſe fineſt imperceptible fibres will hardly deſcend above a yard perpendicular.

It is hard to ſay at what preciſe time the aſſiſtance of the hoe-plough ſhould be called in: but the owner of the plantation may venture on the attempt, I think, with ſafety, in three days after the ſecond cutting, about the beginning of June; for the roots then will be tolerably well ſettled in the ground, and before that time the flat plantation-hoe may be uſed, chuſing ſuch an one as is about eight inches and an half wide in the cutting part.

As continued hand-hoeings will be chargeable, troubleſome, and almoſt endleſs (being in truth little more than a temporary expedient, and ſlight ſcratching the ſurface of the earth) remember to make a light plough, with which you are to cultivate the ſpaces between the rows; and in this caſe you may either invent a plough according to your own fancy, or copy ſuch as are uſed at home, or in other countries, on the like occaſion.

The ſhare of this plough ſhould be ſharp, about ſixteen inches long, with a coulter proportionable; the plough itſelf no heavier than a ſtrong lad of fifteen years of age can carry: and thus one horſe, after ſome obſtructions of no great conſequence in the firſt attempt, will afterwards draw it with eaſe. Yet ſtill the trouble will be leſſened, if the field be prepared by digging and picking up the roots and ſtones, inſtead of common ploughing, juſt before the ground is to receive the tranſplanted roots: therefore, after a full ſecond conſideration, the former practice is recommended preferably to the latter; and if the lucern ſtands nine or ten years, the difference of the expence will not be perceived.

As the rows will be one yard four inches aſunder, there will be room ſufficient to guide the plough ſafely along the intervals, and yet no room to ſpare: it behoves the ploughman therefore to be extremely careful in the ſlice he cuts next the lines: ſuch a ſtroke muſt be a ſhallow and a dexterous one; nor muſt he approach too nearly. A man, an horſe, and a boy to lead the horſe, will manage an acre in a day, when they know their buſineſs; for it is more a matter of nicety than fatigue, ſince the ground ploughed in an acre will hardly exceed half an acre.

After the firſt time of uſing the horſe-hoe plough (which a man's own diſcretion, upon conſidering the ſtrength of the plants, will beſt determine) it may be laid down for a general rule, that it will be always found moſt convenient to horſe-hoe the intervals (as long as the plantation ſtands) the third day after each cutting; for by that time the new ſhoots will make the plants viſible, nor will any ſide-branches ſtand in the plough's way.

It may be proper alſo to hand-weed the lines once a year; and the larger weeds may be taken up expeditiouſly with the three-pronged ſpade, or the field-ſpade.

We will now conſider the expences of an acre of lucern the ſecond year, which will ſtand as follow:

	l.	s.	d.
Clearing the lucern-plants from weeds in the rows by hand - - -	0	8	0
One hand-hoeing of the intervals -	0	8	0
Four horſe-hoe ploughings - -	0	11	0
Compoſt-dreſſing for manure, or ſoot, or wood peat aſhes, at an average per year -	0	10	0
Diſperſing the manure - -	0	3	0
Total	2	0	0

Such will be the yearly charges, or in ſome proportion very like them, during the continuance of your lucern, which I fix at a medium of ten years: M. de Chateauvieux ſays it may laſt twenty; and Pliny goes as far as thirty; though the expreſſion may be looked upon to be exaggerated.

In regard to manuring lucern, it may ſuffice to ſuggeſt here in general terms, that if the ground be ſtiff, cold, and of a clayey tendency, then wood-aſhes, ſoot, and lime, are proper dreſſings. If the ground be hot, ſhallow, and braſhy, a compoſt of calcined clay, dung rotted to a fine mould, and pond mud, long expoſed to ſun and froſts, and frequently turned, may have its uſe: and if the ground proves of a middle nature, then malt-duſt will not be amiſs. All theſe manures are eaſily procured, and therefore we have mentioned none that are ſcarce and dear: but as variations of ſoil are infinite, and few people know the true nature of any field (eſpecially if it be of the mixed kind) we recommend the compoſt dung-hill, as the ſureſt and moſt univerſal aſſiſtant upon ſuch occaſions.

Many other manures may be good for lucern, but dung probably is not one of the beſt, except it be very old, and well corrected with proper mixtures of a ſweet, as well as fertilizing nature, ſufficiently warm and cheriſhing, but noways rank; for dung (eſpecially if it be new) produces in general very luxuriant, troubleſome weeds, inſects in abundance of various kinds, and gives the graſs a foul, cloying, putrefied taſte.

The owner's eye, it is true, may be deceived, and his hopes encouraged by the largeneſs of the crop; but the ſagacious four-footed animals will diſtinguiſh better than we can pretend to diſtinguiſh; and if they could preſent a petition to their maſters, as the white heifers are reported once to have done to the emperor Julian, they would remonſtrate not a little againſt the immoderate uſe of this manure. Nevertheleſs, aſſertions like the preſent ought to be confirmed by ſome proof: an experiment therefore was made upon four acres of graſs-ground, of which one half was dreſſed with ſtable dung, and the other with wood aſhes kept dry. The former moiety appeared the moſt rich and luxuriant of the two, but the cattle always neglected it, till they had bitten the latter down to the bare earth.

Having thus given the reſult of my experience in regard to dung as a manure for lucern, I ſhall ſubjoin only one ſhort caution, which is, that no dung, not even of the beſt kinds, muſt be ſpread on a lucern plantation, till it be two years old at leaſt.

In all grounds inclinable to moiſture, and ſuch particularly as are of a clayey caſt, it is pretty certain, that the preference ought to be given to ſoot-dreſſings, and, after ſoot, to chimney-aſhes (thoſe of green wood eſpecially) provided they are houſed and ſecured from wet; then ſoap-boilers aſhes may take place, coal-aſhes well ſifted, charcoal aſhes, and malt-duſt; nor might the aſhes of lime be amiſs, nor lime itſelf, when mixed with ſuch fine mould as may be found under a ſhort ſweet turf, in lanes or commons. The compoſt-dunghill alſo, as obſerved before, ſhould be applied to, which, at the end of twelve months, having been thrice turned, will ſpread almoſt as well as aſhes or ſoot: nor will ſuch compoſt want ſtrength when it is rightly managed; for if the dunghill be moiſtened at times with the brine, ſoap-ſuds, diſh-waſhings, and chamber-lie, &c. of the family, then, when it is removed into the fields, the ſharp, pungent, ſtrong ſalts, which fly off, will make the labourers ſneeze, and occaſion a ſmarting in their eyes.

When you manure lucern with ſoot, dry chimney-aſhes, lime, ſoap-boilers aſhes, &c. it is ſufficient to dreſs the rows only, becauſe theſe finer ſorts of manures may be diſperſed in the niceſt exacteſt quantities, if ſown in the Berkſhire manner, with a peat-aſh ſpoon; but if coarſer manures are to be employed in larger quantities, as old dung, marle, compoſt-dreſſings, &c. I would then adviſe the proprietor of the field to manure the intervals and rows promiſcuouſly.

Nothing can be more cheaply and eaſily managed than manuring lucern with ſoot-dreſſings; for the labourer, if he makes uſe of a peat-aſh ſpoon and ſeed-lip, may ſprinkle the rows of an acre in four or five hours, walking down the firſt interval and returning by the ſecond, and ſo progreſſively.

Aſhes may be ſown in the ſame manner.

It may not be amiſs to anſwer a couple of queſtions which have been often propoſed.

The firſt queſtion is, How, and in what manner (by way of reſult from the conſiderable number of experiments made by me) I would adviſe any gentleman to prepare three or four acres of land for receiving lucern? this being an undertaking of ſome moment.

The ſecond queſtion is, How to perform this work in the ſhorteſt, ſafeſt, and moſt œconomical manner? Concerning both which points my ideas are as follow, this only premiſed, that I am here endeavouring to make the expence of the undertaking as cheap as poſſible; otherwiſe, where people pay no regard to to a few incidental charges, I would recommend Mr. Boyle's method of preparing a field for receiving tranſplanted lucern, who began his experiments of lucern in the ſame year that I did, but proceeded upon a larger ſcale; for he undertook the culture of ſix acres at once.

His preparation of the field was as follows:

In the year 1757, he gave his field a ſummer fallow, and having thoroughly ploughed and harrowed it (not as farmers underſtand theſe words, but effectually, inſtead of ſuperficially) he ſowed wheat after the ground had been dreſſed with lime. In 1758, his crop of wheat was very great. Immediately after harveſt, he gave the land in queſtion a ſevere diſcipline, uſing every method for pulverizing the earth, and extirpating weeds, that the beſt huſbandmen are acquainted with, either in our kingdoms or abroad; ſo that the field appeared again a perfect fallow. Then ploughing it very narrow and ſharp, he made water thoroughs with the plough, and left it in this condition for the winter 1758.

In ſpring 1759, he made many French drains in the field; as before he had made open ones for the winter; and, by ſtone-picking the land, had nearly ſtones ſufficient to fill them. In March the ſame year (taking advantage of the firſt fine weather) he ſlit the ridges with the plough, and reduced the land to the fineſt tilth he was able, and tranſplanted the lucern from his nurſery in autumn; in the whole proceſs of which he followed Du Hamel exactly.

Nothing in huſbandry could be more ſenſible and maſterly, than this preparation of a large piece of land for receiving lucern.

In the preſent caſe it may ſuffice to ſay, that ſuppoſing the nurſery to be properly prepared, and the ſeeds ſown in the firſt week of April, before the ſeaſon for tranſplanting, according to directions already given; I would recommend a field in good tilth, after barley harveſt, and before oats have been ſown in it. This field ſhould be thoroughly ploughed and harrowed twice, which we will ſuppoſe to be, for example, in the autumn of the preſent year, 1764. After each ploughing and harrowing, there ſhould be a very diligent burn-beating. But if the ſeaſon ſhould prove too wet at the time of a ſecond burn-beating, we make a virtue of neceſſity, and the weeds and trumpery muſt be raked together and carried off.

Then give the field a trench-fallow ploughing for winter, and early in March, 1765 (if the weather anyways permits) having manured your ground as the relative nature of the ſoil requires, and ploughed and harrowed it again to an exquiſite fineneſs, drill in a crop of field-peaſe, as early in the ſpring as is convenient with prudence and ſafety; for this crop muſt be ripe, and removed, by the laſt day of July. Much depends upon this point of foreſight: however the peaſe, by ſtanding thinner than in hand-ſown promiſcuous crops, being at the ſame time banked and hoed with greater eaſe, and enjoying more room, free air, and ſun-ſhine, will, in all probability, gain an advance of ten days at leaſt in their ripening. This will be a great point ſecured; for it is in huſbandry as in war; there are critical moments, which never preſent themſelves a ſecond time in the ſame campaign.

This pea-crop being hacked, and moved from the field by the fourth or fifth of Auguſt, call in all the aſſiſtance you have of huſbandry-ſtrength, or can procure, and plough and harrow the field, and burn the pea-roots, weeds, &c. as often as you have time, before the twentieth of Auguſt; and then (your nurſery being ſuppoſed to be in perfect readineſs) tranſplant your roots as before directed, and contrive to cloſe your work by the end of the month."

Mr. Lullin de Chateauvieux has obliged the world with many valuable experiments on the culture of lucern, which muſt not be omitted here: but it may not be amiſs to give firſt Mr. Miller's directions for cultivating lucern, as it has been often mentioned in this article. They are as follows:

" After having well ploughed and harrowed the land very fine, you ſhould make a drill quite acroſs the ground, almoſt half an inch deep, into which the ſeeds ſhould be ſcattered very thin: then cover them over a quarter of an inch thick, or ſomewhat more, with the earth: then proceed to make another drill, about a foot and a half from the former, ſowing the ſeeds therein in the ſame manner as before, and ſo proceed through the whole ſpot of ground, allowing the ſame diſtance between row and row, and ſcatter the ſeeds very thin in the drills. In this manner, an acre of land will require about ſix pounds of ſeed; for when it is ſown thicker, if the ſeeds grow well, the plants will be ſo cloſe as to ſpoil each other in a year or two, the heads of them growing to a conſiderable ſize, as will alſo the roots, provided they have room. I have meaſured the crown of one root, which was in my poſſeſſion, eighteen inches diameter, from which I cut near four hundred ſhoots at one time, which is an extraordinary increaſe, and this upon a poor dry gravelly ſoil, which had not been dunged for many years, but the root was at leaſt ten years old; ſo that if this crop be well cultivated, it will continue many years, and be equally good as when it was firſt ſown: for the roots generally run down very deep in the ground, provided the ſoil be dry; and although they ſhould meet a hard gravel a foot below the ſurface, yet their roots would penetrate it, and make their way downward, as I have experienced, having taken up ſome of them, which were above a yard in length, and had run two feet into a rock of gravel, ſo hard as not to be looſened without mattocks and crows of iron, and that with much difficulty.

" The reaſon for directing this ſeed to be ſown in rows is, that the plants may have room to grow; and for the better ſtirring the ground between them, to deſtroy the weeds, and encourage the growth of the plants, which may be very eaſily effected with a Dutch hoe, juſt after the cutting the crop each time, which will cauſe the plants to ſhoot again in a very little time, and be much ſtronger than in ſuch places where the ground cannot be ſtirred: but when the plants firſt come up, the ground between ſhould be hoed with a common hoe; and if, in doing of this, you cut up the plants where they are too thick, it will cauſe the remaining to be much ſtronger. This hoeing ſhould be repeated two or three times while the plants are young, according as the weeds are produced, obſerving always to do it in dry weather, that the weeds may the better be deſtroyed; for if it be done in moiſt weather, they will root and grow again.

" With this management, the plants will grow to the height of two feet or more, by the beginning of Auguſt, when the flowers will begin to appear, at which time the lucern ſhould be cut, obſerving to do it in a dry ſeaſon, if it is to be made hay, and keep it often turned, that it may ſoon dry, and be carried off the ground; for if it lie long upon the roots, it will prevent their ſhooting again. After the crop is taken off, you ſhould ſtir the ground between the rows with a hoe, to kill the weeds, and looſen the ſurface, which will cauſe the plants to ſhoot out again in a ſhort time; ſo that by the beginning of September there will be ſhoots four or five inches high, when you may turn in ſheep upon it to feed it down: nor ſhould the ſhoots be ſuffered to remain upon the plants, which would decay when the froſty weather comes on, and fall down upon the crown of the roots, and prevent their ſhooting early in the ſucceeding ſpring.

" The beſt way therefore is to feed it until November, when it will have done ſhooting for that ſeaſon: but it ſhould not be fed by large cattle the firſt year, becauſe the roots being young, would be in danger of being deſtroyed, either by their trampling upon them, or their pulling them out of the ground: but ſheep will be of ſervice to the roots by dunging the ground, provided they do not eat it too cloſe, ſo as to endanger the crown of the roots.

" In the beginning of February, the ground between the rows ſhould be again ſtirred with the hoe, to encourage them to ſhoot again: but in doing of this you ſhould be careful not to injure the crown of the roots, upon which the buds are at that time very turgid, and ready to puſh. With this management, if the ſoil be warm, by the middle of March the ſhoots will be five or ſix inches high, when, if you are in want of fodder, you may feed it down till a week in April; after which it ſhould be ſuffered to grow for a crop, which will be fit to cut the beginning of June, when you ſhould obſerve to get it off the ground as ſoon as poſſible, and ſtir the ground again with the Dutch hoe, which will forward the plants ſhooting again, ſo that by the middle, or latter end of July, there will be another crop fit to cut, which muſt be managed as before; after which it ſhould be fed down again in autumn: and as the roots by this time will have taken deep hold in the ground, there will be little danger of hurting them, if you ſhould turn in larger cattle; but you muſt always obſerve not to ſuffer them to remain after the roots have done ſhooting, leſt they ſhould eat down the crown of the roots below the bud, which would conſiderably damage, if not deſtroy them.

" In this manner you may continue conſtantly to have two crops to cut, and two feedings upon this plant, and in good ſeaſons there may be three crops cut, and two feedings, which will be a great improvement, eſpecially as this plant will grow upon dry barren ſoils, where graſs will come to little, and be of great uſe in dry ſummers, when graſs is often burnt up: and as it is an early plant in the ſpring, ſo it will be of great ſervice when fodder falls ſhort at that ſeaſon, when it will be fit to feed at leaſt a month before graſs or clover; for I have had this plant eight inches high by the tenth of March, old ſtyle, at which time the graſs in the ſame place has ſcarcely been one inch high.

" That cold will not injure this plant, I am fully ſatisfied; for in the very cold winter, anno 1728-9, I had ſome roots of this plant which were dug up in October, and laid upon the ground in the open air till the beginning of March, when I planted them again, and they ſhot out very vigorouſly ſoon after: nay, even while they lay upon the ground, they ſtruck out fibres from the under ſide of the roots, and had begun to ſhoot green from the crown of the roots. But that wet will deſtroy the roots, I am fully convinced; for I ſowed a little of the ſeed upon a moiſt ſpot of ground for a trial, which came up very well, and flouriſhed exceedingly during the ſummer ſeaſon, but in winter, when the great rains fell, the roots began to rot at bottom, and before the ſpring moſt of them were deſtroyed.

" The beſt places to procure the ſeed from, are Switzerland and the northern parts of France, which ſucceeds better with us than that which comes from a more ſouthern climate: but this ſeed may be ſaved in England in great plenty; in order to which, a ſmall quantity of the plants ſhould be ſuffered to grow uncut till the ſeeds are ripe, when it muſt be cut, and laid to dry in an open barn where the air may freely paſs through: but the ſeed muſt be defended from the wet; for if it be expoſed thereto, it will ſhoot while it remains in the pod, whereby it will be ſpoiled. When it is quite dry, it muſt be threſhed out; and cleanſed from the huſk, and preſerved in a dry place till the ſeaſon for ſowing it: and this ſeed ſaved in England is much preferable to any brought from abroad, as I have ſeveral times experienced; the plants produced from it having been much ſtronger than thoſe produced from the French, Helvetian, and Turkey ſeeds, which were ſown at the ſame time, and on the ſame ſoil and ſituation.

" I am inclinable to think that the reaſon of this plant's not ſucceeding, when it has been ſown in England, has either been occaſioned by the ſowing it with corn, with which it will by no means thrive (for though the plant be very hardy when grown pretty large, yet at its firſt coming up, if it be incommoded by any other plant or weeds, it ſeldom does well; therefore it ſhould always be ſown by itſelf, and carefully cleared from weeds until it has ſtrength, after which it is not eaſily deſtroyed;) or, perhaps,

haps, people have ſown it at a wrong ſeaſon, or in wet weather, whereby the ſeeds have rotted, and never come up, which hath diſcouraged their attempting it again: but however the ſucceſs has been, I dare aver, that if the method of ſowing or managing this plant, which is here laid down, be duly followed, it will be found to thrive as well as any other ſort of fodder now cultivated in England, and will continue much longer: for if the ground be duly ſtirred after the cutting of each crop, and the firſt crop fed, as hath been directed, the plants will continue in vigour twenty years, or more, without renewing provided they are not permitted to ſeed, which would weaken the roots more than four times cutting would do.

“ The hay of this plant ſhould be kept in cloſe barns, it being too tender to be kept in ricks open to the air as other hay: but it will remain good, if well dried before it be carried in, three years. The people abroad reckon an acre of this fodder ſufficient to keep three horſes all the year round: and I have been aſſured by perſons of undoubted credit, who have cultivated this plant in England, that three acres of it have fed ten cart-horſes from the end of April to the beginning of October, without any other food, though they have been conſtantly worked. Indeed the beſt uſe that can be made of this graſs is, to cut it and give it green to the cattle. Where this hath been daily practiſed, I have obſerved that by the time the field has been cut over, that part which was firſt cut, hath been ready to cut again; ſo that there has been a conſtant ſupply in the ſame field, from the middle of April to the end of October, when the ſeaſon has continued long mild; and when the ſummers have proved ſhowery, I have known ſix crops cut in one ſeaſon: but in the dry ſeaſons there will be always three. When the plant begins to flower, it ſhould then be cut; for if it ſtands longer, the ſtalks will grow hard, and the under leaves will decay, then the cattle will not ſo readily eat it. Where there is a quantity of this cultivated, ſome of it ſhould be cut before the flowers appear, otherwiſe there will be too much to cut within a proper time.

“ When this is made into hay, it will require a great deal of making: for as the ſtalks are very ſucculent, it muſt be often turned, and expoſed a fortnight before it be fit to houſe; for this requires a longer time to make than ſainfoin: therefore, when it is cut it ſhould be carried to make upon ſome graſs-ground; becauſe the earth in the intervals of the rows will waſh up, and mix with the hay in every ſhower of rain; and by carrying it off as ſoon as it is cut, the plants will ſhoot out again ſoon: but it is not ſo profitable for hay, as to cut green for all ſorts of cattle, but eſpecially horſes, which are extremely fond of it; and to them it will anſwer the purpoſe of both hay and corn, and they may be worked at the ſame time juſt as much as when they are fed with corn, or dry food.” *Miller's Gard. Dict.*

Experiments *on Lucern cultivated according to the New Husbandry*, *by* M. de Chateauvieux.

“ It is truly with regret, ſays M. de Chateauvieux, that I am forced to treat a ſubject of this importance, in ſo ſummary a way as the limits of this letter require. However, I hope that even this general account of my experiments may be a guide to thoſe who would cultivate this plant. Many perſons who live at a conſiderable diſtance from this place [Geneva] have already followed my example, and are extremely well ſatisfied with their ſucceſs.

“ Though I agree with M. Duhamel and the other partiſans of the New Huſbandry, that lucern and ſainfoin thrive beſt when cultivated in beds; yet my practice differs, in many reſpects, from theirs. This difference conſiſts in,

1. *The Principle which I apply particularly to the Culture of Lucern.*

“ Lucern grows naturally with one large perpendicular, or tap-root, which penetrates very deep into the earth, and has few, if any, lateral roots. From ſimilar experiments on other tap-rooted plants, I was induced to think, that this too, by tranſplanting it, and at the ſame time cutting off part of its tap-root, might be made to ſhoot out ſeveral horizontal roots, which, reaching into the looſe mould of the alleys, and extending themſelves there, would collect a greater quantity of nouriſhment for the plant, and conſequently enable it to produce more abundant crops.

“ The event has proved, that when we reaſon on ſound principles, we ſeldom err. My tranſplanted lucern puſhed out numbers of large lateral roots, and theſe branched out again into others, which may be multiplied without end by frequent culture of the alleys: for the horſe-hoe has the ſame effect on theſe horizontal roots, as cutting has upon the tap-root.

2. *The Method of tranſplanting the Lucern.*

“ I made ſeveral beds, ſome about three feet wide, (including the alleys) into which I tranſplanted a ſingle row of lucern; others about three feet nine inches, into which I tranſplanted two rows; and others about four feet three inches wide, in which I put three rows. The deſign of this variation was, to ſee by which of theſe three methods the ſame extent of ground will produce the greateſt quantity of lucern. I believe it will require five or ſix years to determine exactly which of them will be beſt; becauſe, as the plants increaſe every year in bulk, their produce alters, and may perhaps not keep in proportion to the firſt years, though probably the difference will not be great. But without waiting ſo long, I can already ſee, that the crop will be greateſt by planting only one row on each bed.

“ The plants in the ſingle rows were ſix inches aſunder, nor ſhould they ever be nearer; and thoſe in the double and triple rows, were eight or nine inches diſtant from each other. I muſt obſerve, that I likewiſe ſowed lucern with the drill, in beds, in which it has remained without tranſplanting. It is very fine; but not near ſo ſtrong and flouriſhing as that which I tranſplanted. When lucern is ſown where it is to remain, it neceſſarily requires being thinned, and that operation takes up more time than tranſplanting it would do.”

Rules to be obſerved in tranſplanting Lucern into Beds.

“ 1. The middle of the beds muſt be raiſed and arched as high as poſſible; and as the lucern is to remain ſeveral years on the ſame ground, no pains ſhould be ſpared to prepare the earth as well as can be.

“ 2. Lucern ſhould be ſown in the ſpring, and in a rich mould, that the plants may be ſtrong enough to tranſplant in September.

“ 3. Plants two or three years old, may be tranſplanted as well as younger ones.

“ 4. They ſhould be tranſplanted in September, that they may have time to take freſh root before the winter comes on.

“ 5. If they cannot conveniently be tranſplanted in September, it may be done in October, provided the weather be not froſty.

“ 6. The mould into which they are tranſplanted ſhould be moiſt; and if the weather be ſomewhat rainy, it is ſo much the better. In this caſe, I have never found it neceſſary to water the plants.

“ 7. If lucern is tranſplanted in November or December, there is danger of the froſts forcing many of the plants out of the ground.

“ 8. If too warm and dry a ſeaſon prevents tranſplanting in September or October, it is beſt to ſtay till the winter is paſt. The plants will then be ſure of taking root, and very few of them will fail.

“ 9. If they can be tranſplanted in autumn, they will yield pretty good crops the next year: but if they are not tranſplanted till ſpring, the next year's crop will be but indifferent.

“ 10. The plants muſt be taken up out of the nurſery, with great care and patience, that their roots may not be damaged.

“ 11. The roots ſhould be left about ſix or ſeven inches long, and the green tops ſhould be cut off within about two inches of the crown of the root.

“ 12. The plants will take root the ſooner, if they are put into water as ſoon as they are taken up, and kept in it till they are planted.

“ 13. They are planted in holes made with a planting ſtick, in the ſame manner as cabbages or lettuces are planted in a garden.

“ 14. The beſt way of planting lucern is, to cut a ſtrait channel two or three inches deep, and ſet the plants in the bottom of it, covering them up to the neck.

“ 15. Great care ſhould be taken not to ſuffer any weeds to grow among the lucern; at leaſt for the two or three firſt years. To this end, the rows ſhould be weeded by hand, as well as the edge of the alleys near the plants, where the horſe-hoe cannot go.

“ 16. The alleys may be ſtirred, either with the ſingle cultivator, or the cultivator with two mould-boards; which, at the ſame time that it deſtroys the weeds, keeps the mould looſe.

“ 17. The firſt ſtirring may be given with the ſingle cultivator, with which a furrow may be cut on each ſide of the main furrow in the middle of the alleys, by which means the earth will be turned over on both ſides of it.

“ 18. The ſecond ſtirring may be given with the cultivator with two mould-boards, by drawing it along the middle of the alleys. This will turn the earth towards the rows. By theſe alternate ſtirrings, the alley will be conſtantly kept in a looſe ſtate.

“ 19. This culture is ſo eaſily performed, and in ſo ſhort a time, that it may be repeated frequently. In this I differ from M. Duhamel, who orders it but ſeldom. My opinion is, that the alley ſhould be ſtirred once a month, during the whole time that the lucern is in a growing ſtate.

“ 20. If the alleys keep free from weeds, leſs ſtirring them may do: but the mould ſhould never be ſuffered to grow too hard.

“ 21. As ſoon as ſome of the plants begin to bloſſom, the lucern ſhould be cut. It will then make excellent fodder, ſuperior to every other kind.

“ 22. The lucern hay ſhould be dried as quick as poſſible, and frequently turned. The leſs it is expoſed to the heat of the ſun, the better fodder it makes.

“ 23. Lucern muſt not be houſed till it is dry: but at the ſame time care muſt be taken that it be not too dry: for then many of the leaves will fall off, as they dry ſooner than the ſtalks.

“ 24. Cattle muſt not have too much lucern given them at a time, till they are accuſtomed to it.

“ 25. No cattle ſhould ever be ſuffered to feed on the beds of lucern. If the earth is very dry, towards the latter end of autumn, ſheep will do it the leaſt hurt. If the plants are then tall enough to be mowed, the beſt way is to cut them, and give them green to the cattle.

“ Theſe rules contain all that is eſſentially neceſſary for making and keeping in good order this kind of artificial paſture. I can ſafely ſay, that whoever tries them, will be abundantly rewarded for his trouble and expence. Sainfoin may be cultivated in the ſame manner.”

Account of the Produce of Lucern planted in Beds, and cultivated according to the Principles of the New Husbandry: with ſome important Reflections on the Advantages which may be obtained therefrom: by M. de Chateauvieux.

“ No judgment ſhould be formed of what lucern may produce, by the crops of the firſt or ſecond year: it is then too young to be able to yield much. If we were to calculate even by its third year's produce, we ſhould ſtill conſider, that as the plants increaſe every year in bulk and vigour (and where they will ſtop I am not yet able to determine) the produce will be proportioned to that increaſe, and conſequently the crop of each ſucceeding year will be greater than that of the former.

“ The crops I am going to ſpeak of, are thoſe of the ſecond and third year: but my calculations will be made on that of the third year. It is proper to remember, that the years 1753 and 1754 were uncommonly dry, inſomuch that, ſometimes, not a drop of rain, nor ſcarce any dew, fell between the cutting of one crop and that of another. The ſeaſons were ſo unfavourable to the production of graſs, that hay roſe to an exceſſive price.

“ I ſhall firſt ſay what was the ſtate of the plants of lucern in their third year, and afterwards how much hay they yielded.

State of the Plants in their third Year.

“ As the part of the plant which I now conſider is that which is buried in the earth, I uncovered numbers of them, that I might be able to judge of their general ſtate. I was greatly ſtruck with the effect which tranſplanting had had upon them. Inſtead of one perpendicular root, which they uſually have, all theſe plants had three, four, five, and ſometimes more, almoſt equally big roots. They were, in general, three quarters of an inch in diameter, and proceeded from the original root, which was now at leaſt an inch in diameter, and in many of the plants an inch and a half. After the moſt careful ſearch that I could poſſibly make, I could not find one plant of lucern ſown in the common way, though it had ſtood twelve, twenty, or more, years, whoſe tap-root had grown to the bigneſs of an inch diameter: few of them were above half, or at moſt three quarters of an inch thick. This difference is very great.

“ I likewiſe found, that the roots of the tranſplanted lucern had produced another kind of roots, of which I ſaw none about thoſe of the old lucern. Theſe were a great number of fibrous roots, ſome of which were already one twelfth of an inch in diameter, and looked as if they would alſo become principal roots.

“ The ſtalks ſeem to riſe out of the earth; and from the firſt time of cutting them, a kind of head forms juſt above ground, which extends itſelf every year. The firſt year, this head was two or three inches wide: the ſecond year, it was generally about ſix inches over, and this third year, almoſt half the plants have a crown ten or twelve inches in diameter: and as many of them have grown ſo as to touch one another, their crowns are become of an oval form, having extended themſelves on the ſides where they met with no reſiſtance.

CROPS.

“ I have a field of lucern in beds, divided into two parts. This is the third crop of lucern off one of them. The beds are 250 feet long. In 1753, I cut this lucern ſix times, viz. in May, June, July, Auguſt, September, and the beginning of November. This laſt cutting was not near ſo plentiful as the others, and I dried it within doors.

“ Theſe cuttings off one bed, on which there was but one row of lucern, yielded 140 pounds of well dried hay.

“ In 1754, the lucern was late before it began to ſhoot, and the earth was drier than the year before. I had but five crops: the firſt was cut on the 27th of May; the ſecond on the firſt of July; the third on the 27th of July; the fourth on the 26th of Auguſt; and the fifth on the 23d of October. Theſe five cuttings yielded in all 225 pounds of well dried hay off each bed.

“ A field 250 feet long, which was the length of my beds, and 210 feet wide, contains an arpent of our meaſure. This arpent, divided into ſixty-eight beds, each three feet wide, producing after the rate of 225 pounds of hay off each bed, would yield in all 15300 pounds; which is infinitely more than is ever obtained in the common way.

“ The beds with three rows yielded much leſs. The third year, their crops amounted to no more than 169 pounds off each bed, which is a fourth leſs than the others: and as theſe beds are wider, inſtead of having ſixty-eight, as in the former diſpoſition of the arpent, there will be only forty-ſeven, each four feet three inches wide, the total produce of which will be but 7943 pounds: conſequently this arpent will yield little more than half as much as an arpent laid out in beds three feet wide, planted with only ſingle rows.

Remarks, by M. de Chateauvieux.

“ The plants of lucern had the fate of all kinds of plantations: that is to ſay, ſome of them were more vigorous than others. The greateſt number of the plants produced each of them a pound of dry hay, and ſome of them yielded two pounds. I look upon theſe laſt as ſuch extraordinary productions, that I do not expect many of them to yield the like quantity again. I think one may be very well ſatisfied, if the plants, one with another, yield a pound of hay apiece every year. This is nearly the reſult of my experiment on beds which had but one row; and the produce of theſe would have been ſtill greater, if many of my plants had not failed: in the room of which I ſet young ones, which could not acquire ſufficient ſtrength to yield full crops.

" In theſe experiments, I have employed no dung: neither have I for any of my corn fields. I have reſerved it for improving my paſtures and meadows; and intend next to apply it to my lucern, which, I doubt not, but will be much the finer for it. The only thing now remaining is, to know by experience which will be the beſt way of uſing it. I have ſome thoughts on that head, which may render it much more profitable.

Lucern deſerves to be cultivated with care: not only on account of the great quantity of fodder which it yields, but likewiſe becauſe the quality of its hay is ſuperior to any other. The New Huſbandry will render it ſtill more perfect. Plants cultivated this way enjoy the benefit of a free circulation of the air, and that circulation keeps them ſweet and ſound, and free from all muſtineſs towards their roots: for, being open to the rays of the ſun, that great ſource of kindly vegetation, they attain great perfection in all their parts, both as to their ſubſtance, and their flavour. Cattle eat this food greedily, and are better nouriſhed with it, than with any other: but as every exceſs is bad, too great a quantity ſhould not be given them at once, eſpecially at firſt, leſt it ſhould ſwell them. The beſt way is, to bring them to it by degrees.

" I have experienced theſe qualities in this hay, by comparing it with every other ſort. The excellence of this, juſtifies the principles on which the New Huſbandry is founded. I have offered to my horſes bundles of every kind of hay, and at the ſame time a bundle of this hay of lucern. They have not heſitated a moment to prefer the latter. Nothing but its ſuperior qualities could determine them in this choice, which never varied, and has always been in favour of the lucern cultivated in this manner.

" It would be laviſhing this excellent fodder, to feed horſes entirely with it. It need only be given them by turns with common hay: which will be a great ſaving: for this lucern will ſupply the place of oats. I am certain that my horſes fed partly with this hay, and without oats, will be in better plight, ſtronger, and more vigorous, than thoſe which are fed with meadow hay and corn in the uſual way. It is now ſome time ſince I have fed my coach-horſes with it, and have retrenched their oats. Inſtead of this laſt food, and at the hours they uſed to have it, I give them lucern chopt, as the Spaniards do ſtraw to their horſes. Mine are as fond of it, and ſhew the ſame impatience to find it in their manger, as if it was oats; and ſince their being put under this diet, they are in better condition than before, and ſo mettleſome, that the coachman has enough to do to keep them in.

" When I ſaid that retrenching the oats would be a conſiderable ſaving, I did not ſo much mean the ſaving of the expence of that corn, as the better improving of many vaſt tracts of land which are ſown with oats, and might, with proper management, produce much more uſeful and more profitable ſorts of grain, notwithſtanding the too general prejudice, that ſome lands are not capable of bearing any better. For my part, I am thoroughly ſatisfied, that whatever ground can bear a crop of oats, can likewiſe, under the New Huſbandry, bear any other grain."

Continuation of M. de Chateauvieux'*s Account of his Experiments on Lucern, in the Years* 1755, *and* 1756.

" The great drought of the year 1755, was accompanied with great heat; and the year 1756 was very rainy, and moderately warm, there being but few very hot days in it.

" My lucern was expoſed to a moſt ſevere winter in 1755, when the froſt was exceſſive hard, and laſted very long. M. de Reaumur's thermometer was ſome days, at different times, eight, nine, ten, twelve, and thirteen degrees below the freezing point; and on the third of February, a thermometer, in the open air, ſtood at ſixteen degrees below freezing. Theſe ſevere froſts made me uneaſy for my lucern, which, however, bore them, without receiving any damage.

" The rains in 1756 did no hurt to theſe plants, but they prevented my cutting them at proper times. I had but four crops of lucern this year, being obliged to wait for an appearance of fine weather to dry it in, before I could venture to cut it down. Theſe rains likewiſe hindered my giving the proper hoeings to the alleys, which were full of weeds during the ſummer and autumn. I choſe rather to leave them in that condition, than attempt to hoe them while the ground was over wet: not doubting but the ſpring hoeings would eaſily deſtroy them.

" In 1755, I cut my lucern five times: the firſt was, on the third of May, before any flowers appeared: the ſecond, on the twelfth of June: the third, on the fifteenth of July: the fourth, on the twenty-firſt of Auguſt: and the fifth, on the ſeventh of October. I was obliged to finiſh the drying of this laſt cutting, in barns and under cover.

" In 1756, which was the fifth year of theſe plants, I cut them but four times: the firſt, on the third of June: the ſecond, on the firſt of July: the third, on the fourth of Auguſt: and the fourth, on the twenty-ſeventh of September.

A bed 250 feet long, with only one row of lucern,

Yielded	In 1754 - - - - - -	225	pounds of dry hay.
	1755 - - - - - -	197	
	1756 - - - - - -	281	

In three years, 703 pounds.

A bed of the ſame length, with three rows of lucern,

Yielded	In 1754 - - - - - -	169	pounds of dry hay.
	1755 - - - - - -	180	
	1756 - - - - - -	226	

In three years, 575 pounds.

Obſervations by M. de Chateauvieux.

" We ſee, by the above account of three years, that a piece of ground laid out in narrow beds, planted with only one row of lucern, yielded a greater produce than the ſame extent made into wider beds, and planted with three rows.

" I ſhall not, however, pretend to determine from this one experiment, that it is beſt to lay down large fields in this manner. I think it will be right to try firſt, whether the ſucceſs will be the ſame on different ſoils, and likewiſe on lands whoſe expoſition may be more or leſs advantageous. If after repeated trials, the beds which have but one row of plants, yield the greateſt quantity of hay, that method is certainly to be preferred. To clear up this point ſtill more to my ſatisfaction, I continue to plant lucern in beds, ſome with one, and others with three rows.

" The difference between the crop of 1756, and thoſe of the two preceding years, would induce one to think that rainy ſeaſons are beſt for the production of hay: but ſtill, the greater quantity which the year 1756 produced, muſt not be imputed to the rain only: we ſhould likewiſe conſider, that the plants had throve greatly ſince 1754; that their ſtems were grown much larger, and their roots much ſtronger and more numerous, and that they were conſequently able to yield much greater crops than before. They have abundantly anſwered my expectation, both as to quantity and quality.

" With reſpect to the quantity, it is much greater than that of any common fodder: I mean, of any that the ſame extent of ground would have produced, if cultivated in the common way, though it would then have been covered with an immenſe quantity of plants. This is a fact, which numbers of experiments prove, and which we ſhall ceaſe to wonder at when we conſider the great effects of the frequent ſtirring of the alleys. To this it is that I owe the repetition of my crops, and their being all of nearly equal goodneſs. I do not exaggerate when I ſay, that every ſummer month, which is the time I generally allow between each cutting, will produce ſhoots two feet long, and ſometimes more: and ſuppoſing that I cut them but five times a year, each plant will have produced after the rate of nine or ten feet length of ſhoots, and that in the ſame time that moſt meadows will not produce graſs above two feet long.

" As to the quality of this hay, I continue to prefer it to all other fodder. My experience has confirmed what I ſaid of it in 1754; and I ſhall only add, that I have ſince found, that it is as good at the end of four years, as when it is firſt cut. If there was any difference, horſes would ſoon be ſenſible of it: but they eat of either without diſtinction.

" I feed my horſes with it, chiefly in the ſummer, at which time they do moſt work, and am more and more ſenſible of the advantages of it. Five or ſix pounds of lucern a day, are ſufficient for a middle ſized horſe: but the quantity may be increaſed or diminiſhed, according as the horſe is nouriſhed by it; for in that there is great difference." *Culture des Terres*, *tom.* IV. *c.* iii. *art.* 15.

The following account of the cultivation of lucern, was communicated to the public by a very ingenious huſbandman, and merits the attention of the reader.

Having read and heard a great deal of lucern, I determined to have ſome of it myſelf; and Mr. Miller's method ſeeming to me by far the moſt rational, I reſolved to follow it: accordingly, the ſeventeenth of July, 1763, I ordered a field of three acres and a half, then under ryegraſs and clover, to be ploughed deep, and ſown with turnips. The crop was middling: I ſold them to a cowfarmer for nine guineas: he drew and carted them home. If I had had ſheep, I would have fed them on the field.

By the twenty-ſeventh of March, 1764, the field had been twice ploughed, the firſt time ten, and the laſt time near twelve inches deep, with the Rotheran-plough and four horſes a-breaſt: the ſoil is light and ſtoney, with a rock of gravel about ten or twelve inches deep, and had never before been ploughed above ſix or ſeven inches deep; however, I knew it was right to go as deep as I could for a tap-rooted plant, as the lucern is.

I was greatly pleaſed with reading M. Lullin de Chateauvieux's account of his method of tranſplanting lucern, and determined to follow it, from a full conviction that it muſt be ſuperior to every other method.

Accordingly I ordered the field to be ſown with Poland oats, and laid out about twenty-eight rods in beds four feet wide, alleys one foot and a half, which were ſown with lucern in broad-caſt by my gardener, in the ſame manner as you ſow cabbages or ſavoys in ſeed-beds: one bed, however, out of curioſity, I ordered him to ſow in the following manner.

Run a garden-line through the middle of the bed from one end to the other; draw a ſmall drill along the line, about half an inch deep; then move the line ſix inches, and make another drill, and ſo on: by this means you will have nine drills on a bed four feet wide. When this is done, fill a quart or pint bottle near full with your lucern-ſeed, cork the bottle, bore a hole in the cork, and inſert a quill cut at each end: this will be found a great aſſiſtance in ſowing the ſeed thin and regularly in the drills: and I muſt obſerve, that the bed which I ſowed in this manner, afforded me much the greateſt quantity of plants, and by far the fineſt. Another advantage attending it is, that it is kept clean with much more eaſe, and far leſs expence; for a gardener, with the ſmall three-inch hand-hoe, will clean a great deal of ground in a ſmall ſpace of time. When the bed is ſown, the ſeed muſt be covered with care: rather chuſe the backſide of a ſmall rake than the teeth.

By the middle of Auguſt, my plants looked very well, and were moſtly in bloom, when I ordered them to be mown, and given to my horſes and cows, who ſeemed as if they had a high treat.

The oats being got in, I ordered the field to be deep ploughed again, and then waited for a ſeaſon of rain to begin my planting, which, by my journal, did not come till the fifteenth and ſixteenth of September; and the field being firſt well harrowed, we went to work the ſeventeenth, and continued planting till the twenty-ninth; nor can I now ſee any difference between thoſe planted the ſeventeenth or twenty-ninth. Though I quite agree with the author of the Eſſays, that it is beſt to plant ſooner than I did if poſſible; yet I muſt obſerve, that what may do for gardens, or ſmall pieces of ground, will not do for fields. From the laſt week of Auguſt to the middle of September, ſeems to me a very proper time. But " filling each hole with water, making drills, half filling them with ſea-ſand or wood aſhes, and watering each plant," as the author of the Eſſays mentions, is an endleſs and very expenſive work.

For my part, I kept my eye on M. Chateauvieux's directions, as laid down above, with regard to that part that relates to planting; but another ingenious gentleman, having cautioned the public againſt planting on ridges, I muſt needs ſay, I was fearful of the rain and froſt myſelf, if planted in that manner, eſpecially on light land; and therefore I ordered my field to be ploughed as level as poſſible, and made my man, after the field was ploughed, go three bouts on each ſide the furrows, ſo that, when harrowed acroſs, you could hardly tell where they were. The field being brought to this order, as I ſaid before, we began to plant the 17th of September: two men with ſpades dug up the plants, and two women cut them: ſome care is certainly required in taking them up, but I did not find it great; it was done by common labourers. The women were ordered to cut the plants to about ſix or ſeven inches long in the root, and the tops to about two inches, as M. Chateauvieux directs. They did it very handily: their method was to take them up one by one, (ſo that they could throw by the faulty ones) and when they had about a dozen in their hands, they cut them at top and bottom with one ſtroke of the knife at each end. Each had a waſhing-tub by her ſide, filled to about ſix inches with water: as they cut the plants, they ſet them in the tubs; and as they filled one tub, another was brought them.

The method of planting is the ſame as for cabbages: men who are uſed to work in gardens will do it very handily with a dibble or planting ſtick; but that mine might ſtand with all poſſible exactneſs, each man had a garden-line and reel: and as I think I ſhall be very able to keep them clean with M. Lullin's ſingle cultivator, the rows are only twenty inches apart, and ſix inches in the lines.

If I find a difficulty in keeping them clean in this method, then by drawing every other row, which may be done with great eaſe, my plants will ſtand at the diſtance directed by M. Chateauvieux, of three feet four inches.

I was very impatient to ſee the effect tranſplanting would have, and therefore, as ſoon as my plants in the ſeed-bed were about ſix inches high, I drew ſeveral, cut and tranſplanted them, and in the autumn I took up theſe plants, and found they had all formed new-tap roots round the bottom of the piece (if I may ſo call it) planted, and inſtead of one, they had from five to thirteen new roots: this, you may ſuppoſe, gave me great pleaſure, and convinced me, that the illuſtrious Swiſs was quite right.

The author of the Eſſays on Huſbandry, I find, cut his plants with ſciſſars: this muſt be very tedious work; and, with ſubmiſſion, I think he is quite wrong in cutting his plants to the length of nine or ten inches. Six or ſeven inches ſeem to me a much properer length; for the ground being dug or ploughed about twelve inches, the new roots will have five or ſix inches of well-looſened mould to ſtrike into, which muſt be a great advantage to the plants; and if gravel, or a ſtrong clay, is near the ſurface, I am convinced mine, or rather M. Lullin's, is the beſt method.

Yet this gentleman ſays, he cut his tap-roots too ſhort, and knew not how to manage a root that was very ſmall: in regard to the laſt, I muſt obſerve, that, if they were very ſmall, I ordered them to be thrown away. So much has been ſaid on the neceſſity of keeping lucern in broadcaſt, drills, or tranſplanted, free from weeds, that I will ſay nothing on that ſubject.

At the ſame time that this gentleman ſo warmly recommends M. Chateauvieux's method of cultivating lucern by tranſplanting, he has, I fear, thrown a ſtumbling-block in the way of moſt gentlemen, and, I think, every farmer; I mean his calculation of the expence: this, therefore, I muſt endeavour to remove.

When I began to cultivate lucern in this manner, the only defect I could find in M. Chateauvieux's account was, that he had not told the public how much ground they were to ſet apart for a nurſery: this deficiency, however, I can ſupply to thoſe who come after me, for ſixteen rod will be about the quantity for an acre; and then, I think, the expence of tranſplanting will ſtand as follows:

	l.	s.	d.
Digging, ſpit-deep, ſixteen rods, at three-pence per rod - - - -	0	4	0
Seed, three pounds, at one ſhilling per pound	0	3	0
Weeding the nurſery twice with the three-inch hand-hoe. (By ſowing in this manner, tranſplanting will not be wanted; nor do I think it proper, as they are to be tranſplanted again) - - -	0	3	0
Ploughing - - - -	0	10	0
Tranſplanting - - -	1	5	0
Hand-hoeing the plantation once, the middle or latter end of October, in dry weather, which men uſed to hoeing turnips will do for three or four, but ſay - -	0	5	0
	2	10	0

This, I am perſuaded, is the full expence of making the plantation; yet the author of the Eſſays has ſtrangly worked it up to ſix pounds twelve ſhillings per acre: however, I readily ſubmit this account to the inſpection of every farmer and every gentleman in the kingdom, converſant in matters of this kind.

If the ſpring-ploughing for barley or oats has been nine or ten inches deep, then a ploughing in autumn of twelve inches will be ſufficient, and cannot be charged at more than ten ſhillings. The trenching for the ſeed-beds may be done at leiſure time; ſo may the weeding of the nurſery, and the hand-hoeing of the plantation: then the real expence to the farmer will be only the ſeed and tranſplanting, or one pound eight ſhillings per acre.

As to what this gentleman calls the yearly charges, I can by no means agree to them; for the plantation having been weeded in October, will lie very ſafe and well till the latter end of February, or beginning of March: then, in dry weather, it may be hand-hoed again, the expence of which has before been charged at five ſhillings per acre; to which add four horſe-hoeings after each cutting, at eleven ſhillings, which makes ſixteen ſhillings per acre the annual charge.

I cannot recollect any thing further that is neceſſary to be ſaid on the ſubject of tranſplanted lucern; but as I would have every one, who writes to you on ſubjects of this ſort, tell the truth, the whole truth, and nothing but the truth; ſo I think it but juſt to ſay a word or two on lucern ſown in broad-caſt, or Mr. Rocque's manner. I live within a few miles of Mr. Rocque; and muſt add, that I have paid great attention to the culture and growth of lucern and burnet for ſome years paſt; ſo that I think I am pretty well acquainted with them.

The author of the Eſſays ſays, "If lucern is ſown broad-caſt with corn, no care can keep it clean: it may laſt two years, only one crop being tolerable, and then muſt periſh in the common courſe of nature." And ſeveral of your correſpondents are alſo of opinion it will never ſucceed in this method; but I know it will; for I have ſeen it cut three and four times. To cut it four times, the ſummer muſt be very favourable, and the laſt cutting will be late. Here I muſt remark, that lucern is not only excellent as a green fodder, but as an early one, eſpecially if ſown in drills, or tranſplanted; for that ſown in broad-caſt will not be fit for cutting ſo ſoon as the former, by a fortnight or more; however, the farmer may depend on three good crops in this manner of ſowing.

In the ſpring, 1760, Mr. Rocque ſowed about five acres with lucern and barley: the land is light and hot, but being in good heart, the barley was rank, which obliged him to mow it green, and ſell it to a farmer for feeding cows, &c. Indeed I believe it will always be beſt to do ſo; for the weeds, if there are any, are thus cut down, and the lucern thrives apace. The ſpring following, it may be harrowed with light harrows, and every year after with ſuch harrows as you find clean it beſt. Laſt autumn, when the weather was hot and dry, I ſaw a farmer harrowing Rocque's field with large ox-harrows, and I do not perceive that it is at all hurt. The weeds and trumpery were raked up, and carted to a dung-hill, with which he has this ſpring dreſſed his field, and it is now in a fine thriving condition.

Lucern makes moſt excellent hay: horſes are very fond of it, and, with one quartern of oats, I will be bound any gentleman will be well ſatisfied with the condition of his horſes, even coach-horſes; nor do I ſee it is at all more difficult to be made into hay than clover. *Muſeum Ruſticum, vol.* IV. *page* 307.

Experiments on Lucern, by Mr. John Wynne Baker, publiſhed by the Dublin Society.

The ineſtimable value of this plant has been ſo much ſpoken of by all the ableſt writers on huſbandry, that it is quite unneceſſary for me to ſay any thing in its recommendation.

Here follow my experiments upon it this year.

No.
15. Sown in drills, three feet aſunder.
16. Sown in drills, two feet aſunder.
17. Sown in drills, one foot aſunder.
18. Sown in the common, or broad-caſt way.

I ſowed the ſeed for theſe experiments on the firſt of May, but the middle of April would have been a more proper ſeaſon.

The lucern began to appear on the eighth day: in its firſt appearance, it has two very ſmall leaves of an oval form.

Theſe experiments were treated in the ſame manner as the burnet.

On the ſixteenth of Auguſt, I cut the lucern of each experiment, and the produce of green fodder was as follows:

Number 15. i. e. the three feet drills, produced off one perch, thirty-one pounds and a quarter.
Number 16. i. e. the two-feet drills, produced off one perch, forty-four pounds and a half.
Number 17. i. e. the one-foot drills, produced off one perch, forty-three pounds.
Number 18. i. e. the broad-caſt, produced off one perch, fifty-nine pounds.

Upon the face of theſe experiments, the broad-caſt has the greateſt produce. Above the three-feet drills, twenty-ſeven pounds and three quarters; above the two-feet drills, fourteen pounds and a half; and above the one-foot drills, ſixteen pounds.

Hence it may be concluded, by perſons not acquainted with the nature and culture of this plant, that the broad-caſt ſowing is to be preferred, as yielding the greater produce; but I think that concluſion ſhould not be too haſtily drawn, for the following reaſons.

Theſe crops are all from the firſt cutting after ſowing the ſeed, and therefore the lucern in the broad-caſt was then as good, or probably better, than it will ever be again in any ſucceeding crop, the ground being looſer, and fewer weeds in it, than there ever can be hereafter; for the natural graſs is already riſing in it, although it was managed in the way practiſed by Mr. Rocque; which is to harrow, or rake the ground after cutting the lucern. Another reaſon is, that for the firſt year the plants are in their infancy; but in three years I apprehend the drills will more than treble their produce: whereas, at that time, I ſhould fear the broad-caſt would be quite or near deſtroyed by the natural graſs. In other words, as faſt as the drilled crops improve, I do conceive the broad-caſt will diminiſh.

The culture of lucern in drills, with intervals of only one foot, I find is no better than the broad-caſt, as there is no ſuch thing as horſe-hoeing between the rows, and where the crop ſhould be large, digging would be too expenſive.

But upon the comparative experiment, between the two and three feet intervals, I confeſs I cannot ſo readily pronounce: the two feet produce the moſt, by thirteen pounds and a quarter; whether that diſtance will continue to do ſo, I cannot ſay: it may happen that when the roots become large, which is the propereſt time to aſcertain the fact, that the three-feet drills may have the greater produce; but time alone can determine this point, which really is very material to know.

Second Set of Experiments on Lucern.

Theſe experiments were calculated to diſcover how far the roots of this plant would bear being wounded, as in the culture of lucern practiſed by Mr. Rocque: I do conceive many of the roots muſt be injured, to the manifeſt diminution of the crop.

In April, 1763, I ſowed a little lucern in my garden. May the firſt, 1764, I treated ſome of the plants in the following manner, after thinning of them in the row, by taking all others from them, and leaving the plants ſingle, and about two feet aſunder.

Numb. 1. The root of this plant I ſplit from the crown of it downwards, for about an inch.
Numb. 2. The root of this plant was ſplit firſt in the ſame direction as the former, and then I ſplit it tranſverſely, for about an inch downwards.
Numb. 3. The root of this plant I cut a ſlice off one ſide, about an inch long, juſt below the crown of the root.
Numb. 4. This plant I cut the whole crown of the root off.
Numb. 5. This plant I ſplit the root of, in the ſame manner as Numb. 1. and then cut about an inch and a half off one ſide.

After wounding theſe plants, I dug the earth round them, in order to feed the fibrous roots to the nouriſhment of the plants.

They never afterwards made any figure. Towards September, Numb. 1, 2, and 3, threw out a few weak ſtems, not worth notice; but Numb. 4, and 5, never grew afterwards.

Theſe experiments I mean to repeat in a greater number, and that for two or three years together, before I ſhall venture to draw poſitive concluſions from them: but I think theſe ſeem to prove, that Mr. Rocque's method is not to be preferred ſo much beyond Tull's, Duhamel's, and M. de Chateauvieux's, as his advocates would inſinuate. But the fair trial between his method and the drill, will be to experiment carefully upon them for four or five years together; my experiments in wounding the plants, being only calculated to ſupport theory by facts; for my notion of the conſequences which muſt happen from his culture, is no more than theory.

Till I made this ſet of experiments, I confeſs I never was ſenſible of the texture and firmneſs of lucern-roots, which are really very hard to cut, and not much unlike a dried ſtick, which I muſt confeſs ſeems to favour Mr. Rocque's method, ſo far as relates to my apprehenſion of the plants being wounded by his inſtruments, which, from the hardneſs of the roots, cannot wound them in the manner I did mine with a knife. And as my purſuits tend only to diſcover the truth in matters of huſbandry, for Mr. Rocque's honour, and my own credit, I could not omit to communicate this remark, as I hope the reader will believe I am endeavouring to aſcertain the beſt culture for lucern, and not writing to leſſen Mr. Rocque or his ſyſtem: every man acting in a private capacity, has a right to adopt ſuch as he pleaſes; but I, who am acting in a great meaſure for the public, think myſelf bound to be conſcientiouſly exact in my ſcrutiny of every ſyſtem, which I ſhall comparatively experiment upon. If I am miſtaken in the culture of lucern, I have the ſatisfaction of conſidering ſome of the greateſt men, who have ever wrote upon the ſubject, are no leſs miſtaken than I am.

Notwithſtanding all that has been ſaid by many writers on lucern, as to its tap-roots, yet I find it has many lateral ones, and it is only a few of the plants that ſend down but one tap-root, but an infinite number in all ſhapes and directions. At a year old, I find the healthy ones are from ten to eighteen inches long; I preſerve them of that age now by me, and intend every year to take them up, in order to have them of all ages, the better to ſee their progreſs from year to year.

Upon the firſt of laſt May, ſome of my lucern, which was ſown the year before, was eighteen inches high; but let it be obſerved, that it had the benefit of a ſouth aſpect, aided by the reflection of a fruit-wall. This induces me to believe, that a declivity with a ſouth aſpect, will be the moſt advantageous ſituation for this plant, in this country; for, although lucern will live in the ſevereſt winters, yet it flouriſhes beſt under the influence of a warm ſun; the only bleſſing we ſeem to want in this country.

In the ſummer months I obſerve, in a good ſoil, and under proper culture, it grows about an inch in twenty-four hours; ſometimes I have known it grow an inch and a half in the ſame time.

Third Set of Experiments on Lucern.

The tranſplanting lucern ſeems to have been firſt thought of by the ingenious and never-ſufficiently to be praiſed M. de Chateauvieux, whoſe reaſons for every new attempt are founded upon ſuch ſolid and rational principles, that they have generally ſucceeded to his expectations. This gentleman ſays, plants of two or three years old may be planted equally well with thoſe of one year old.

My plants laſt April were all one year old, which, upon taking up for the purpoſe of tranſplanting, I found differed very much in their ſize, which induced me to divide them into three parcels, *i.e.* the ſmalleſt, middling, and largeſt. Theſe I tranſplanted in the following manner, ſix inches aſunder in the rows, and the rows three feet.

Numb. 1. Forty of the ſmalleſt plants, with their tap or leading roots cut off.
Numb. 2. Forty of the middling plants, with their tap or leading roots cut off.
Numb. 3. Forty of the largeſt plants, with their tap or leading roots cut off.
Numb. 4. Forty of the middling plants, without cutting their roots.
Numb. 5. Forty of the largeſt plants, without cutting their roots.
Numb. 6. Forty of the ſmalleſt plants, without cutting their roots.

Theſe ſix rows of plants were put down the twenty-eighth day of April. I watered them at the time of putting down, and once afterwards.

Very few of them died; ſo that the different ſizes and methods ſeem to anſwer equally well the firſt ſeaſon.

I intended to have cut the produce of each experiment for weighing; but a few days before that was to be done my horſes got into the place where it grew, and eat ſome of it, which diſappointed my purpoſe. From the appearance of the experiments reſpectively, there would have been very little, if any difference in the produce; but a third and fourth year's crops will aſcertain how far cutting off the tap-roots will benefit the plants, and how far tranſplanting is preferable to ſowing. Be it noted, that the tranſplanted roots make no great figure the firſt year.

In order to aſcertain, with ſome degree of certainty, how far lucern may be worth the farmer's attention, I laſt ſummer made an experiment with an horſe, to diſcover how much he would eat, which being known, we can, from the firſt ſet of experiments, pretty exactly tell how many horſes an acre of lucern will maintain during the ſummer months. The horſe I choſe for this purpoſe is a very large one; he had been ploughing from ſeven o'clock in the morning till ſeven in the evening, during which time I forbid his having any thing to eat. When he was taken out of the plow, I ordered him into a ſtable by himſelf, where I had provided for him fifty-ſix pounds of lucern, without any other food for that night, of which he had eat by next morning, forty-nine pounds; a quantity, which I own ſurprized me.

Lucern will in this country, in favourable ſeaſons, mow four times in a ſummer after the firſt year, and we may ſafely calculate, that at every cutting it will yield half an hundred weight upon each perch, which at the four cuttings is two hundred weight upon a perch in the ſeaſon, or ſixteen tons upon an acre, *i. e.* thirty-five thouſand eight hundred and forty pounds. This is a low calculation; but at this rate, ſuppoſe five horſes to be allowed forty-nine pounds every twenty-four hours, which is two hundred and forty-five pounds, in that caſe an acre will maintain them one hundred and forty-ſix days, which is twenty weeks and ſix days. No man will contend for it, I believe, that any natural paſture will do any ſuch thing. Add to this profit, the circumſtance of making dung all the ſummer; an object, I am ſorry to obſerve, not ſufficiently attended to in this country, amongſt the common farmers; if they can make a little for their potatoes, they ſeem to think of no more.

Lucern ſhould never be ſown upon wet or ſpungy ground, but upon dry rich land, and muſt always be kept free from weeds.

I ſowed ſome laſt April in drills, upon ground not ſix inches deep, above a lime-ſtone quarry, and it grew very luxuriantly; but the ſoil is very good.

Turneps are the beſt preparation of ground that I know of for lucern, particularly if they be raiſed in drills, in the manner before repreſented.

My lucern in the broad-caſt and one-foot drills, was infected with the ruſt or mildew, during its growth; this ſeems to be an objection to the ſowing of it with ſuch narrow intervals, or in the broad-caſt way, ſince the two-feet and three-feet drills were in the ſame place, and they were not at all infected with this diſeaſe.

An Account of the comparative Advantages of cultivating Lucern, on the Drill and Broad-caſt Methods; for which the Society for the Encouragement of Arts, &c. adjudged their Premium of a Gold Medal.

The farm on which the following experiments were made, is a ſtrong clay; a ſoil, in the opinion of all writers in agriculture, the moſt unfriendly to lucern. Encouraged, however, by M. Lullin de Chateauxvieux's experiments, the owner was tempted to try how the lucern would ſucceed when treated in the manner he propoſes: and in the year 1761, he ſowed a field of about three acres with lucern in drills, two feet aſunder. During the firſt year, he cauſed it to be weeded carefully; and from the places where it grew too thick, he ſupplied thoſe in which it had failed. After every weeding, he cauſed the intervals to be ſtirred with a horſe-hoe, reſembling M. Lullin's ſingle cultivator, which manifeſtly revived the plants.

In 1762, the plants throve greatly, being kept clean, and horſe-hoe'd as in the former year; and the ſociety having publiſhed a premium for a comparative trial between lucern ſown in broad-caſt, and in drills, he determined to try one part of that experiment on this field, and not to beſtow on his lucern any manure whatever, or to give it any other help than the horſe-hoe.

In 1763, the plants were arrived at a ſize to yield ſo full a crop as to maintain five horſes, from the middle of May to the end of autumn, or above five months. Theſe horſes, though conſtantly worked very hard, had neither corn or hay given them during all this time; and yet they continued in ſtrength and ſpirit, and grew fat. A horſe which in May was ſo weak, and in ſo bad a ſtate of health, that it was thought he could not live, ſoon recovered, when fed with lucern. The plants were in general between three feet and three feet and a half high, at the firſt and ſecond cutting. The plants made ſo many ſhoots, and theſe ſhoots branched ſo much, that in three weeks after every cutting, or ſometimes ſooner, the intervals quite diſappeared; the whole field being ſo equally covered, that it looked as if ſown in broad-caſt. December 1763, January and February 1764, having been uncommonly rainy, the water ſtood in ſome parts of the field; and though there was generally ſuch a declivity as that it might have been carried off, he reſolved to let it remain, in order to ſee what effect it would have on the lucern. When the lucern began to riſe in the reſt of the field, in ſpring, he found that wherever the water had ſtood, the plants were killed. He ſupplied this loſs by tranſplanting lucern from other parts; and theſe plants throve very well. By a continuance of the ſame treatment, the lucern remained in a very flouriſhing ſtate: and retained a beautiful verdure and vigour, during the very great drought of this ſummer, 1765. It has yielded four cuttings every year, and ſometimes five.

Having obſerved in a root of lucern taken up in the winter, that the ſpring ſhoots had no connection or concern with the remains of the ſhoots of the preceding ſummers, but proceeded from numbers of little tubercles, with which the head of the root was ſet very thick; it appeared evident, that the plants could not ſuſtain any damage, though covered with a depth of earth during the winter. This ſuggeſted a hint, that the intervals might be plowed as deep as poſſible early in the winter, turning the earth on the beds; and that by letting the earth remain in this condition till ſpring, the clay, or ſtrong ſoil in which the lucern grew, would be mellowed, or looſened, by the winter's froſt and rain: and being harrowed ſmooth in February, the freſh lateral roots, which ſhoot out in the ſpring, would find a fine freſh mould to extend themſelves in, which muſt tend greatly to the benefit of the plants. This thought was confirmed by experiment: for the ſpring crop is amazingly vigorous ever ſince this practice was followed, and the ſhoots though of great length, and moſt plentifully ſupplied with branches, are ſo ſtrong, that no rain or wind lays them, even when they have ſtood to be in full bloom, as is the caſe with part of the firſt crop; the horſes not being able to conſume the lucern before part of it is neceſſarily in bloom. Another advantage ariſing from this practice is, that the graſs which takes root near the plants, and which cannot be otherwiſe deſtroyed but by hand-hoeing, is killed by being ſo long covered with the earth laid on the beds.

In 1761, a ſpot of ground of an exactly ſimilar ſoil was incloſed for a kitchen-garden; and there being part of it, which was not wanted for other uſe, in the ſpring of 1762, it was ſown with lucern in broad-caſt, as a counter experiment to the former. The warmth of the garden, and the partiality of the gardener to this method, who held the field experiments very cheap, gave his lucern every advantage that could be deſired. It came up well, and was kept free from weeds; but it neither grew ſo faſt nor ſo high as the lucern ſown in drills. This difference became much more ſenſible during the ſecond and third years; for in 1764 the field lucern had got the ſtart of it ſo far, that this did not riſe to half the height, nor did it yield a quarter of the quantity of fodder; ſo that he thought it needleſs to proſecute the compariſon further.

Seeing ſo very remarkable a difference between the lucern raiſed in drills, and that raiſed in broad-caſt, he reſolved to try what ſhare of this advantage might be placed to the horſe-hoe, and what to the diſtance at which the plants ſtood; which diſtance afforded the roots more room to extend in. With this view, in 1764, he ſowed a neighbouring field in rows, two feet aſunder, intending to horſe-hoe one half, and to keep the other free from weeds by hand-hoeing only. The months of April, May, and June, of that year, were ſo dry that the plants came up thin; and the clay was become ſo hard, that the horſe-hoe could not be made uſe of till late in the year. Even with this diſadvantage there was ſeen a manifeſt difference, in favour of the plants that were horſe-hoed. The ſame difference was alſo obſervable in the ſpring of this year: but the uninterrupted drought of this ſummer has kept the clay ſo hard that the horſe-hoe could not be uſed.

Computing the rent of the land, and the utmoſt expence that can attend the horſe-hoeings and cuttings, it will be found, that feeding horſes with lucern will be a great ſaving, when compared with the price of the hay and corn, which horſes muſt have neceſſarily conſumed in the ſame time, being kept to equally hard labour.

LUG, *or* Lugg, the ſame with pole, or perch, a long meaſure of ſixteen feet and a half.

LUPINES, a ſpecies of wild pea, cultivated principally as a manure.

Lupines require the leaſt labour of any thing that is ſown; and will thrive in any ſoil, except the chalky and miry; but delights particularly in poor hungry worn out land, eſpecially if it be dry and ſandy. If ſown in February or March, after a ſingle very ſhallow plowing, and ſlightly harrowed in, or even harrowed in without any plowing, it will bloſſom three times between May and Auguſt, and prove an excellent enricher of the ground when plowed in juſt after its ſecond blooming: though Mr. Miller, holding the lupine to be a very great impoveriſher of the ground whilſt it grows, thinks it is ſtill better to parboil the ſeeds, to prevent their ſprouting, and then to ſtrew about ſixteen buſhels of them upon an acre of land, and plow them in. In warm countries, lupines are much ſown in vineyards for this purpoſe only, and are found to be one of the beſt manures that can be laid to the roots of the vines. Their ſeeds ripen towards the end of September, or in the beginning of October. They are very bitter: to remedy which, the Spaniards and Italians, who feed their cattle, horſes not excepted, with them in winter, ſteep them in river water and ſalt till that bitterneſs is gone, and afterwards dry them thoroughly over a fire, or in the ſun. They even make bread of them, when corn is very ſcarce, and put them to ſeveral other culinary uſes. The beſt time for mowing them is after a ſhower of rain, becauſe the ſeeds drop eaſily out of their pods when they are gathered to dry. They muſt, however, be laid up very dry, or worms will ſoon breed in them. The red and the blue lupines, which are frequently planted in our gardens by way of ornament, grow wild, and in great quantities, about Madrid.

LYE, a fluid impregnated with ſalts, &c. *See the article* STEEPS.

LYNCHETS, or *Linchets*, graſs partitions in arable fields.

M.

MADDER, the Engliſh name of a plant, cultivated with great advantage in ſeveral parts of Europe, and lately in England, being a very capital ingredient in the dying buſineſs.

There are ſeveral ſpecies of madder, all of which afford a dye. M. Guettard, of the Royal Academy of Sciences, has experienced that the ladies bed-ſtraw, or cheeſe-rennet (gallium) may be made to yield one; and of this kind is probably the Ray-de-chaye, which is uſed on the coaſt Coromandel for dying red. M. Dambourney has not, indeed, as M. Duhamel remarks, hitherto been able to extract a good colour from the gallium: but there yet remains room to hope that he may be more ſucceſsful in the future experiments which he intends to make on this root.

Mr. Ray mentions and deſcribes four different kinds of gallium or mollugo, baſtard madder, which, after the laudable example of our enterprizing neighbours, ſhould likewiſe afford matter of experiment to thoſe who wiſh well to this country, and particularly to our dyers.

The azala or izari of Smyrna, perhaps more properly written hazala or lizary (according to the eaſtern method of pronunciation) which is the ſort uſed by the French dyers at Darnetal and Aubenas, to give cotton that fine carnation colour for which Adrianople is famed, is a true madder. Some ſpecies of it grow naturally under hedges and in woods; and the roots of theſe, when carefully dried, yield as fine a dye as the azala of Smyrna. M. Dambourney has cultivated a ſpecies of madder which was found growing wild on the rocks of Oiſſel in Normandy, and the roots of this plant have yielded him as beautiful a dye as the azala of the Eaſt. We ſhall hereafter ſpeak of it in his own words: but in the mean time we cannot help obſerving here, that Mr. Ray deſcribes particularly a wild madder which grows not only on the St. Vincent's rock near Briſtol, but alſo on the rocks about Biddeford in Devonſhire, and in great plenty among the hedges almoſt all over that county. As Mr. Ray calls this the *Rubia ſylveſtris Monſpeſſulana major*, and as M. Duhamel ſuſpects M. Dambourney's Oiſſel madder to be that very ſpecies, it ſurely is a matter of great importance to this nation, and well worth the attention of patriots, to follow M. Dambourney's example in making proper trials of it.

The ſpecies moſt commonly cultivated is the *Rubia tinctorum ſativa*, J.B. III. 2.714. and C.B. Pin. 333, commonly known among us by the general name of madder. It is of this ſpecies that the plantations of madder are made in Zealand, and in the neighbourhood of Liſle.

The following method of cultivating this uſeful plant was ſent to the editors of the Muſeum Ruſticum, by a gentleman who has been a practical grower of madder for ſeveral years, and tried it upon land of various kinds.

My firſt trial, ſays he, was upon a ſmall piece of ground near my houſe, of about forty perches of land, lying pretty low and moiſt, of a deep mellow ſoil, and rich black mould, a little inclining to ſandy; and underneath about two feet and a half, and in ſome places three feet of good earth, was a bed of looſe ſand, with a mixture of gravel.

I have been the more particular in the deſcription of the nature of this land, becauſe it produced the beſt Engliſh madder I ever had, both as to quality and quantity.

In March I cauſed this plot to be dug a full ſpit deep; and as it was under natural graſs for ſome years before, I took care in digging to throw the top turf as low as poſſible, turning the mould uppermoſt, in order to prevent the graſs from ſpringing; which had the deſired effect. I alſo took care to pick out all the roots of weeds, and other noxious plants, which were found therein.

In this ſtate it remained about a month; then with a line I divided it into beds of five feet wide, and two feet interval between each bed, raiſing them a little in the middle with ſome of the earth in the intervals; then with iron-rakes the beds were reduced to a fine garden-mould, leaving them a little rounding, like aſparagus beds, in order to ſhoot off the rain-water; and having procured ſome ſtrong packthread, at every foot diſtance I tied a ſmall piece of white woollen-yarn, and thus continued the whole length of the line, which afterwards ſerved as a rule where to fix the plants.

This line was extended the whole length, upon the outermoſt bed, ſix inches from the ſide ridge of it; then with iron-ſhod dibbles a madder-plant was ſet ſtrong in the ground, near every tuft of white yarn fixed along upon the line.

This row being thus planted, the line was removed two feet forwards, which brought it exactly to the middle of the bed: this being alſo finiſhed, the line was again removed two feet, and planted as before; and this method I continued till the whole was planted. Thus there were three rows of plants in each bed, at two feet diſtance, and one foot apart in the rows; and the diſtance between the innermoſt row of one bed, and the outermoſt row of the next adjoining bed, was three feet.

During the firſt ſummer I kept the young madder quite clear from weeds, by hand-hoeing, as ſoon as any appeared: and in October following I took the haulm, that over-ran the intervals, and ſpread it over the beds, without cutting any off; then with a ſpade I covered the haulm with the earth from the intervals about two inches thick.

In this condition it remained during the winter, and in March following, the young madder came up very thick and ſtrong; and as faſt as any weeds appeared, I kept them down by hoeing, as before; but in the ſecond ſummer I found there was no neceſſity of repeating the hoeing after the middle of June, for the haulm was now grown ſo very luxuriant as entirely covered the ſurface of the ground, and thereby prevented the weeds from growing; and in October I again ſpread the haulm upon the beds, and covered it over with the earth in the intervals, as before.

There are three good reaſons for covering the madder in winter.

The firſt is the new dreſſing of the beds with freſh untried earth.

Secondly, by this method deep trenches are formed at proper diſtances throughout the whole plantation, and conſequently the beds are kept dry and healthy, and thereby the roots are prevented from rotting, which otherwiſe they are apt to do, if the water continues too long ſoaking on the beds.

The third reaſon is ſtill more efficacious; for by this means the haulm is entirely rotted, and the volatile ſalts contained therein are waſhed down to the roots by the winter rains, which tends more to encreaſe the vegetation of the plants than double the quantity of any other ſort of manure whatſoever, and for this reaſon, becauſe the ſalt, inherent in the haulm, is of the ſame kind with that which was before extracted out of the ground by the growing of the madder, and is now returned into the earth again, in order to renew its former office of vegetation.

This, perhaps, may ſeem new doctrine to moſt of your readers; but experience convinces me of the truth of it, not only with regard to madder, but likewiſe in the propagation of aſparagus, which, in a future letter, I may, if I have leiſure, explain more fully, by giving the public an account of my making and managing thoſe beds.

If this hint was duly attended to, it is my opinion that both farmers and gardeners would find their account in it, in the production of moſt ſorts of vegetables.

But to return more immediately to my ſubject.

In the third ſummer very little work was required, only two ſlight hoeings in April and May, owing to the ſtrength of the haulm, which covered the ground as in the preceding ſummer; and in October following the roots were taken up, and this ſmall piece of ground produced one thouſand nine hundred and ſixty-five pounds of green roots, which were very large, and the madder, upon trial, found to be exceeding good.

In cultivating madder, great care is to be taken to ſee that every ſet or plant has ſome ſmall fibres at the root; and this ought particularly to be obſerved by thoſe who are employed in taking them out of the ground; for unſkilful perſons, not uſed to the buſineſs, very often draw up ſuch as have no fibres at all, and then they certainly miſcarry.

The beſt way is, to remove the earth from the mother-plant with a ſmall hand-hoe, or ſome ſuch inſtrument; and then you may eaſily find which of the young plants has fibres, and which not.

In the ſecond ſpring you muſt be cautious not to take off above two or three ſets from each root; but in the third ſpring, when they are deeply rooted, you may take off almoſt as many as you pleaſe, without injury.

The ſooner the young plants are ſet after they are taken up, the better; and if you are obliged to have them at a diſtance, ſo that they cannot be ſet again in leſs than three or four days after they are taken up, they muſt be well watered at firſt planting, and repeated as often as you ſee occaſion, till they have taken root.

In dry ſeaſons, the young plants very often die for want of moiſture ſoon after they are planted; and in large plantations the expence of watering would be too great; therefore I always get my land ready early in the ſpring, and wait for ſome ſhowers falling; and when I find them juſt at hand, and ſometimes in the rain, I get a great many hands, and immediately go to work, ſome taking up, and others raking and planting; ſo that the whole is ſoon finiſhed, even in a large piece of ground; and when the plants are well watered at firſt, they ſoon take root, and afterwards they will ſtand a dry ſummer very well.

In the moſt favourable ſeaſons, ſome few plants always die ſoon after they are ſet; therefore, about three weeks after planting, you muſt go over your madder-ground, and replace ſuch as have failed, with the beſt and moſt likely plants; and if the ſeaſon be dry, let them be well watered at firſt planting; but, if after all, you find any miſcarry, (which, in a dry ſummer, they ſometimes will do) the beſt way is to fill up the vacancies, with winter-plants, in October following, juſt before you cover the haulm.

Madder may be ſucceſsfully planted from the middle of March to the end of May, according as the ſpring is either forward or otherwiſe; but if ſhowers ſhould happen to fall in April, this is the beſt month in the year for planting madder. There ſhould be no dung of any kind laid upon the ground during the time the madder is growing, becauſe it has been found to give the madder a bad colour; and if the land is in good heart, and proper for the purpoſe, there will be no need of it.

It cannot be expected that any land, even the richeſt, ſhould produce repeated crops of madder; for which reaſon I am told, that the Dutch always allow an interval of ſix or ſeven years, in which time they manure the land very well, and ſow it with corn or garden vegetables, and have always large crops, owing to the deep ſtirring of the ground, and being clean from weeds; and I can, from my own experience, aſſert, that the beſt crops of corn always ſucceeded a madder-crop.

About five years ago, I planted an acre of madder on a light, dry, ſandy ſoil, which produced a tolerable crop, but nothing equal to the other.

I likewiſe tried it upon an acre of land of a loamy, mellow ſoil, ſomewhat ſandy, about a foot deep in mould; and undearneath is a cold, ſtiff clay: from this piece I had great expectations, as the plants thrived very well at firſt, but in the ſecond ſummer, when the roots reached the clay, the plants died away, and came to nothing; therefore I am well ſatisfied a cold clay is by no means proper for madder.

I have alſo, at this time, two other acres of madder, which I intend to take up next winter; it will then have ſtood three ſummers. The ſoil is a deep, hazel mould, worth about twenty ſhillings per acre. Inſtead of digging it with the ſpade, I plough-trenched it at leaſt eighteen inches deep, but managed, in all other reſpects, like the former. From the appearance it made laſt ſummer, I have no great expectations from this plantation, though, I fancy, it will be a ſaving crop.

Expences attending the Culture of an Acre of Madder, ſuppoſing the land to be worth forty Shillings per Acre.

	l.	s.	d.
Rent for three years	6	0	0
Digging ditto at two-pence per perch	1	6	8
Dividing ditto into beds, two men one day, at one ſhilling each	0	2	0
Raking ditto, two men one day, at one ſhilling each	0	2	0
Planting ditto with two thouſand plants, one day, at one ſhilling and ſixpence each	0	3	0
Six women to take up two thouſand ditto, at ſix-pence each, one day	0	3	0
Hoeing the firſt ſummer five times	0	15	0
Covering ditto in autumn the firſt year	0	6	0
Hoeing ditto the ſecond ſummer three times	0	9	0
Covering ditto in autumn the ſecond year	0	6	0
Hoeing ditto the third ſummer twice	0	4	6
To be paid in lieu of tythe, at five ſhillings per acre per annum	0	15	0
Digging ditto out of the ground	5	0	0
Total of expences	15	12	2
As I always allow my people beer when they are about this buſineſs, I may add	0	6	0
Which brings the whole expence to	15	18	2

In the above account I have not reckoned any thing for the plants; for though they coſt conſiderably at firſt, yet it is then done once for all, to any perſon who continues to propagate madder, as he has always a conſtant ſupply from his own plantations.

	l.	s.	d.
Produce of an acre of madder	52	12	6
Expences	15	18	2
Clear profit	36	4	4

In the buſineſs I follow, which is that of a clothier, a great deal of madder is uſed in dying; and being of opinion that there are many uſeful diſcoveries now lying dormant, only for want of proper methods to bring them to light, I determined to try an experiment on madder; accordingly I took twenty pounds of the green root, and having waſhed it clean from dirt and filth, I bruiſed it in a large iron mortar, juſt before uſing, and with other ingredients I dyed half a pack of wool of a dark, full drab: upon examining my colour, I found it full as good as tho' I had uſed four pounds of the beſt umbro madder, imported from Holland; ſo that, according to this calculation, which is founded on experiment, five pounds of green madder-root is equal to one pound of dry manufactured madder; and as I have found this method to anſwer, I have continued to uſe the root in this condition ever ſince, and find it much the beſt and cheapeſt way; for the green root is bruiſed very eaſily in the mortar, and thereby ſaves a great expence in drying, pounding, &c.

Before I quit this ſubject, I would adviſe thoſe perſons who are inclined to cultivate madder, to be very cautious in the choice of land for this purpoſe; for hereon their ſucceſs chiefly depends. Madder being a plant that draws a great deal of nouriſhment, conſequently the richeſt and deepeſt lands are to be choſen, and ſuch as lie pretty low; for high lands are ſeldom fertile.

The following method of cultivating madder, was communicated to the public by M. de Salens, a French gentleman, who is well acquainted with this branch of huſbandry.

I am apt to think, ſays he, there is hardly any kind of ſoil, but what madder will grow in; but it does not thrive alike in all: on the contrary, ſcarcely any plant ſooner diſcovers the richneſs, or poverty of land, by the ſtate of its growth, than madder: in rich land, and a ſoil that agrees with it, it is luxuriant, and produces a great number of ſizeable, well-conditioned roots; but in a poor, dry, hungry ſoil, the plant is viſibly checked in its growth, and the roots of it are ſmall, and few in number.

Madder is a great friend to moiſture, and therefore thrives beſt on a good loam, with a clay bottom. It is very fond of freſh land juſt broke up; but it muſt be ſo ſituated as not to be ſubject to be overflowed, as that will deſtroy the plant.

Madder requires, to come to a ſtate of perfection, a great deal of nouriſhment; yet it is ſaid not to impoveriſh the land; and this, in fact, is evident; for when the madder is dug up, the land will be in excellent condition to bear a good crop of wheat.

I have tried ſeveral ways, and at length am of opinion, that the beſt method of raiſing madder in France, is from the ſeed: it occaſions, indeed, at firſt, ſome delay; but by continuing to ſow a quantity in the nurſery every ſpring, you will never fail of having plenty of plants.

The ſeed muſt be ſown on a bed of earth, dug well, and made very fine by the rake, with which inſtrument the ſeed muſt be ſlightly covered.

When the plants appear, they muſt be carefully weeded, and ſet out with a hoe: the bed muſt, during the whole firſt and ſecond ſummer, be kept very well hoed, and clear of weeds; and, if this is done, they may be planted out the ſecond autumn.

I have many reaſons for preferring this method in France; but I ſhall forbear giving a detail of them, becauſe my opinion, with reſpect to planting madder in England, is different.

The ſeed of madder does not ripen ſo well with you, as with us; neither does it, as I have been informed, take ſo well on being ſown. For theſe reaſons, I would recommend it to you, to make your plantation with ſhoots that are put forth by the old roots in ſpring. I have practiſed this method, and met with ſucceſs.

For madder to ſucceed well, there ſhould be a great depth of good ſoil, and it ſhould be turned up very deep with a plough, or, what is much to be preferred, with a ſpade. When the ground is properly prepared, it ſhould be planted with ſets, being the ſpring ſhoots pulled up in a madder-plot, with ſome root to them; for, if they have not ſome root and fibres, they will not take kindly: theſe ſhoots generally come from the layers of the plants, and great care ſhould be had in taking them up, or the crop of madder will be damaged: the beſt way of doing it is with a dibble that has a flat edge ſhod with iron; this, on being thruſt into the ground, cuts off the root at a proper length, and by gently declining the handle of the dibble, raiſes the ſet, without injuring the fibres of the root; and great care ſhould be had not to take up too many of theſe ſhoots, or ſtalks, as they are undoubtedly neceſſary to the ſupport and thriving of the principal roots, which, were they deprived entirely of their ſtalks, would certainly periſh.

It is ſcarcely neceſſary to inform you, that as faſt as theſe ſets are taken up, they ſhould be immediately replanted.

To make the method of planting theſe ſets more intelligible to you, I muſt obſerve, that they are planted nearly as potatoes are planted in Ireland; that is, a ſtraight furrow is drawn, the ſets are put into it, the earth of the ſecond furrow is thrown over them, the ſecond furrow is filled with ſets, &c. and ſo on till the whole ground is planted.

We place the ſets here within three inches of each other; but this I think is too near for good land: perhaps they would thrive better, was double the ſpace allowed: when three rows are planted a foot aſunder, we leave an interval of four or five feet, according to the ſtate of the land.

Grounds planted with madder, always ſucceed beſt when gentle rains fall ſoon after the work is done, as the ſets take root the readier, and the whole gets into a thriving way.

In Holland and Flanders, their method of planting differs from that above deſcribed: they take up their ſets from an old madder ground in May, and they plant them again immediately with a dibble, about three inches aſunder, in rows about fifteen inches from each other; they form their beds about ten feet wide, and leave intervals of only one foot and a half, or thereabout.

The beſt time of planting a madder-ground is undoubtedly in autumn, as the ſets are then beſt furniſhed with roots, and the rains which commonly fall at that ſeaſon forward their growth.

As the ſtalks of the madder-plants are to be laid down and covered with earth, the intervals ſhould be every now and then ſtirred to keep the ſoil looſe. This covering is done when the ſtalks are about fourteen or fifteen inches long: after the ground has been well cleared of weeds, a part of the ſhoots in each row are laid down in the intervals on the looſe earth, and ſlightly covered with the ſame earth; obſerving, however, not to cover them entirely: the end of each ſhoot ſhould be left out of the ground, or they will not grow, and the whole work would be thrown away. The intention of laying theſe ſhoots down is, that they may be converted into roots, and thereby increaſe the quantity for ſale; but all the ſhoots muſt not be laid down, or the diſproportion betwixt the ſtalks and the roots would be too great.

This work may be done with great eaſe with the common implements: let a furrow be opened cloſe to each ſide of the bed with a plough: in theſe the ſhoots are laid down, and covered ſlightly with a hoe.

None of the ſtalks of the madder ſhould be pulled up the firſt year, as it would too much weaken the roots by diſturbing them, and tearing off their fibres.

After laying down the ſhoots the firſt year, the madder-ground requires no farther care, except being kept clear of weeds; and in the autumn of the ſucceeding year it may be taken up, in order to its being prepared for ſale: the earth of the intervals muſt always be kept looſe by tillage.

When the madder-roots are taken up, the whole land gets a thorough ploughing, and ſome freſh roots or ſets are regularly planted in rows, in the intervals of the former year; and when this ſecond crop of madder is off, the land will be in fine condition to bear excellent crops of corn; for madder is no impoveriſher of land, and the frequent tillage it requires, brings the land into fine tilth, reducing it into as ſmall particles as the bed of a well-kept garden.

The beſt huſbandry is, not to plant the ſame land in madder for many years afterwards; and whenever it is again planted with that crop, it ſhould be well dunged, manured, and tilled, the preceding year.

When the ſtalks begin to wither, that is, about the latter end of October, the roots are to be taken up; and the cheapeſt and ſhorteſt way of doing it, is to looſen the earth with a common plough, firſt taking off the earth-board and coulter: when the earth is thus looſened, women and children may ſerve to pick up the roots; and wherever any difficulty occurs, the labourers turn up the ſoil with their ſpades.

But a much better, though rather more expenſive method is, to have the earth of the beds turned into the intervals with a three-pronged fork: by this method the roots are taken up almoſt without damage; and many which lie a little deep are ſaved, but which would otherwiſe have been left in the ground and loſt; and particularly moſt of the vertical or tap-roots are got up.

When the roots are taken up, they are dried as much as poſſible in the air, afterwards carried to a kiln, and laſtly to the mill to be ground.

A light loamy ſoil is better for madder than a rich ſtrong clay; it loves moiſture, but is killed if it is overflowed: therefore, if the ſoil is in other reſpects proper, but too wet, it muſt be firſt drained, or at leaſt the beds muſt be raiſed high, and the intervals ſunk low: on the other hand, if the land is too dry, the intervals may ſafely, and even profitably, be raiſed above the beds: this will at leaſt prevent the young freſh planted ſets from being hurt by too much drowth.

When the upper ſtratum of ſoil is deep, it is to be obſerved, that the land cannot be ſtirred too deep: the only thing to be apprehended is the expence of doing it: the more the earth is reduced, the more nouriſhment will it afford to the roots of the madder; they require a great deal: but in general madder pays well for any labour that is beſtowed on it.

Dry weather is, if poſſible, to be choſen for taking up madder roots, as the earth then eaſily falls off them, and they need not be waſhed, which is to be avoided; and, in fact, there is no occaſion to waſh them, unleſs they grew in a ſtiff ſoil, and the weather was very wet when they were taken out of the ground.

Some judgment is required reſpecting the time of taking up theſe roots: I have already mentioned that they will, in general, be fit for uſe by the latter end of the ſecond autumn; but this is not always the caſe; and it is much better to let them lie in the ground another year than to ſpoil a crop.

The Dutch often taken them up too ſmall, and the French almoſt as often let them grow too large. The two extremes are equally to be avoided: the proper time to take them up is, when they are about the ſize of a ſwan's quill; they then yield moſt dye, and are of courſe moſt proper for uſe. The time when they arrive at this proper ſtate, depends not only on the nature of the ſoil in which they have been planted, but alſo on the good huſbandry that has been beſtowed on the land; for without proper tillage they will turn out but an indifferent crop; but if they are planted on a good loam, are well tilled during their growth, and have favourable ſeaſons, they need never be left in the ground longer than the end of the ſecond autumn, whether they are planted in the ſpring or the autumn.

I have mentioned in this letter many things which will appear trifling to you, when experience has made you more knowing in this culture; for, depend upon it, a greater portion of knowledge is acquired by a little experience than by a great many precepts; the firſt makes a deep impreſſion on the mind, whilſt the latter are ſoon chaſed away by new, and perhaps more pleaſing ideas.

I would recommend it to you, when you begin to plant madder, to depend more on the judgment you ſhall form of things, than on any thing you can read on the ſubject. If you miſcarry in ſome inſtances, you will certainly rectify matters in your future practice: a ſenſible man cannot be long in the wrong.

I have not, I know, given you any ſyſtematical inſtructions in the affair of cultivating madder; and this I purpoſely avoided doing; for, had I attempted telling you in what manner this uſeful plant ought to be cultivated in England, I ſhould certainly have miſcarried, and all I could have ſaid would have amounted only to probable conjecture: had I, on the contrary, given you a circumſtantial detail of our methods of practice here in France, it would only have ſerved to miſlead you, ſo much do the climates of the two countries differ. I am therefore in hopes, that my manner of treating the ſubject will be not only more agreeable, but more uſeful to you, as I have, for the moſt part, only mentioned ſuch circumſtances as may be equally uſeful in the culture of this plant in both countries.

Lay it down as a maxim, that the culture of madder, if properly managed, is very profitable; there are few crops pay better; but then the two extremes are to be carefully avoid; we muſt not let our expences be ſo large as that no crop will repay them; neither muſt we be ſo ſparing as to baulk the growth of the plant for want of proper tillage. A great deal is required, yet too much may be beſtowed on it, for the reaſon above mentioned: the golden mean is beſt in this, as well as in all other matters; and what this mean is, can only be learnt from experience; for it is abſolutely impoſſible to lay down maxims that will ſuit all countries, all climates, and all ſoils.

What has hitherto been ſaid relates to the common way of cultivating madder; we therefore ſhall now give in his own words, the great improvements made in this article by the ingenious M. Dambourney.

" M. Rondeaux, ſays he, found, eight or ten years ago, on the rocks of Oiſſel, two plants of madder, which he took up and ſet in his botanic garden. He afterwards gave me ſome ſlips of them, and I planted them in a ſimilar place, out of curioſity: but M. Du Hamel's treatiſe ſoon made me perceive the importance of cultivating this plant. I accordingly applied myſelf to it: and by following all the methods which had been pointed out to me, and thoſe which ſeemed to coincide with them, I ſucceeded ſo far as, in four years, to have plants enough to try this culture in the open field. In the mean time I learnt that M. Peter Dupont cultivated with ſucceſs, at Elboeuf, plants of madder which he had received from Lille in Flanders. He was ſo kind as to make me a preſent of an hundred ſets of them ; and this little reinforcement, added to what I had raiſed of my own, obliged me to ſeek for room in my garden at Oiſſel, wherein to extend this culture. Finding no other ſpot vacant there, but two walks, I ſacrificed the pleaſure of enjoying them, to my then new and prevailing inclination. I therefore dug up one of them, the ſoil of which is a yellow and ſandy clay, underneath which, at a ſpade's depth, is a bed of large gravel, cloſe knit with very ſtrong earth : but I did not ſuffer this to be broken into. I divided the walk lengthwiſe, and, without dunging it at all, planted in December 1757, in one half of it, firſt the ſets which I had received from Elboeuf, and then, immediately after, but without mixing them, thoſe which I was able to take from my own plantation. The other half of the walk was ſowed in the month of April 1758, with ſeed which I had gathered from my own plants. The other walk was diſpoſed of in the ſame manner, as faſt as I could get plants or ſeed to ſtock it ; taking care the firſt year to keep my beds well weeded, and to lay down the branches as faſt as they ſhot out.

" So early as in the autumn of 1758, I gathered ſeeds from my plants of Oiſſel madder, whether raiſed from ſeeds or from ſlips ; but that of Elboeuf had not then bloſſomed, though it had put forth ſtalks three feet high ; and even in 1759, it produced bloſſoms on only a few ſtalks, whilſt the Oiſſel madder was loaded with them. When the ſtems were withered, I had the curioſity to take up ſome of the roots, and was thereby informed of the following intereſting facts.

" 1. Though it is ſaid poſitively, in the Dictionnaire Encyclopedique, that madder raiſed from ſeed requires five years to grow to the ſame ſize as that which is raiſed from ſlips attains to in eighteen months, yet I found all things equal in this reſpect ; and if there was any ſort of advantage on either ſide, it was in favour of that which had been ſown : both the one and the other occupied the whole depth of the ground ſo far as it had been looſened, and their roots had, in ſeveral places, penetrated through the hard bed of gravel underneath : but in order to pierce through it, three or four roots had twiſted themſelves together, and ſhaped themſelves exactly to the form of the paſſage they found between the pebbles, in conſequence of which they were more or leſs choaked there ; though they afterwards reſumed their natural ſhape and plumpneſs in a bed of ſmall pure ſand which lies underneath the hard bed, and in which I have been obliged to leave ſome of them at the depth of four feet.

" It is plain therefore, from this inſtance, that no time is loſt by raiſing madder from the ſeed, and that this plant may be raiſed ſucceſsfully in the moſt indifferent ſoils, even without the help of dung.

" 2. I took advantage of ſome fine days to dry in the ſun, but ſeparately, the roots which I had taken up. Every thing ſeemed to give the preference to thoſe of the Elboeuf ſpecies. They were larger and redder than the others, and their powder was finer to look at : but the effect proved very different. To make a fair compariſon of them, I dyed, with equal quantities of each of theſe ſorts of madder, two equal parcels of cotton prepared in exactly the ſame manner : that which was dyed with the madder originally of Oiſſel took a much brighter colour, and reſiſted during thirty minutes a boiling which the other could not bear during ten. I likewiſe compared its effect with that of the Lizary or Hazala of Smyrna, and the advantage, as well in point of brightneſs as of the durableneſs of the colour, was alſo on the ſide of the Oiſſel madder.

" This valuable kind appeared to me from that moment to deſerve the preference. In the ſpring of 1760 I ſowed all the ſeed I had of it, part upon hot-beds, and part on beds in my kitchen-garden ; and I deſired M. Rondeaux to help me to find out more plants of it upon the rocks of Oiſſel or of Orival : but he aſſured me that he had ſearched for ſuch ſeveral times, in vain : nor was he more ſucceſsful in a journey which he took thither laſt Auguſt, with M. Dangerville.

" I therefore determined to have recourſe to the ſuckers which grow around theſe plants : but though I took them up as carefully as poſſible, I could ſcarcely get any that were rooted ; and notwithſtanding that moſt of thoſe which I did plant were yellow for the length of from four to eight inches, yet nine of them in ten died. The offſets of the Elboeuf madder, on the contrary, though taken up with but little precaution, have a great many fibres and young roots, and their taking freſh root is ſure, provided they are planted in cool weather. Nature ſeems thus to compenſate the cultivator for the ſcantineſs of the ſeed which this laſt ſpecies produces, whilſt the other yields it in abundance.

" Not to neglect any means of multiplying the Oiſſel madder, I dug up a ſmall ſpot of it, about the fifteenth of laſt June, and took from thence all the ſlender roots which run in great plenty juſt below the ſurface of the ground : I cut them into pieces at every ſecond joint, and planted them the ſame day in channels, where all thoſe that were brown and woody became good plants, and thoſe which were then only yellow and tender rotted.

" The doing of this taught me what I had not learnt from M. Hellot's memoir, nor had any of my correſpondents in Holland informed me of it ; namely, from what part of the root it is that the moſt valuable colour is obtained. After all my runners were thus taken off, and replanted, there ſtill remained the ſtock furniſhed with lateral and with deſcending roots, reſembling in form and colour large earth-worms. In three days of ſun-ſhine they were dry, and the parenchymæa, or pulpy part of the root, being then leſſened in bulk, the outer ſkin became wrinkled, becauſe it was then too large. To clear them of this wrinkled ſkin, I had recourſe to a method firſt thought of by M. Paynel of Darnetal, which was, to put theſe roots in a large ſack of coarſe canvas, and to ſhake them ſtrongly therein. The friction of the ſack, and of the roots one againſt another, took off almoſt all that outer ſkin, which I afterwards ſeparated by winnowing, and what then remained was that which alone ought to be called fine and true peeled bunch madder, the effect of which is as ſuperior to that of the azala, as the azala is ſuperior to the fineſt Dutch madder. I would not however adviſe the cultivators of madder to follow this method, any farther than there may be curious and nice buyers ready to give them a price proportioned to the expences it occaſions.

" By thus taking up each ſpecies of madder in the ſpring, one has, as M. Du Hamel gives room to hope, not only the advantage of obtaining ſuckers and joints of roots for raiſing new plants, but alſo, if the ſeaſon be not quite unfavourable, one may dry the root itſelf in the ſun ſufficiently to make it keep, and by this means the expence of drying it with fire in a ſtove is ſaved, and the injury which the fire does to the quality of the madder is avoided. The colouring part would be ſtill more valuable, if the root were dried in the ſhade under a ſhed open on all ſides ; and to accelerate this drying I have ſucceſsfully made uſe of a bed of half-baked bricks, upon which I have ſpread the freſh roots. A bed of dry aſhes, ſix inches thick, may alſo be uſed : but in this caſe it muſt be covered with cloths upon which the roots muſt be laid, that the aſhes may not mix with them when they are turned. A floor of plaiſter likewiſe facilitates this drying ; and I believe it far preferable to bricks, on account of the ferruginous parts which theſe generally contain.

" The principal difference which diſtinguiſhes the Oiſſel ſpecies is therefore obſervable in its roots, which are ſlenderer, of a leſs bright colour, leſs furniſhed with fibres at their joints and thoſe joints farther aſunder, than in the Elboeuf madder : but, beſides this, an attentive eye will diſcern many more diſtinguiſhing marks.

" In the ſpring of the ſecond year it riſes ten or twelve days earlier than the other ſorts, its ſtalks are ſlender, and they trail upon the ground as ſoon as they are a foot long ; its leaves are of a pale green, long, narrow, thin, waved along their edges (pretty much like that of the laurel) ; its bloſſoms are diſpoſed in looſe ſpikes, and each of the ſeeds which ſucceed thoſe bloſſoms ſtands upon a pretty long foot-ſtalk.

" The Elboeuf madder, which came originally from Flanders, and is the ſame as the Flemiſh refugees carried into Holland, puts forth, on the contrary, ſtrong ſtalks, which have frequent joints, and are able to ſupport themſelves even when they are two or three feet long. Its leaves, which are of a deep green, are thick, broad at their baſe, and terminate in a point almoſt like the leaf of the great mirtle, and they are not at all, or very little, waved. It does not bloſſom till the ſecond or third year: its flowers are very apt to fall off, and when this accident does not happen, its ſeeds ſtand on ſhort foot-ſtalks. This ſeed grows very well: but the eaſe with which well rooted ſhoots are obtained from this ſpecies renders it the leſs valuable.

“ In order to enlarge my plantation, and likewiſe in hopes of enriching it with a new ſpecies, I wrote to Smyrna for ſome ſeed of the azala or izary, and luckily received three pounds of it on the 20th of Auguſt 1760. It ſeemed to me abſolutely like that of the Oiſſel madder, and I ventured to ſow a ſmall part of it, on the 27th of Auguſt, upon an old hot-bed which had loſt all its heat. It roſe well, and the young plants were not injured by the winter. I tranſplanted them into open ground at the end of laſt February, they are now in bloom, and their appearance is exactly like that of the Oiſſel madder, excepting that their ſtems are ſlenderer.

“ As to the culture, I ſet out with ſcrupulouſly obſerving M. Du Hamel's directions: but afterwards I ventured to deviate from them in ſome points, in order to adapt it to the leſs attentive genius of our farmers. In the firſt place, I have experienced the truth of what M. Paynel of Darnetal obſerved to me, viz. that the plants which are raiſed from layers, at a great expence, produce only long woody roots, which yield hardly any colour, remain hollow during two years, and produce very few of thoſe vermicular roots, which are the only valuable ones. I have therefore quadrupled the number of plants in a given ſpace; the ground has been well filled with them, and the expence of making layers has been ſaved; and, thoroughly to accommodate the culture of this plant to the practice which our country people are accuſtomed to, I have either planted the ſlips, or ſowed the ſeed, in rows after the plough, as is done for kidney-beans, and the workman uſed to earth up theſe performs mechanically the ſame operations for the madder, the expence of cultivating which in this manner is no more than that of raiſing thoſe beans in the field.

“ Having obſerved that the eaſt winds in the ſpring, and the heat of ſummer, are equally fatal to whatever is then ſet in the lands about Oiſſel, and that, on the contrary, whatever will bear planting in the autumn ſucceeds very well in them; I took up in October laſt all the plants of two years old madder that were in my garden walks, and theſe afforded me as many ſlips as were ſufficient to plant half an acre of ground. Very few of them failed, becauſe they were all brown and woody. But as the roots which are taken up in autumn, and which one might wiſh to be able to keep, cannot be dried without fire; it is adviſable to dig up in that ſeaſon only the quantity neceſſary to furniſh ſets for replanting, and from June to September to take up what is intended for ſale.

“ On the 16th of laſt February I ſowed in a hot-bed the greateſt part of the Lizary ſeeds which I had received from Smyrna, and the reſt of them a fortnight after in one of the beds of my kitchen-garden. I raiſed from them plants enough to ſtock four hundred and forty ſquare feet of ground, in an open field, where they ſucceed perfectly well: but this tranſplanting checks their growth; ſo that if the ſeed is ſown in the field in May, the crop will be in nearly equal forwardneſs: but I have not had cauſe to approve of ſowing it earlier in open ground.

“ As it is right to make even inconveniencies become leſſons of inſtruction, the impoſſibility of drying without fire the roots which I took up in October, put me upon trying to uſe them freſh, in the ſtate they were when dug out of the ground. I therefore waſhed them well, that no earth might remain upon them: but having myſelf experienced that, as M. Du Hamel obſerves, this root loſes ſeven eighths of its weight when it is dried ſufficiently to be reduced into powder, I judged that I muſt proportion my quantity accordingly. I therefore put into a quantity of liquor which would have required a pound of powdered madder, eight pounds of freſh roots bruiſed in a mortar, and with this I dyed ſome cotton, in the uſual way. When the dying was finiſhed, I found that the liquor was ſtill over-charged, though the cotton had imbibed ſo deep a dye as to require two boilings to bring it down to the uſual colour: upon which I repeated the experiment with ſix pounds, and afterwards with four pounds, and I found that this laſt proportion of undried roots is that which gives a colour equal to what is extracted from a pound of dried and powdered madder. One half of the quantity of roots commonly uſed may therefore be ſaved by dying with them when they are freſh dug: but, though this is a great ſaving, it is not the only one.

“ 1. There is no need to build kilns or ſheds for drying the roots in changeable weather.

“ 2. One is exempted from the inconveniences of a too haſty or too ſlow drying, either of which is equally hurtful to the quality of the madder.

“ 3. The waſte occaſioned by the peeling, garbling, winnowing, &c. of the roots, in the doing of which many, if not all of the ſmall ones, that are not for example thicker than ſtraws, are ſeparated with the refuſe parts, and thereby generally loſt, is hereby ſaved.

“ 4. The expence of grinding is ſaved, together with the waſte and fraud which may be committed at the mill; and likewiſe the inconvenience of waiting till the mill is at liberty, which is of no ſmall conſequence in places where there are not mills appropriated to the grinding of madder only.

“ 5. Laſtly, the roots thus uſed do not evaporate or ferment, as the powdered madder always does if it be not ſpeedily uſed.

“ All theſe advantages put together may be deemed equivalent to a ſaving of five eighths in the quantity. The planter who knows how to dye may reap the benefit of them the moment that his roots are large enough to be taken up: the dyers by trade will by degrees be ſenſible of the advantage, and ſhare the profit with the planter, when the madder grounds are nearer them: they will even find themſelves under a neceſſity of ſo doing whenever this method ſhall become general, and this will be a means of rendering it ſuch; for as there is no particular time to be waited for in order to the madder's acquiring maturity, after it has been planted eighteen months; the huſbandman who carries a parcel of freſh roots to market will be ſure of ſelling them in that ſtate, and the dyer may buy them daily, in proportion to the quantity he wants; or he may agree with the planter for ſuch and ſuch quantities to be delivered to him at ſuch and ſuch times. I have moreover experienced that theſe roots may be kept freſh during ſeveral months, by laying them in a hole three feet deep, in alternate layers of roots, and of earth.

“ This experiment pleaſes me again in its tending to leſſen the expence of dying, and conſequently to reduce the price of our dyed ſtuffs at foreign markets, by which means our trade with other nations may be benefited: and it is likewiſe new, ſince neither M. Hellot nor M. Duhamel have pointed it out. I have alſo experienced that the Elbœuf madder is very good when it is uſed freſh; a circumſtance by ſo much the more important to be known, as this ſpecies is not only the longeſt lived of any, but alſo the moſt eaſily propagated.

“ The principal difficulty now remaining for me to ſurmount, is to find out ſome cheap and eaſy way of taking up the madder, without leaving in the ground its deſcending roots, which yield the beſt colour; for the method which I have hitherto practiſed has been conſiderably expenſive. M. Duhamel propoſes a plough which turns over the earth, without a coulter: but if I may judge from what I have ſeen, this expeditious inſtrument can ſuit none but lands where a clayey bottom hinders the vermicular roots from piercing deep. I wrote to Holland, to know how the Dutch manage in this reſpect: but thoſe zealous patriots are very reſerved in every thing relative to this plant, of which we let them be the monopolizers: I was anſwered, that they uſe the ſpade and the fork. However, I ſhall try what my zeal and what incidents may ſuggeſt to me, and ſhall communicate whatever I may find to anſwer beſt.

“ An objection which may, perhaps, be ſtarted againſt this branch of huſbandry in France, is that there may be danger of its prejudicing that of our corn, which is an article of the greateſt neceſſity. But beſides that we have immenſe tracts of uncultivated lands where it might be eſtabliſhed, I can, with M. Duhamel, aſſert, that the profit of the madder may be had in the beſt fields of this province (Normandy) without diminiſhing the crops of the moſt valuable corn. In effect, it remains in the ground but eighteen months, and after it is taken up, a ſingle ploughing is ſufficient to enable the land to produce very fine wheat, without any manure. Now it is the cuſtom in all our wheat grounds to take a crop but once in three years, and this may be had after the madder. Nay, an advantage may be reaped even in the firſt year, by ſowing, between the rows of madder, onions and other pot-herbs, which do not root deep or occaſion much ſhade: but there will be a ſtill greater profit in making it grow jointly with kidney-beans, becauſe, the rows being regular, nothing would hinder the after-ſtirrings, which contribute ſo much to promote vegetation."

M. Dambourney continued his experiments on madder, and gives the following account of them.

"I have reſtricted myſelf to the three ſpecies which yield the brighteſt and moſt laſting colour: theſe are, the madder originally of Oiſſel, that which is ſometimes found growing wild in the vineyards of Poitou, and the lizary or hazala of Smyrna. All theſe bear ſeed in their very firſt year, and in the ſecond one may gather two thouſand ſeeds from a plant which would not afford at moſt above twenty or thirty ſlips. The difference between theſe means of propagation is ſtriking, and ought to be deciſive in all countries where the ſeed ripens well, as it does in almoſt every part of France.

"The manner of raiſing it from the ſeed, as practiſed by me, is thus. Along a wall which fences off the north wind, let a trench be dug two feet deep, five feet wide, and of ſuch length as may be moſt convenient; then, towards the middle of February, let it be filled with hot dung of horſes or mules, well preſſed down, to within about three inches of the level of the ground, and afterwards fill it quite up to the top with fine mellow mould, preſſed down gently, and laid ſmooth with a rake. A bed of this ſort is preferable to any other, becauſe a common labourer can make it very well, whereas it would often be neceſſary to have recourſe to a gardener to make a raiſed hot-bed. The expence is not to be regarded, becauſe this bed may be ſown ſix times in a year, and the mould which may be taken from it afterwards will be worth as much as the coſt of the dung. The uſing of this bed does not at all prevent ſowing likewiſe in the beds of a kitchen garden; but as this laſt ſhould not be attempted before the middle of March, for fear of froſts, there will be a great advantage in ſowing upon the hot-bed; for a month gained in this ſeaſon is invaluable.

"On the 20th of February, 1762, I ſowed upon ſuch a bed ſome madder ſeed in ſmall channels about an inch deep, and three inches aſunder. This method is always preferable to ſowing in broad-caſt, becauſe the ſeed is better covered, and the weeding is more eaſily performed. The young plants appeared after nineteen or twenty days, they were watered and weeded when neceſſary, and on the 30th of April they were fit to be tranſplanted into open ground.

"As moſt of our farmers are, unhappily, not able to advance money for a culture from which they have no proſpect of reaping a return in leſs than eighteen months, I tried, laſt year, what would be the event of ſowing madder at the ſame time as kidney-beans, and in the ſame furrows of the plough. The beans, which riſe in leſs than eight days, required to be earthed up when the madder had ſcarcely appeared above ground; and this operation ſmothered the madder entirely. I therefore judged it moſt proper, this year, to ſubſtitute my young hot-bed plants of madder in lieu of the ſeed; and accordingly, when the weather was moiſt, for that is an abſolutely neceſſary circumſtance, I ſet ſome of my people to plant a piece of ground which had been well prepared for a crop of dwarf-beans. In each furrow of the plough where theſe beans were ſown, women and children placed the young plants of madder ſix or ſeven inches aſunder, fixing the root in the bottom of the furrow by means of a handful of earth put around it, and reſting the green ſtem againſt the ſide of the furrow, the ſurface of which it exceeded by at leaſt one row of leaves. The ploughman ſtopped a little at the end of the furrow, till the whole of it was planted: he then opened with his plough, which had a ſhifting mould-board, a ſecond furrow, in which nothing was either ſowed or planted; and at the ſame time the earth turned up out of this filled the firſt. A woman finiſhed this filling with a rake, as well to cover the beans completely as to earth up the plants of madder. The third furrow was ſowed and planted like the firſt, and this was continued till the whole extent of the ground was planted in rows fifteen inches aſunder. This work, which did not in the leaſt alter the common method of cultivating the beans (excepting that only two thirds of the uſual quantity of ſeed were uſed) was performed in five hours, by one ploughman, three women, and three children. The ground thus planted contained upwards of twelve thouſand ſets of madder; and theſe had taken freſh root and had begun to ſhoot up when the beans roſe. It was weeded twice, its ſurface was ſtirred, and the plants were earthed up as uſual, without any danger. Both throve well together: the beans were pulled up when they were ripe, and the madder, now ſole poſſeſſor of the ground, covers it like an artificial graſs. The greateſt part of it has yielded a little ſeed. The crop of beans, notwithſtanding the drought of this ſummer, is almoſt equivalent to the expences, and next year I ſhall have that of the ſeed and roots of the madder, at the expence of only a ſtirring of the ſurface and a ſingle hoeing in the ſpring.

"My hot-bed was no ſooner cleared, than I ſowed it again with madder: but the extraordinary drought of the ſeaſon obliged me to leave it there till the 6th of Auguſt, by which means I loſt a crop. I then took advantage of a rainy day to tranſplant it: and this was done in the ſame way as before, excepting, that the ſeaſon was too far advanced to admit of ſowing beans at the ſame time. The length of the roots of the madder likewiſe required more precautions to fix them with earth at the bottom of the furrow, in which one of the horſes being forced to tread in order to open the next furrow, the whole would have been trampled to pieces, or dragged out of the ground. Yet the ſame number of work people as before-mentioned, ſet ſixteen thouſand plants in ſix hours. The ſpot is well filled, and the plants will be ſtrong enough to reſiſt the winter.

"On the 15th of May, being deceived by a ſmall rain, I ſowed near an acre of ground in alternate rows, as is practiſed for beans, but only with madder. I uſed for this purpoſe three quarts of ſeed, which I have much regretted; for the conſtant drought has hardened the ſurface of the earth ſo that the young plants have not been able to pierce through it, and conſequently all has been loſt. The method which I am now going to relate will prevent this inconvenience hereafter.

"I ſowed my hot-bed, for the third time, on the 6th of Auguſt, with a deſign to let the young plants remain there all the winter, and not to tranſplant them till the end of February: but the nineteen or twenty days which this ſeed requires, in order to its ſprouting, diſconcerted me. It was neceſſary, in that hot ſeaſon, to water frequently by hand, and this, beſides wearying out the gardener, laid bare ſome of the ſeeds, which grew no more. It then occurred to me, that this might probably be remedied by ſowing ſeed which had already began to ſprout. Accordingly, I filled the bottom of a box with moiſt mould a quarter of an inch thick, then covered this entirely with ſeeds, and ſo proceeded in alternate layers, the laſt of which was of mould. I kept this box well watered, though expoſed to the ſun, and each day I examined the progreſs of the ſeed. It was on the eighth that the germ began to appear, and the very next day it was three quarters of an inch long. I ſeized that inſtant to lay in channels made in the hot-bed both the ſeed and the mould in which it had ſprouted: I then ſmoothed the ſurface of the bed, and two days after all the rows appeared diſtinctly. This method likewiſe ſaved me a weeding, which I had generally found to be neceſſary as ſoon as the ſeed which had not been made to ſprout before-hand had riſen. The growth of the young plants was ſo rapid, that inſtead of letting them remain there all the winter, as I firſt intended, I ventured to tranſplant them into open ground on the 14th of laſt September. Froſt is a little to be feared for this laſt plantation: the event will be a leſſon for the future.

"Eight days before theſe plants were taken up, I laid another parcel of ſeed to ſprout, in the ſame manner as before, and therewith immediately replanted my hot-bed. It has riſen well, and will paſs the winter there. I hope (by thus uſing ſprouted ſeed) to be able next year to raiſe at leaſt ſix crops on the hot-bed. I likewiſe ſowed at the ſame time ſome of this ſprouted ſeed in a bed of my kitchen-garden, where it roſe in four days. I intend alſo to venture ſome of it about the end of next April in a ſpot with beans; and I preſume that as this already ſprouted ſeed will riſe ſooner than them, the plants of madder will be able to bear the firſt weeding and ſtirring neceſſary for the beans; in which caſe the expence of culture will be much leſs than the charge of removing the young plants, and both the hazard and the delay of their taking freſh root will be avoided. If this trial ſucceeds, it will be the greateſt inducement that can be for the farmer to adopt the ſame method, ſince it will require only one ploughman, a woman to ſow the beans after the plough, another to lay the ſprouted madder in the furrow, and a perſon to cover the whole over with a rake.

" The gathering of the ſeed is expenſive when one has but little of it, becauſe, for fear of loſing any of it, it is gathered almoſt ſeed by ſeed. I thought myſelf rich enough this year to try another way of doing this work. I cauſed all the tops to be cut off with a reaping hook when there remained upon them but a few ſeeds that were not ripe, and the whole was then laid upon cloths in the ſun. In two or three days the ſtalks and leaves became ſo brittle, that a few ſtrokes of a ſwitch reduced them into duſt. Two turns of a winnow blew away their duſt, and with it the unripe ſeeds, which, after they had been dried, were found to be lighter than the black or purple ones, in which the horney ſubſtance was formed. I hope next year to be in a condition to proceed with ſtill leſs precaution, that is to ſay, to mow at once all the branches and ſtems, and then to ſeparate the ſeeds from them in the ſame manner as before. It generally is during the whole of the month of September that the ſeed of madder is fit to be gathered.

" After the ſeed has been thus ſeparated from the ſtalks, and winnowed clean, it muſt be expoſed to the ſun till it becomes perfectly dry; for if there remains the leaſt mucouſneſs in the black pulp which ſurrounds it, a fermentation will enſue in the winter, or at leaſt a mouldineſs, which will deſtroy the germ. It muſt afterwards be put up in bags of thin cloth, and theſe ſhould be hung to the cieling of a dry and airy place, as well to preſerve the ſeeds from all moiſture, as from mice, which are very fond of them.

" If it be intended to ſow wheat after the crop of madder, the roots of this laſt muſt be taken up in the beginning of October. It is not poſſible for me yet to point out a better method of doing this, than to begin at one end of the field, and trench the whole ground two or three feet deep, whilſt women gather up the roots as the men purſue their digging. The ground is then ſo well prepared for wheat, without uſing any dung, that two-thirds, or at moſt three-fourths of the uſual quantity of ſeed, will be ſufficient to ſow it.

" The madder now taken up might become burthenſome to the planter, if the conſumer thereof ſhould ſeek to take advantage of the eaſe with which it corrupts: for the huſbandman would in ſuch caſe, be forced either to dry on kilns whatever he takes up in this ſeaſon, or to ſell it at whatever price the buyer ſhould be pleaſed to offer. Theſe inconveniencies ſeemed to me the greateſt obſtacles to the progreſs of this branch of cultivation, becauſe they neceſſarily required, in the common way of proceeding, either that kilns ſhould be built for drying the madder, or that its roots ſhould not be dug up till they were to be ſold. I therefore tried, as follows, to remove theſe diſadvantages. On the ſixth of October 1761, I dug in my garden, a hole three feet deep, into which I threw thirty plants of madder, then filled up the hole, and let it remain thus expoſed to the air and rain. I cauſed it to be opened on the 30th of laſt March, and found all the roots in good condition. It was filled up again till the 15th of September, when, upon its being opened anew, even the vermicular roots, the broken ones, and thoſe which had been ſeparated from the plant, ſeemed to me as firm and as ſound as when they were firſt put into it; but to be certain whether they had not ſuffered ſome alteration imperceptible to the eye, I have dyed with them in compariſon with roots which I took up on purpoſe, and I have not found any difference in the liquor, or in the brightneſs and fixation of the colour.

" The huſbandman may therefore, in caſe of need, keep his crop of madder a year in a hole made in his farm-yard, or in a pit dug at the end of the field; only obſerving to lay it in alternate layers of roots and of earth. He will thus be enabled to wait till he finds a proper opportunity to ſell, and the buyer will no longer have it in his power to tyrannize over him by taking advantage of his neceſſities. The dyer, who will know his own intereſt well enough to adopt my method of dying with freſh roots, may alſo keep them equally well in the ſame manner, in a hole in his cellar, from whence he will take, whenever he pleaſes, whatever quantity of them he has occaſion to uſe.

" It may not be amiſs to repeat here, that when theſe roots are uſed freſh they need only be waſhed a little to clear them of earth, and that the quantity of them put into the dye ſhould be after the rate of four pounds for each pound of ground madder which the operation would require. Theſe roots are cut into middle-ſized pieces, and pounded in mortars of ſtone or wood (iron abſolutely excepted) till they are reduced into a kind of pummice, and this is thrown into the copper when the water (of which I have experienced that, in large works it is hurtful afterwards to increaſe the quantity) is a little more than lukewarm. The liquor is then heated to a degree at which a man can hardly bear to hold his hand in it, and whilſt it is in this ſtate the ſtuff or cotton is puſhed down into it, and there worked about during three quarters of an hour, between hot and boiling, after which the liquor is made to boil during three quarters of an hour more.

" As this liquor remains, after the dying is finiſhed, much finer than that which has been made with the Dutch ground madder, I intend this winter to try whether it may not be put to ſome farther uſes; and I ſhall, in due time, give an account of whatever I may ſucceed in."

M. Duhamel thinks the month of September the moſt proper time for cutting the ſtems of madder, in order to their being made into hay. The Flemings cut theirs in Auguſt: but that is when they do not intend to ſave the ſeed, of which indeed their madder yields but little, as was before obſerved. As Mr. Ray informs us that the madder which grows wild in England preſerves its verdure all the winter, it will become a conſiderable addition to our winter and ſpring ſucculent food for cattle, and this will add greatly to its value; for this plant has been experienced to be an excellent fodder for cattle.

Cows fed with the tops of madder yield plenty of milk, which is a little tinged with red; and the butter of it is yellow and well taſted.

After the madder has been cut for hay, the ground ſhould be gently ſtirred, eſpecially in the alleys, and particularly if theſe are to be planted with madder the next year.

When the ſame ground is to be planted anew with madder, the whole of it ſhould be thoroughly ploughed after all the roots are taken up, and the beds ſhould now be made where the alleys were before. If the ground is ſown with wheat after this ſecond crop of madder has been taken up, the farmer may reaſonably expect an abundant crop of corn: for beſides that madder does not impoveriſh the ground; the weedings and frequent ſtirrings neceſſary for the culture of this plant prepare it well for wheat or any other crop. M. Duhamel confirms this by the following experiments.

A field of madder being dug up, he ſowed it with ſpelt, which was harrowed in, and did not appear for ſix weeks, becauſe the ground was very dry; and even after this, only a ſmall quantity of it ſprouted: yet, at harveſt, this field yielded as many ſheaves as others in the ſame country; but with this eſſential difference, that the ſtraw of theſe was ſix feet long inſtead of four, and the ears were as long again as thoſe in the other fields.

Another year, having ſown ſpring-wheat after a crop of madder, there were, at harveſt, twenty dozen of ſheaves on an arpent (about an acre and one fifth) whilſt the other fields yielded but eight or nine. Likewiſe, another year again, having ſown oats on a piece of ground where the madder had juſt been dug up, it yielded forty dozen of ſheaves to the arpent. The common lands produced that year but five or ſix dozen.

The peaſants about Liſle, being in too great a hurry to enjoy the fruits of their labour, take up their madder before its roots have attained a proper ſize. The Zealanders let their's grow larger. A medium ſhould however be obſerved; for the roots which have remained long in the ground yield leſs dye than thoſe which have ſtood only till they have acquired the bigneſs peculiar to each kind.

This root, which is one of the beſt ingredients that can be uſed for dying wools and ſtuffs, gives them a red colour, not very bright, it is true; but which reſiſts, without alteration, the influence of the air, the heat of the ſun, and the effects of the ingredients made uſe of to try colours: it contributes alſo to make other mixed colours laſting: finally, a method is found out of giving cotton a very pleaſing and laſting carnation colour with it. All parts of the root do not yield this red; the dye of ſome parts fades, other parts are worth nothing at all.

In examining a well-conditioned root of madder with a microſcope, under the outer bark, in the fleſh may be perceived certain red particles, which certainly yield the colour which the root contains; but there is, beſides this, ſeen a great quantity of woody ſubſtance of a fallow colour; and this ſubſtance probably impairs the firſt mentioned colour. According to M. de Tourniere, this fallow colour is not ſo good a ſhade as the red; and he imagines that leys, &c. give a brightneſs to the colours dyed with madder in no other reſpect than by abſtracting this fallow colour. The ſun and dews have the ſame effect on yarn dyed with madder, when it is expoſed on the graſs.

M. de Tourniere alſo imagines, that the part which yields the red, is, in the green root, diſſolved in a mucilaginous juice; for the bark, and the other parts which contain moſt red, are alſo moſt ſucculent: by drying them in a kiln they loſe ſeven eights of their weight, and yet the roots are not perfectly dry; for they bend before they break; they are rather bruiſed than ground by the mill; and this unctuous powder is apt to clot: it is true, that in time they loſe this unctuouſneſs, and become dry; but at the ſame time the quality of the red particles is lowered. Theſe obſervations are well deſerving of attention; for they make it evident to us, that theſe valuable particles may be impaired by too great a heat: ſuppoſing it unctuous, were it too much dried, perhaps water would not diſſolve and ſeparate its parts. Finally, theſe reflections of M. de Tourniere agree very well with the experiments of M. d'Ambournay, and convince us that madder-roots may be uſed green with very conſiderable advantage. But green madder can never be uſed, except when the grounds lie convenient for the dyers: thus, when madder is to be carried to any conſiderable diſtance, it muſt of courſe be dried, and pulverized. I ſhall reſume this ſubject.

1. As madder-roots are very apt to ferment when they are bought green, it will be neceſſary to examine carefully whether they are ſpotted, or have a muſty ſmell: if the fermentation has given them a black hue, they are by all means to be rejected.

2. The roots to yield a fine dye ſhould be freſh: ſuch as are duſty on being broke muſt therefore be rejected, and with ſtill greater reaſon thoſe that are rotten and worm-eaten: on the contrary, ſuch ought to be preferred as have a ſtrong ſmell ſomewhat like that of liquorice: the ground-madder ſhould be unctuous, and run into clots on being handled.

3. As madder is ſold by weight, it is an advantage to the purchaſer to have the roots quite dry; but he ſhould be careful that they have not been kiln-burnt: ſuch as have a ſtrong ſmell have ſeldom this defect. Too haſty a drying wrinkles and ſplits the bark; and, as it then ſeparates very eaſily from the wood, the moſt uſeful part is loſt: the bark therefore ſhould be ſmooth, entire, and adhering to the wood: but we muſt not confound the true bark with the outer bark, or epidermis, which would only leſſen the brightneſs of the colour.

4. The largeſt roots are not always the beſt: they are frequently yellow, and have but little of that red which alone yields the colour. The very ſmall roots are of little value, as they have too much outer bark, which hurts the colour: but thoſe of the beſt quality are from the ſize of a gooſe-quill to that of the end of the little finger.

5. In breaking the roots there may be ſeen, as I have already obſerved, two ſubſtances differing one from the other: that which inclines to a yellow only, hurts the dye: that of the deep red is the part really uſeful; conſequently the higheſt coloured roots ſhould be preferred.

It would be a uſeful diſcovery could there be a method found out of extracting the red particles without any mixture with the fallow or yellow part: I am of opinion the trials ſhould be made on the green root, that the red particles, which are then in a ſtate of diſſolution, may be more eaſily extracted.

6. As the ſureſt method of knowing the quality of madder is to make a trial of it on ſome piece of ſtuff, it will not be amiſs if ſuch as plant much of it accuſtom themſelves to make this trial, that they may demonſtrate to the purchaſers the quality of their roots: the following proceſs for doing it, is extracted from the works of M. Hellot.

To dye a pound of woollen-yarn, a bath muſt be made with five ounces of allum, and one ounce of red tartar, diſſolved in a ſufficient quantity of water: the wool that is to be dyed muſt be well drenched in this liquor: in about a week half a pound of ground madder root is to be thrown into water as hot as you can bear your hand in; and, after having mixed the water and powder together with a ſtick, the wool is put into it; and the bath muſt be kept hot for an hour, but not boil; for, if it did, the colour would be dull: but towards the end of the time the bath is made to boil; but the yarn muſt be inſtantly taken out.

As very trifling circumſtances will affect the beauty of the colour, it will not be amiſs to make at the ſame time two trials with the ſame yarn; one with the madder that is to be proved, and the other with the fine madder of Zealand, or azala: the beauty of the ſkains will determine which is the beſt madder.

As theſe trials may as well be made on two or four ounces of yarn as a pound, the baths may be made accordingly. I ſhall now treat of the methods of drying and pulverizing madder.

We have obſerved that green roots are very apt to ferment: it is therefore neceſſary to abſtract the great quantity of moiſture that cauſes it. If the weather is very dry and hot, it is certainly adviſable to take the advantage of it to dry the roots in part, and ſave wood; but, if the weather is damp, the roots muſt be ſpread under ſheds, or on barn-floors, and often moved; for, if they were laid in heaps, they would ſoon heat, and change, more or leſs, according to the ſtate of fermentation they were in. With care the fermentation of the roots may be greatly leſſened; and, according to M. d'Ambournay's opinion, they may even be kept good for ſome time; but the roots cannot by theſe means be made dry enough to preſerve them from any change. For ſmall crops a common oven will ſerve; but it muſt not be heated to above forty-five or fifty degrees of M. de Reaumur's thermometer. But this method is very tedious, and it would require very large ovens to ſupply the place of kilns. To ſave the expence of building a kiln, I would recommend the making a place over the roof of the oven, to put the roots in, that they may begin to dry: but, if we grow much madder, it is abſolutely neceſſary to have a kiln proportioned to the quantity that is to be dried, not only of our own crops, but thoſe of the peaſants that cannot afford kilns.

The kilns may be made of very different forms, many of which are of equal goodneſs; but when a man propoſes building one, he ſhould be attentive, 1. That it may contain a large quantity of roots: 2. That it may be worked with eaſe: 3. That as little fuel as poſſible may be uſed: 4. And that it be ſo contrived as to retain an equal and moderate heat. To make theſe matters eaſy to planters, we ſhall deſcribe the kilns that have been long in uſe at Liſle for drying madder-roots: we ſhall point out their defects, as well as the defects of two kilns that were ſucceſſively built at Corbeil; and, laſtly, we ſhall mention the attempts we have made to improve and perfect them.

Deſcription of the Liſle Kiln.

This kiln differs very little from that uſed for drying malt. To have a general idea of it, we muſt ſuppoſe there

Fig. 1.

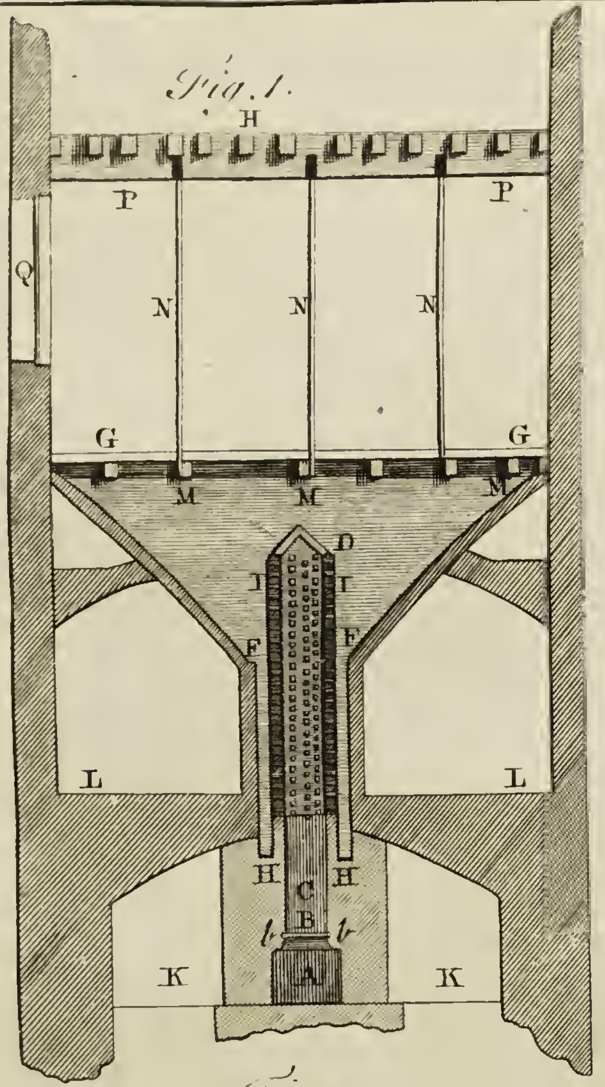


Fig. 2.

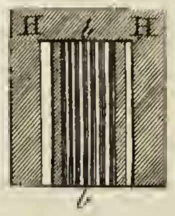


Fig. 3.

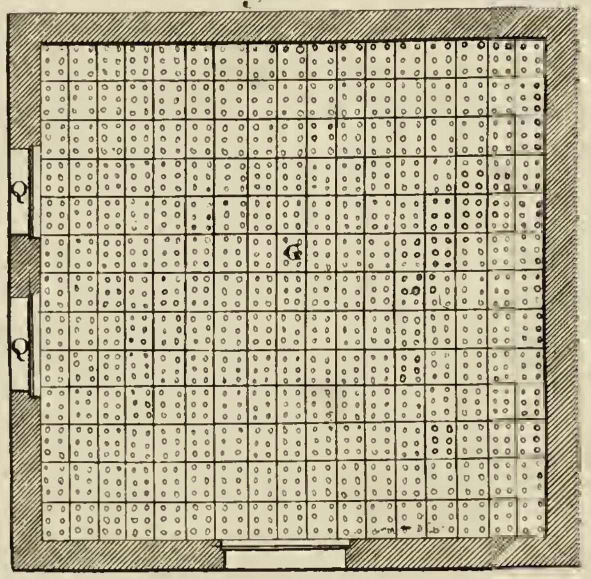


Fig. 4.

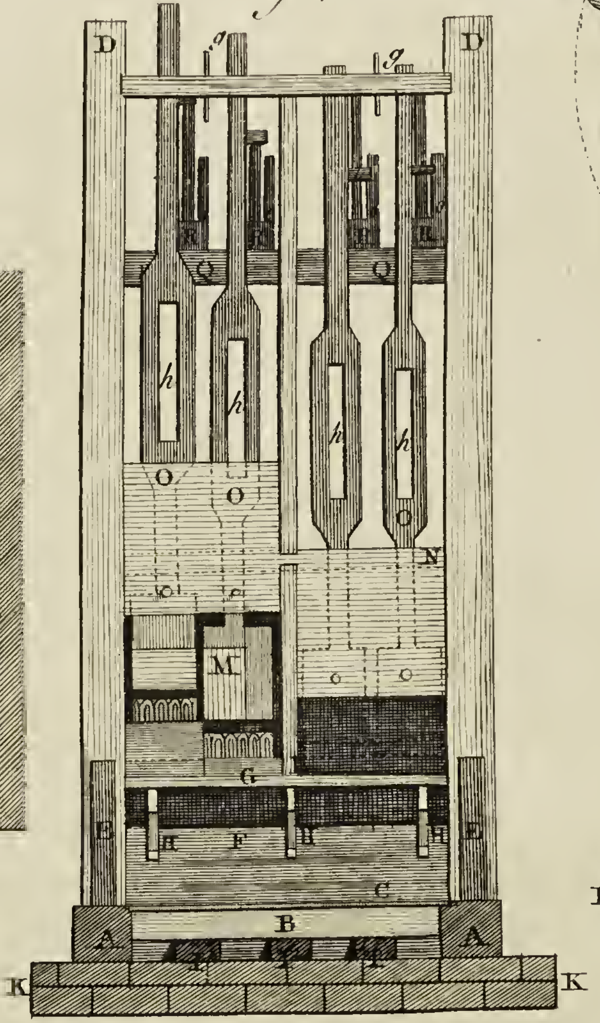
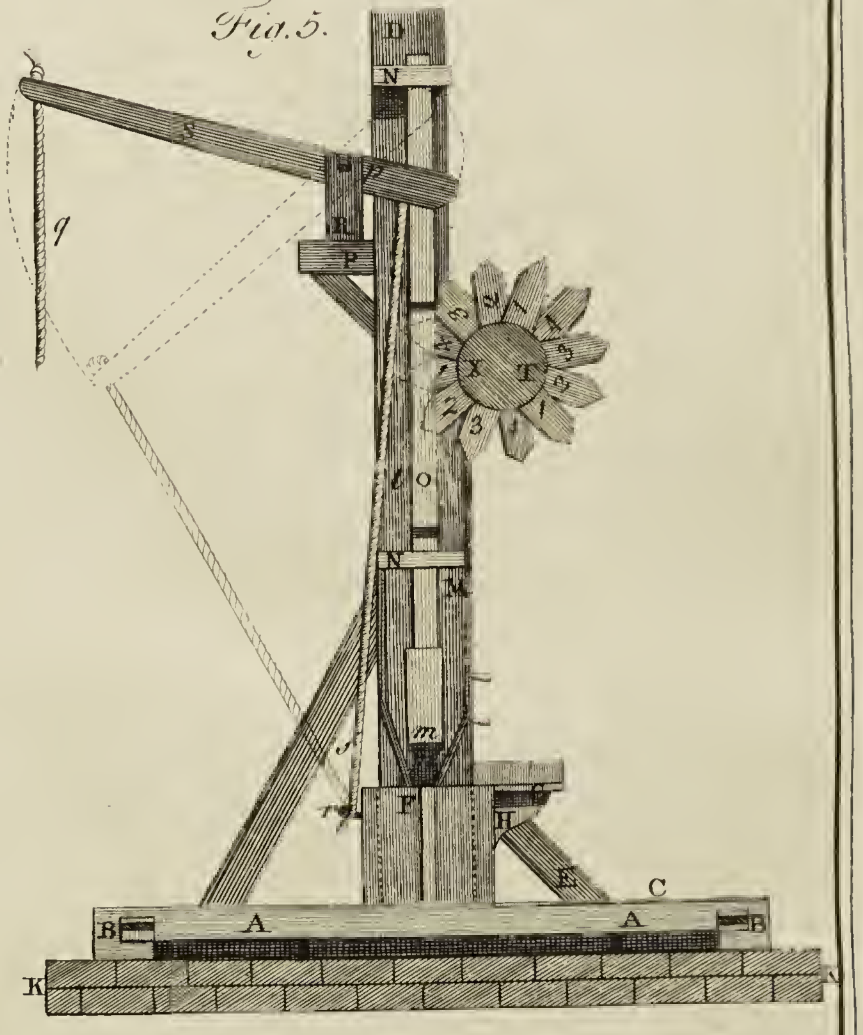


Fig. 5.



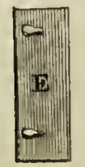


Fig. 7.

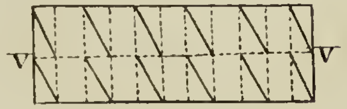
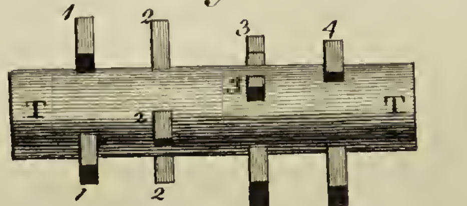


Fig. 6.



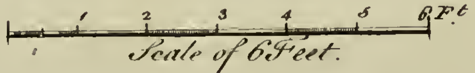


Fig. 8.

is a large furnace, in which a great fire is made: this furnace is made under an arch: the hot air and ſmoke paſs through a funnel over the furnace, and ſpread themſelves in a ſpace in form of an inverted pyramid, the bottom of which is covered with a perforated floor, on which the madder-roots are ſpread. This is the general form of the kiln; but we ſhall give a deſcription of it according to the figures in the plate, for the uſe of ſuch as intend to build one.

The Fig. 1. Plate XVIII. repreſents the ſection of a building, containing a madder-kiln.

In this building may be ſeen a vault, K, K, a ground-floor, L, L, and a firſt floor, G, G, over which we are to ſuppoſe a granery, H. The foundation of the brick-work of the kiln, is ſomewhat lower than the bottom of the vault; the walls terminate in arches, at the bottom of the firſt ſtory; the ſide-walls of the building ſerve as upright ſupporters; and the arches of the kiln are ſuſtained by jams, which are put into the ſide-walls. All this will be better underſtood by explaining the letters of reference.

A, an aſh-hole two feet wide, three feet and a half deep, and two feet three inches high. B, the furnace with an iron grating, *b b*, at bottom. C, a pricked line, which determines the height of the furnace door: this aperture is ſixteen inches wide, and ſeventeen high. D, the chimney, B, the perforated funnel, which diſperſes the heat, by means of the holes, *i i i*. It is to be obſerved, that this chimney is entirely covered at the top, to prevent any thing falling into it. I I I, holes two inches ſquare, by which the heat eſcapes; they are placed chequerwiſe. F, an empty ſpace, into which the heat goes, out of the funnel before it reaches the upper ſtory. G G, a floor ſet with ſquare tiles, on which the roots are to be ſpread one foot and a half thick. Theſe tiles are fifteen inches long, ten or eleven wide, and two thick; they are perforated with conic holes, as here repreſented. H H, tubes four inches wide, by which the ſuperfluous ſmoke eſcapes, and through which fall the duſky particles that drop through the holes in the tiles of the floor G. Theſe tubes are ſtopped by a little iron door, which is opened when the heat is too great.

K, the vault in which the fuel is kept. L places where the undried madder is ſafely kept. M, iron joiſts two inches thick, traverſed by bars which bear the tiles that compoſe the floor. N, iron braces fixed to the beam P, to ſupport the floor G. P, the beam of the ſecond ſtory. Q, a caſement or window, to be opened at the beginning of every drying, to let out the ſmoke. When the madder begins to dry, theſe caſements are ſhut, to keep in the heat. There are alſo in the ſecond flooring two trap-doors, which are open to let out the ſmoke and ſteam.

Fig. 2. repreſents the plan of the furnace. The three iron bars which croſs it, are each two inches and a half broad, and ſix lines thick; they are let into the wall three inches; the bars of the grating are one inch ſquare, and rivetted to the other bars. In this plan are to be ſeen the tubes marked H, to ſhew that they run the whole depth of the furnace. Theſe tubes are very neceſſary to convey into the kiln the heat from the body of the furnace.

Fig. 3. repreſents the plan of the tiled floor, G: it is ſixteen feet ſquare.

As the furnace we have deſcribed reſembles that uſed for drying malt, we was willing to obſerve in what manner it was dried, and remarked, that they lay it about nine inches thick, and that it is very hot at bottom. When M. de Reaumur's thermometer was applied, it roſe upwards of twenty-two degrees above Zero; but the upper part, being influenced by the external air, heats but little: the ſteam that riſes, being condenſed by the cool air, is reduced to water, which occaſions the upper part of the bed of malt to be always wet: for this reaſon it muſt be often turned. In this method, by being often wetted with the ſteam, the bed of malt is much retarded in its drying. We imagined this inconvenience might be removed, by preventing the external air from affecting the ſurface of the bed: and this would be affected by making a covering for it; and, if this covering could be fixed within a foot of the malt, another advantage, which we ſhall mention, would reſult.

It is well known in phyſics, that the vapours which ariſe from heated matter, have a great power of penetrating and heating the matter whence they proceeded, provided they are collected, and in ſome manner reverberated on the matter to be heated: it is on this principle the machine was conſtructed in which the bones of animals could be diſſolved; and we know, that in an equal degree of heat, water has eight hundred times more volatility than air; and vapours or ſteam contain a great deal of water.

This induced us to think, that it would be of great uſe to reverberate the ſteam on malt and madder-roots, by means of the covering above mentioned. M. Villot, a brewer at Paris, who takes all opportunities of improving his beer, has made ſome experiments of this nature, and in part ſucceeded. It is only neceſſary then to contrive a method of putting this in execution in a large building, of which we ſhall in due time take notice.

One great defect of the Liſle kiln is, that the ſmoke, mixing with the roots, charges them with fuliginous matter, which probably hurts the colour, and is perhaps the cauſe of the difference betwixt the Levant madder and that of Liſle, theſe laſt being by no means fit for dyeing cotton, as done in the Levant: beſides, in theſe kilns the workman cannot properly regulate his fire: theſe defects might be removed by making the middle cloſe, and terminating it in a tube of caſt or hammered iron, to carry off the ſmoke: the floor, ſupported by iron bars, might very well be diſpenſed with, and inſtead of it one of wood, lattice, wicker-work, or iron wire, would do; for the funnel once properly ſecured, there would be no danger of fire. In order to enable every one to vary the conſtruction of theſe kilns, we ſhall add ſome reflections and obſervations made with great care by M. de la Levrie, who ſuperintended the building of two kilns at Corbeil.

Remarks on the Kiln uſed at Liſle.

It will not be amiſs to begin by relating the experiments made with two kilns, built one after the other at Corbeil, to dry madder, as thereby the advantages of that, herein after propoſed, will be more evident.

The firſt of theſe kilns was twenty-one feet long, twelve wide, and ten feet high: within-ſide it was ſurrounded by three ſtages of hurdles, like ſhelves, four feet wide, and twenty inches one from the other: the firſt ſtage was five feet from the ground: on theſe ſtages the green madder was laid eight inches thick. In the upper floor was a trap-door, which opened to let out the ſteam of the root. The furnace, which was not without defect, went three feet within the kiln: it was ſupplied with fuel from without: within-ſide it was furniſhed with metal tubes, which paſſed through the fire: theſe tubes received at one end the outward air, which they diſcharged within, very hot, by an aperture two feet from the ground. The effect produced from this kiln was as follows: the three ſtages, being filled with roots, thoſe on the upper ſtage became dry enough to ſend to the mill. It is true, they dried but ſlowly, becauſe the ſteam, which proceeded, though in no great quantity, from the two lower ſtages, wetted the under part of the hurdles of the firſt ſtage, thereby retarding the work. The heat which was not powerful enough to raiſe all the moiſture of the madder-root on the lower ſtages in ſteam, made them ſweat abundantly, ſo that the under parts of the hurdles were covered with drops of water as big as the finger's end, which fell from the ſecond ſhelf on the firſt, where they wetted the root; and from the firſt ſhelf they fell to the ground. On the upper ſhelf were very few of theſe drops of water, except for a very ſmall ſpace of time after the kiln had freſh roots put into it, becauſe at the upper part of the kiln the heat was powerful, and regularly diſperſed, whilſt at the bottom it was cold. At each ſtage was fixed one of M. de Reaumur's thermometers: after four days continual fire the loweſt ſcarcely roſe to eighteen degrees; the ſecond, ſomewhat higher; and the uppermoſt never paſſed eighteen degrees, which is thought ſufficient; when the drying is not retarded by any ſteam from below. When the dried root was carried to the mill, the root from the ſecond ſtage, which had loſt part of its moiſture, was removed to the third, and that of the firſt ſtage, ſtill wet, was laid on the ſecond, the firſt ſtage being filled with freſh roots. The loweſt thermometer then fell to fourteen degrees, and the uppermoſt to Zero: this induced them to dry all the roots that were at once put into the kiln, before they admitted any freſh; yet even in this method it was neceſſary to move the roots from the lower to the upper ſtages, where the laſt laying dried faſter than the others. As this work was tedious and troubleſome, it was determined to take down this kiln, and build a new one, now in uſe.

This ſecond kiln is of the ſame length and breadth as the firſt; but the hurdles on which the madder is put are raiſed only ſix feet from the ground, and the apertures of the furnace, which ſupply the hot air, are level with the ground: they, beſides, continued to avail themſelves of the miſtaken advantage of encreaſing the ſurface to contain more roots, by making, as in the firſt, three ſtages of ſhelves. The roots indeed dry in it faſter, becauſe the furnace yields more heat; but this heat is very unequally diſperſed at the different heights, and in the different parts of the length of the kiln; becauſe the ſame inconveniencies ſtill ſubſiſt, as they have made in it, like the other, three ſtages, one above the other, and they have formed the kiln long, without letting the furnace extend through its whole length. They have beſides placed the firſt ſtage too near the fire; but this may be remedied by taking it entirely away, and uſing only the uppermoſt ſtage, which is fifteen feet from the bottom of the kiln, and may extend over the whole of it: the heat will then be more regularly diſperſed. The roots may be laid fifteen or eighteen inches thick, and may be much eaſier attended to than on the ſhelves, which occaſion a great deal of trouble: there might alſo be two furnaces, one at each end of the kiln, and the tubes might be carried over the whole length of it.

From what has been ſaid, we may conclude, that to dry a plant like this, which contains a great deal of moiſture, no advantage can reſult from having a kiln with three ſtages, one hurting the other; ſince the heat tending always upwards, the roots muſt be moved higher, which cannot be done without trouble, loſs of time, and expence; whereas, the ſame quantity may be dried in leſs time on a floor raiſed eighteen or twenty feet above the furnace.

It is certain that a peaſant, who raiſes madder after a proper method, will always be a greater gainer than ſuch as are obliged to hire day-labourers. But the peaſant cannot go to the expence either of a kiln, or a mill: it muſt be planters who raiſe large quantities of it, and can afford the expence, that have them: thus, it is to be preſumed, the peaſants will be under a neceſſity either of ſelling their roots green to the dyers, of taking them up in the ſpring to dry them in the ſun, of drying them in their ovens, when they have only a ſmall quantity; or, finally, of carrying their roots to the kiln, as they do their grapes to the preſs.

The Liſle kiln, though built on a good principle, is too expenſive for a young planter. There muſt be ſtrong walls to ſupport the arches, internal abutments, and bricks to build the arches with. In ſome provinces there is not a workman capable of turning an arch in brick-work. The floor requires many large iron-bars. On the other hand, a kiln in the form of an oblong ſquare, like that at Corbeil, will never heat equally in its whole extent, unleſs tubes be made to convey the ſmoke through various parts of the kiln, before it reaches the chimney, or there is a furnace at each end. All this is expenſive, and ſubject to inconveniencies.

Perhaps then a kiln ſomewhat reſembling a malt-kiln would do; and this might any where be built at a ſmall expence: ſuch a kiln need not be above eighteen feet ſquare, and eighteen or twenty feet high from the ground to the floor. Underneath the floor ſhould be a reverſed pyramid, ſomewhat obtuſe at bottom, to receive the funnel and tubes that are to give the ſupply of hot air: this may be made with quarter-ſtuff covered with lath and plaiſter. This kiln does not require any large furnace. The new kiln at Corbeil is much larger, taken from the ſecond ſtage to the bottom; yet has the heat been brought there to upwards of forty-five degrees. The floor of the kiln is to be made with joiſts eight inches by four, covered with laths, grating, or with hurdles as at Corbeil, where it has already laſted ſeven or eight years: there muſt be walls to ſupport the roof and beams, and it ſhould have two windows: there ſhould be a plaiſter-floor eight or nine feet above the grating, with one or more trap-doors, as they let out the ſteam much better than the windows: laſtly, the beams ſhould be plaiſtered. There is reaſon to think that ſuch a kiln would coſt little, and anſwer the intended purpoſe. It ſhould have been obſerved, that over the grated floor ſhould be laid a large thin cloth, or rather a hair-cloth, riſing round the edges, and faſtened with nails: this is particularly uſeful when ſmall roots are dried, as it prevents their falling through. A foot above the roots may be put wooden traverſes, over which may be laid ſtraw-mats quilted on cloth: this will keep down the ſteam, and may be of great ſervice, as has been already obſerved.

The Furnace of this Kiln.

The furnaces of the Liſle and Zealand kilns are certainly neither of them proper for drying madder, any more than thoſe of the malt-kilns: they have all the ſame defect, as they fill the kiln with ſmoke, which damages the roots. It was this inconvenience induced us to endeavour to contrive one that would give a great deal of heat, without the above defect. This may be probably effected, by not letting the funnel be perforated, and carrying tubes from it which ſhould run under the madder before the ſmoke was diſcharged; and by having other tubes run near the fire, to circulate in the kiln a warm air, which they ſhould receive from without. We have made the trial of ſuch a furnace, and confeſs it did not yield ſufficient heat: the furnace ſhould certainly have been made larger; but the expence is a continual objection, which, beſides being conſiderable, is pure loſs to one that makes experiments for the public good, without being in a ſituation of reaping any profit from them. We ſhall cloſe then what we have to ſay on madder-kilns, by concluding, that malt-kilns ſeem well adapted to the purpoſe; but ſome method muſt be found to prevent the ſmoke damaging the roots.

Madder well dried and cleaned may be ſold in that ſtate to the dyers; but if it is to be pulverized, there will be occaſion for a mill, which we ſhall now deſcribe.

Deſcription of a Mill, at Liſle *in* Flanders, *for pulverizing Madder.*

Plate XIX. Fig. 1. repreſents the parts of a madder mill: it is inſulated, and covered only by a ſlight thatch. The figures 2, 3, 4, 5, and 6, are ſupplementary to the firſt: we muſt have recourſe to them in our explanation of the parts of the mill: they are therefore diſtinguiſhed by the ſame letters, and each piece is repreſented apart.

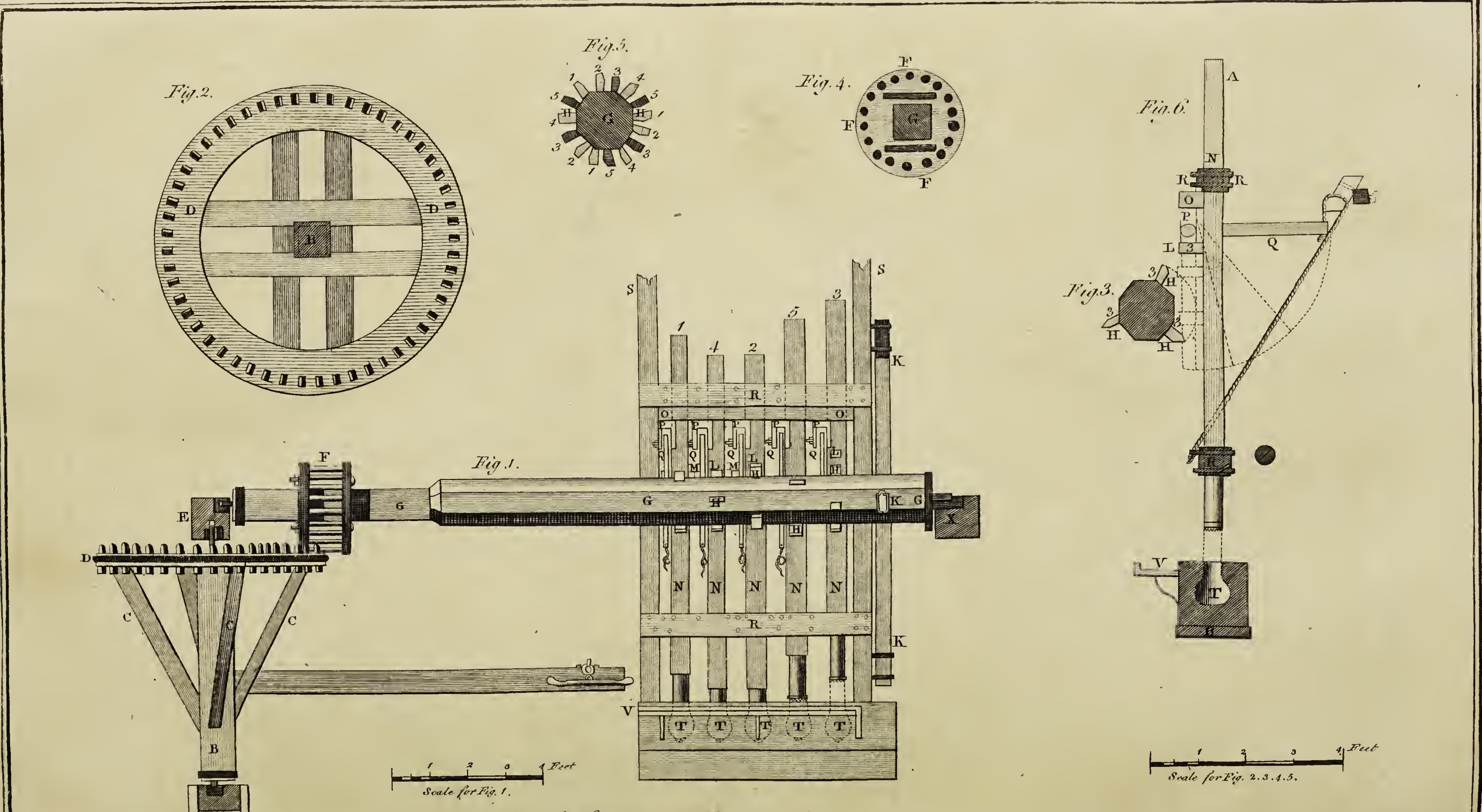
A is a lever, or pole, nine feet eight inches long, and ſix inches by four in magnitude. B, the axis of the wheel, ſix feet four inches ſix lines high, and nine or ten inches diameter. C, ſtays, or knees, four feet ſix inches long, and four or five inches ſquare. D, the cogged wheel, three feet one inch ſix lines ſemi-diameter, and furniſhed with fifty-ſeven cogs.

The fellies, or circumference of this wheel, muſt be eight inches by four large: they are ſecured by an iron hoop. The traverſes are ſix inches by four thick, pinned and keyed. The cogs are made of apple-tree wood, and project three inches three lines: they are two inches and a half by two, at their inſertion, and two inches and a half by one at the top: and beneath the wheel they are two inches long, and one and a half ſquare: they act on the rounds of the trundle-head about one inch and a half of their length. The pins that faſten them are alſo apple-tree wood.

E is a beam twelve inches ſquare. F, the trundle-head, thirteen inches ſemi-diameter, furniſhed with eighteen rounds, each a foot long, and two inches diameter: the ends of this trundle-head are two inches and a half

PLATE XIX.

Facing Madder.



A Section of a Vertical Mill to Pulverize Madder.

half thick, and hooped with iron. There are alſo two iron bars pinned on to ſecure the joints of the wood.

G is another axle-tree, or turning-beam, eighteen feet ſix inches ſix lines long, ten inches ſquare near the trundle-head, and fourteen inches diameter in its octogonal part. H, lifters four inches nine lines long, five inches broad, two inches and a half thick. Hence it is apparent, that there are fifteen lifters inſerted into the axle-tree, to ſerve five beetles; that is, three to each. For this reaſon the lifters, the catches, and the peſtles, are diſtinguiſhed by the ſame figure.

K, flyers four feet five inches long, and four inches ſquare: they are loaded with lead at their ends. L, catches, which anſwer to the lifters, H: they project five inches nine lines, and are five inches broad and two and a half thick.

M, other catches inſerted into the ſides, or thickneſs of the beetles, N, and anſwer to the levers. Q, N, beetles ten feet four inches long, and four inches ſquare. They are round at the end next the mortars, and ſhod with an iron foot four inches diameter, which may be ſeen in figure 6. The beetles are numbered in this manner, 1, 4, 2, 5, 3, (Fig. 1.) to ſhew the order in which they play when the machine is in motion. O, croſs-bars ſix inches by four, which ſupport the joints, P.

P, joints eight inches long, ſix wide and four thick. An iron pin, keyed, paſſes through each joint, and ſupports a moveable lever, Q, which acts on the catch, M, when the peſtle, N, is to be kept up. Q, levers, two feet three inches ſix lines long, three inches thick, by four wide.

R, keeps, ſix or eight inches wide to prevent the beetles from being diſordered. S, an upright poſt four inches ſquare, in which the croſs-bars and keeps are inſerted. T, mortars cut in a ſingle piece of wood ſixteen inches ſquare: they are eleven inches deep, and their greateſt diameter is ſeven inches: the bottom is lined with lead three or four lines thick.

V, a trough to prevent waſte, over which hangs a cloth, faſtened above to the keep, whilſt the mill is at work.

X, a beam twelve inches ſquare; this beam, and that at the other end, marked E, reſt on the timber work that ſupports the roof. The ſockets and pivots may be ſo well comprehended by the plate, that letters of reference were thought unneceſſary: the ſockets are braſs, the pivots ſteel.

We have purpoſely omitted giving the dimenſions of every part, to avoid confuſion; but the machine may be eaſily conſtructed by attending to the deſcription we have given, which is very exact.

But though the mill deſcribed above, is now actually employed in grinding or pulverizing madder at Liſle; yet it labours under ſeveral imperfections, which we ſhall endeavour to point out, and deſcribe a mill conſtructed in a more perfect manner.

There will be, however, no occaſion to deſcribe the wheel work of this mill, it being the ſame as that of Liſle: it will be ſufficient to give the proportion of the parts which compoſe it. The pole, or lever, from the center of the axis of the cogged wheel, to the part where the links of the ſpring-tree bar are faſtened, is nine feet long; the wheel is five feet ſemi-diameter, and has ſeventy-two cogs; the trundle-head is ten inches ſemi-diameter to the center of the rounds, and has twelve rounds; thus it makes ſix turns to one of the wheel. The horſe, going three feet in a ſecond, makes three rounds and a half in a minute, and the trundle-head twenty. The axle-tree having on its circumference three lifters to every beetle, each beetle makes ſix ſtrokes in a minute, and the four two hundred and forty in the ſame ſpace. The ſquare part of the axle-tree, on which the trundle-head is fixed, is made out of a piece of wood five inches ſemi-diameter; the other part of the axle-tree is larger, being ſeven inches ſemi-diameter. It is neceſſary it ſhould be ſo large, that the tenons of the lifters may have a proper length and thickneſs: it is much better to be round than an octagon, or any other faced form, as the mortiſes may be more regularly made. From the end of the lifters to the center of the axle-tree is twelve inches; ſo that in their motion they form a circle two feet diameter: the upper face of theſe lifters is cut in a curve, the radii of which are tangents to the circumference of the above-mentioned circle; the largeſt of theſe tangents is twelve inches, and determines the greateſt riſe of the beetles. By the lifters being thus curved, the reſiſtance is equal, at whatever height the beetles may be, as they are always in contact with the lifters at the ſame diſtance from their center of gravity. As there are on the length of the axle-tree twelve lifters in four parts, they form, one with the other, angles of thirty degrees, ſuppoſing them to be ſeen one behind the other, as if inſerted on the ſame plane: on this account, when the firſt beetle is raiſed to half its height, the ſecond is about to riſe; the firſt quitting the lifter, the third is on the point of riſing, &c. We ſay, on the point, becauſe we are to obſerve, that the lifters go under the catches, or under that which ſupplies their place, five or ſix lines; and that the greateſt tangent of the curve, being twelve inches, is leſs, by near ſeven lines, than the ſixth part of the circumference of the circle, and gives the firſt beetle time to quit the lifter before the third riſes: this is neceſſary, that the power may never have more than two beetles to act upon.

The front of the frame-work is that ſide before which the axle-tree turns. The frame-work conſiſts of two beams, ten feet long, and eight inches ſquare: betwixt them, at each end, is a traverſe quarter, ſix inches by four. In the middle of the length and width of the beams, riſe two uprights, which are mortiſed and pinned: they are twelve feet eight inches high without their tenons, fourteen inches wide, and ſix inches thick, ſupported by a brace mortiſed into the front at the height of two feet, at the back part four feet and a half. Betwixt theſe two uprights is the block on which the beetles fall: it is made of a piece of dry tough elm, four feet and a half long betwixt the uprights, to which it is joined by a dove-tail two inches thick, and as much deep: it is twenty inches high, and eighteen broad: it reſts the whole breadth of its ends on the edge of the beams, and betwixt them, on three pieces of wood, at equal diſtances, that lie on the brick-work, which ſupports the whole. The block is divided croſs-ways, by a partition two inches thick, parallel with the uprights, and of the ſame breadth, fixed into the block by two tenons, and in a groove wide enough to receive its whole thickneſs; the ſame is obſerved in the back part of the firſt keep, which is fixed: the upper end is, in like manner, fixed to the upper-keep: this partition divides the block croſs-ways into two troughs, each twenty inches long, formed by two ſloping planks; ſo that the troughs are four inches and a half wide at the bottom within, eleven inches and a half at the top, and twelve inches perpendicularly high: and to prevent the loſs of the light duſt that riſes in the work, the ſpace betwixt the edge of the troughs, and the firſt keep, is boarded up; the boards at the back-part, as well as the ſides of the troughs there, are faſtened with grooves and dove-tails into the uprights and partition; thoſe before lift up in a groove like a ſaſh, and are faſtened by turn-buckles; the fronts of the troughs take entirely off; the pulverized root is taken out with a wooden ſpoon, and a feather broom, and they let it fall on a ſhelf before, which has a ledge four inches high: the fronts of the troughs are then put on again, and are filled with branch-madder; the ſliding-ſhutters are pulled down, and the peſtles are ſet at liberty to work, which had before been ſtopped whilſt the troughs were emptied; this takes but little time in doing; and the mill continues going during the time they gather up the root, and bolt or ſift it. There are two keeps, which ſerve to direct the beetles: the under part of the firſt is three feet, and the under part of the ſecond ten feet: above the block they are three inches and a half thick; the firſt is made level in the front with the back of the groove, that the ſliding ſhutters may reſt on it when they are raiſed. Each keep conſiſts of two parts; thoſe at the back are let into the uprights, and pinned to them, and ſtrongly faſtened to the partition: thoſe in the front are made to take down, and put up, as occaſion ſerves; they ſlide in the grooves of the uprights, and thoſe that run along the middle of the partition: they have, beſides, two pins, by which they are kept in their places.

The beetles are, at the lower part, twelve inches wide, eighteen inches high, and four inches thick; ſo that their face, or bottom, contains forty-eight ſquare inches: the upper part, or ſtock of each peſtle, is eight feet and a half long, four inches wide, and three thick; ſo that in the whole, they are ten feet long, without compriſing the cutters, which are four inches long, and formed like a carpenter's chiſſel: the blades of them are two inches and a half wide, and the tongues three inches and a half long: there are ſeventeen to each beetle. There are no catches, becauſe the lifters being in contact with their extremity, always at the ſame diſtance, five inches from the center of gravity of the beetles, the reſiſtance occaſioned by the friction of the ſtocks in the keeps, would have been very conſiderable. To avoid this inconvenience, a mortiſe twenty-five inches long, and three inches wide, is made in the face of the ſtocks of the peſtles, ſtrengthened on the ſides by cheeks two inches thick. The upper parts of theſe mortiſes are ſix feet above the block; that is, on a level with the center of the axle-tree: this part is lined with a plate of copper, ſtrongly ſcrewed, well poliſhed, and rounded at the edge, to facilitate the fall of the beetles. On the ſide of the beetle-ſtock, ſixteen inches below the upper keep, are fixed catches a full inch thick, two inches high, and projecting four inches, to keep the beetles up while the troughs are emptying.

The levers, which ſerve for this purpoſe, are placed behind, and reſt on ſhoulders fixed on a piece of wood, which bears by its two ends on two brackets, mortiſed and pinned into the two uprights, and ſupported by braces: theſe pieces are ſix inches ſquare. The levers are made of quarter-ſtuff, ſix inches and a half ſquare, as well as the lifters of the axle-tree. The upper face of the ſhorteſt arm of the lever is rounded like the lifters, in a curve deſcribed by the original circle, the radius of which is the ſpace from the middle of the catch to the center of motion of the lever, which ſhould be parallel to the bottom of the catch. The radius of this circle, as well as the greateſt of the curve, ſhould be fifteen inches, that the beetle, being raiſed thirteen or fourteen inches, may not ſlip off. That the levers may be the ſtronger, the wood muſt not be croſs-grained; and in the center of motion, it ſhould be traverſed by a ſquare iron bar, projecting two inches on each ſide: theſe projections, being rounded into pivots, reſt on the ſhoulders in braſs ſockets. A cord is faſtened to the ſhorteſt arm, and the end of it is faſtened occaſionally to wooden pins at the back of the block, to keep the levers ſomewhat lower than the catches, whilſt the beetles are at work. The longeſt arm leſſens by degrees towards the end, till it is reduced to a ſquare: at this part is fixed another cord, which is faſtened to the ſame wooden pins, when the beetles are to be kept up. The above deſcription, with figures on the copper-plate, will be ſufficient for an ingenious mechanic to conſtruct a mill of this kind, which will doubtleſs be of great advantage to this kingdom, as conſiderable quantities of madder are now planted, and ſome of it fit for uſe.

REMARKS.

The beetles of this mill weigh only one hundred pounds with their mounting; perhaps a few pounds more, which may be abſtracted by taking off a few inches of the lower part: there are never more than two beetles raiſed at a time, and one hundred and thirty-three pounds and a half for the power to act upon. A middle-ſized horſe is generally reckoned able to apply one hundred and eighty pounds of his ſtrength to move a machine, working for four hours together, and going three thouſand ſix hundred yards in an hour: he often goes faſter, but ſo was this mill calculated: there remains then forty-ſix pounds and two-thirds for the action, which is more than it amounts to in this machine: we may even venture to aſſert, that the friction of it is leſs than any other mill of the kind. A horſe may bear this work the better, as every five or ſix minutes there are two or three minutes reſpite to empty the troughs, and give them a freſh ſupply. This mill at Corbeil never pulverized above two hundred pounds of roots a day, becauſe that was all the kiln could ſupply it with; but the time in which this work was done, induces us to think it could eaſily pulverize four hundred and eighty, or five hundred pounds. They ſay that the Liſle mill can pulverize five hundred pounds in twenty hours: we ſcarcely believe it, eſpecially as we imagine it does not work in the night: thus we muſt ſuppoſe it really works only ten hours, like that at Corbeil. Be it as it may, the work of theſe mills ſhould be calculated by the weight of their beetles, the number of blows they ſtrike in a minute, and the ſuperficies of their baſes; that is, the Corbeil mill is to that of Liſle, as four hundred pounds, the weight of the four beetles multiplied by two hundred and forty, the number of blows they ſtrike in a minute, and the product by one hundred and ninety-two, the ſuperficies of the baſes of the four beetles, is to three hundred and eighty-five, the weight of the five beetles, multiplied by one hundred forty-two and a half, the number of blows they ſtrike in a minute, and the product by ſixty-three, the ſuperficies of the baſes of the five beetles; or, after the numbers are reduced, as ſixteen is to three; by which it appears, that if the Corbeil mill pulverizes five hundred pounds in twelve hours, that of Liſle ſhould pulverize no more than one hundred.

The indifference they diſcover in Flanders, with reſpect to the ſituation of the kilns and mills, is worthy of blame: they are, it is ſaid, in ſeparate buildings, which have no communication: nothing can be more inconvenient. It is well known at Corbeil, that the root, which they ſome time ago pulverized in a little hand-mill, fixed in a barn, ten or eleven yards from the kiln, which had no influence to warm it, grew damp, and clogged under the cutters, by which it was much damaged. This work is always done in winter, and it is ſcarcely poſſible it ſhould be otherwiſe: the fogs muſt therefore be guarded againſt.

The kiln we have recommended would contain four thouſand pounds weight of green madder, which would yield five hundred pounds of dry root when it had been there forty-eight hours: the mill can pulverize this quantity in a day. If one had a very conſiderable crop, for inſtance, four hundred thouſand pounds, which would yield fifty thouſand pounds of dry root, and this is as much as the mill could turn out in four winter months, working every day, it would be neceſſary to have two kilns. The buildings to contain the kilns and mill might be diſpoſed nearly in the following manner. A building ſhould be erected ſixty-three feet long, and twenty-one wide, with a floor twenty or twenty-two feet from the ground, which ſhould be a ſtore-room for part of the green root: the under part ſhould be occupied by the mill and its frame-work, ſo that at each end there would be a ſpace of eighteen feet to the walls at the extremities: in the middle of this ſpace the apertures of the furnaces to heat the ſtoves ſhould be made, which ſhould be ſo ſituated, that the floors of the kilns ſhould be on a level with that of the ſtore-room: trap-doors might be contrived in the floor of the ſtore-room, to throw the dried roots down; and as they ought to be kept dry till they go to the mill, they may be heaped round the furnaces under the reverſed pyramids of kilns; for they ſhould be kept dry till they are barrelled up.

On a ſuppoſition that the produce of four hundred thouſand pounds might be pulverized in the four winter months, ſome place ſhould be provided to keep it in proper order till the laſt went to the kiln: it muſt be ſpread at moſt two feet thick, that it may every day be turned. Experience convinces us, that eight cubic feet of green root weigh one hundred pounds. The ſurface of the granary will give one thouſand three hundred and twenty-three ſquare feet, which, divided by four, give three hundred and thirty quintals and a quarter, or thirty-three thouſand ſeventy-five pounds; but this does not come near four hundred thouſand pounds. It is preſumed, the beſt way would be to erect ſome large building, four or five ſtories high, which might altogether contain, at leaſt, twelve times as much as the ſtore-room above-mentioned; but this expence might be ſaved, if the root could be taken up in ſmall quantities during the autumn, winter, and part of the ſpring.

Explanation of the Figures of the Corbeil *Mill.*

Fig. 4. Plate XVIII. is the frame-work of the mill ſeen in the front: Fig. 3. is the ſame frame-work ſeen endwiſe, the upright and beam being taken off.

A,

A, beams, eight inches ſquare, ſeen end-wiſe (Fig. 4.) and the length of one of them, which is ten feet (Fig. 5.)

B, traverſe quarters, which are fixed into the beams: the length of one of them is ſeen (Fig. 4.) and the ends of both are ſeen (Fig. 5.) they are ſix inches by four.

C, a flooring or ſtage, laid on the grooved edge of the beams, and the traverſe quarter.

D, uprights, fixed to the beams: their thickneſs may be ſeen (Fig. 4.) the top of one of the uprights only is perceivable (Fig. 5.) over the upper keep, N; and the breadth of the bottom is diſtinguiſhed by two pricked lines on the end of the block which covers it, as the remainder of it is concealed by the middle partition. Theſe uprights are twelve feet eight inches high, ſix inches thick, fourteen inches broad, as high as the axle-tree, then reduced to ten inches.

E, braces, which keep the uprights ſteady on the beams; thoſe in the front are mortiſed at the height of two feet, thoſe behind at four and a half: they are ſix inches by four.

F, the block, on which the beetles fall: it is made of elm, four feet and a half long betwixt the uprights, and twenty inches high by eighteen broad: it has at each end a dove-tail two inches thick, and as much deep, which goes into the grooves of the uprights.

G, a ſhelf, level with the upper part of the block, of the ſame length, twelve inches wide, two inches thick, and a ledge four inches high: it reſts on a groove at the edge of the block, and on the brackets H, Fig. 4 and 5.

I, three pieces of wood, which ſupport the block.

K, the brick-work, which is the foundation of the frame-work.

L, a partition which divides the block into two parts: it reaches from the block to the upper keep; it is two inches thick, and the ſame breadth and ſhape as the uprights: it has on the front, and two ſides next the uprights, grooves which run up till it begins to narrow; there are other ſimilar grooves in the uprights. This partition conſiſts of two parts: the lower part is fixed in a groove of the block, and above with a tenon, and is beſides pinned to the back part of the firſt keep, which is fixed: the upper part is tenoned into the upper part of the firſt keep, and the under part of the ſecond: they go into grooves that croſs the whole breadth of the front parts of the keeps, which are moveable.

M, troughs in which the roots are kept: they are four inches and a half wide at bottom, eleven inches and a half at top, and twelve inches perpendicularly: they conſiſt of two boards ſloping before and behind (Fig. 5.) the ſpace between their edges and the firſt keep is boarded up. In the front *d*, are ſliding ſhutters. The fronts of the troughs take off. In Fig. 4. is ſeen one of the troughs open, and the ſliding ſhutter puſhed up: two of the beetles are alſo viſible, one quite, the other half raiſed.

N, are keeps, three inches and a half: their breadth conſiſts of two parts: thoſe behind are entirely fixed to the uprights: they are ſeven inches broad, notched half the thickneſs of the ſtocks of the beetles, in the parts where they paſs: the other two pieces take off at pleaſure, and are notched in the ſame manner to give the beetles room to work: they have each of them two keys, or tongues, four inches broad, four long, and one thick, which go into the mortiſes in the fixed part of the keep, between the ſtocks of the two beetles belonging to each trough, where they are faſtened by two large pins, *g*. They ſlide on the grooves of the uprights: the undermoſt is ſix inches broad, that the ſhutters may ſlide over it: the uppermoſt is four inches, conſequently projects an inch: the edges are rounded off. The under part of the firſt keep is three feet above the block; the under part of the ſecond, ten feet.

O, beetles, ten feet high: they are twelve inches broad at bottom, to the hight of eighteen inches (Fig. 4.) four inches thick (Fig. 5.) with a ſtock eight inches and a half long, and four inches broad, by three thick. At an inch above the firſt keep, they are left ſeven inches broad, for thirty-ſeven or thirty-eight inches, to make room for a large mortiſe, *h*, twenty-four inches long, and three inches wide. The upper part of the mortiſe is lined with copper, the angle being rounded off. Sixteen inches below the ſecond keep, there are, on the ſides of the ſtocks catches, *i*, two inches high, an inch thick, and projecting four inches. The bottoms of the beetles are ſecured with an iron band, *m*, one inch and a half broad, and four lines thick, and armed with ſeventeen cutters, *n*. The order in which they are placed may be ſeen in Fig. 7. and the ſhape of them in Fig. 8.

P, (Fig. 4.) is a bracket ſix inches ſquare, with its brace, both mortiſed and pinned into the upright (Fig. 5.) There is another on the other upright, not viſible in Fig. 4.

Q, (Fig. 4.) a piece ſix inches ſquare, fixed to the brackets. The end of it might have been ſeen in Fig. 5. but it was not pointed out to avoid confuſion.

R, ſhoulders, reſting on, and pinned to the piece Q, notched at *o*, to receive the levers, Fig. 4. and alſo at *p*, Fig. 5. to receive their pivots.

S, levers which ſerve to raiſe the beetles, and keep them up while the troughs are emptied: they reſt on ſhoulders, R, where they play: they are made of a piece of even grained wood ſix inches broad, and two inches and a half thick: the length of the ſhorteſt arm is fifteen inches; that of the longeſt ſixty inches. The center of the point ſhould be on a level with the under part of the catches. At the extremity of the long arm is faſtened a cord, *q*, which is fixed to the pins, *r*, in the block, when the beetles are raiſed thirteen or fourteen inches. Another cord, *s*, is faſtened as near as poſſible to the end of the ſhort arm, which is tied to the ſame pins *r*, when the beetles are at work.

T, the turning axle-tree, ſeen endways, Fig. 5. and in front, Fig. 6. It is round, and fourteen inches diameter. It is furniſhed with twelve lifters, on four planes, ſo diſpoſed, that, when it is at work, the lifters anſwer the mortiſes, *h*, Fig. 4. by which they raiſe the beetles, without touching the ſides: they may all be ſeen in Fig. 5. Thoſe that are on the ſame plane, are diſtinguiſhed by the ſame figures, 1, 2, 3, 4, as well here as in Fig. 6. They are made out of pieces of wood, ſix inches broad, and two inches and a half thick: their tenons, X, Fig. 5. are two inches and a half by two, and as long as poſſible, without touching in the center of the axle-tree. From the center of the axle-tree, to the point of contact of the levers with the mortiſes, *h*, is twelve inches: this point is five or ſix lines under the mortiſes. Great care muſt be taken, that the tenons of the lifters be not made of croſs-grained wood.

V, V, (Fig. 7.) the baſe of a beetle, to explain the manner of placing the cutters, which are repreſented by black lines, as if only their edges were ſeen. The pricked lines make the diviſion of the ſuperficies to arrange them.

Y, (Fig. 8.) one of the cutters, marked *n*, Fig. 4, and 5. The height from the upper part of the ſhoulder to the edge, is four inches; the tongue three inches and a half; its largeſt part half an inch ſquare; the ſhoulder about eighteen lines diameter: the edges twenty-ſeven lines broad; they ſhould be ſteeled and ſhort.

The Fig. 7. and 8. are drawn by a ſcale, four times as large as the reſt, that their parts might be the better diſtinguiſhed.

MADS, earth-worms.

MAIZE, a ſpecies of grain ſo generally uſed for food in America, that it has obtained the name of Indian corn.

The ſize of its ear differs greatly, according to the fertility of the ſoil, and the warmth of the climate in which it is cultivated; but, at a medium, it is about a ſpan long, and commonly has eight or more rows of grain, each of which uſually contains upwards of thirty ſeeds, of various colours, as red, white, yellow, blue, olive, greeniſh, blackiſh, ſpeckled, ſtriped, &c. ſometimes in the ſame field, and the ſame ear: but the white and yellow are the moſt common: nor does this diverſity of colours ever reach beyond the outſide of the grain, the flour of which always is white, with a little tinge of yellow. Theſe ſeeds, which are as big as large peas, are round at their outer ſurface, very ſmooth, and ſet extremely cloſe, in ſtraight lines. The ear is cloathed and armed with ſeveral ſtrong thick huſks, which defend it not only from unſeaſonable rains, and the cold of the night; for it does not ripen fully in ſome places, till towards the latter-end of September, but alſo from crows and other birds, which, being allured by the ſweetneſs of the grain before it hardens, flock to it in great numbers, ſuck through the top of the outer covering, and devour as far as they can reach. In the northern colonies, the ſtalk of this plant, which contains a remarkably ſweet pith, and is jointed like a cane, does not grow near ſo high as in the ſouthern parts. It has long leaves, almoſt like flags, at every joint, and at the top a bunch of flowers, of various colours, highly pleaſing to the eye. The northern Indians, far up in the country, have a ſpecies of this grain, called Mohawk's corn, which never grows high, and, though planted in June, ripens in due ſeaſon. The general time of planting it, is between the middle of March and the beginning of June, or, more particularly, from the middle of April to the middle of May.

Mr. Ray was of opinion, that there are only two really diſtinct ſpecies of this plant; but Mr. Miller is certain there are three, which do not alter by culture, and he enumerates them in the following manner:

“ The firſt of theſe, with yellow grains, grows naturally in the iſlands of the Weſt-Indies, and has a very large ſtrong ſtalk, which riſes to the height of ten or twelve feet. Its leaves have a broad white mid-rib, are long, broad, and hang downward. The male flowers (for maize has both male and female flowers, ſituated at remote diſtances on the ſame plants) come out in branching ſpikes at the upper part of the ſtalks, and are from eight to ten inches long. The female flowers come out from the bottom of the leaves on the ſide of the ſtalk, and are diſpoſed in a cloſe, long, thick ſpike, which is covered cloſely with their leaves: out of the end of this cover hangs a thin long bunch of filaments or threads, which are ſuppoſed to convey the *farina fæcundans* of the male flowers to the germe of the female. When the ſeeds of this ſort are ripe, the ſpikes or ears are nine or ten inches long, and ſometimes a foot: but theſe rarely ripen in England.

“ The ſecond ſort, which has white grains, is cultivated in Italy, Spain, and Portugal. The ſtalks of this ſpecies are ſlenderer than thoſe of the former, and ſeldom riſe more than ſix or ſeven feet high. Its leaves are likewiſe narrower, are hollowed like the keel of a boat, and their tops hang downward. The ſpikes of the male flowers of this are ſhorter than thoſe of the former ſort, and the ears, or ſpikes of grain are ſlenderer, and not more than ſix or ſeven inches long. The grains of this ſort do not come to maturity in England, unleſs the ſeaſon proves very warm, and they are planted early in a warm ſoil and ſituation.

“ The third ſpecies, which has a yellow and white ſpike, is cultivated in the northern parts of America, and alſo in Germany. The ſtalks of this are ſlender, and ſeldom riſe more than four feet high. Its leaves are ſhorter and narrower than thoſe of the two former, are hollowed like the keel of a boat, and their tops hang down. The ſpikes of the male flowers of this ſort are ſhorter than thoſe of the others, and the ears, or ſpikes of grain, are ſeldom more than four or five inches long. This ſort ripens perfectly well in England, in as little time as barley, and therefore may be cultivated here to advantage.”

This plant is ſeldom cultivated in England for uſe, tho' it might probably turn to good account, as was lately experienced by a gentleman in Lincolnſhire, who planted this corn in an open field, where it ripened perfectly, and yielded an abundant crop; but very great quantities of it are raiſed in Aſia and Africa, in ſeveral parts of France, in Italy, Germany, and North America; its culture in the latter is given in the following manner, by a very worthy and ingenious gentleman of that country, who ſpeaks from his own knowledge.

“ The Engliſh in North America plough the ground thoroughly before the grain is planted. They ſeldom, if ever, dung the whole face of the field, but ſometimes put a little dung in each hill of corn, if they think the ground requires it. Where fiſh are plenty, in the planting ſeaſon, they put two or three ſmall fiſh into each hill, with the grain.

“ In order to plant the corn, they make trenches, or furrows, with a plough, acroſs the field, at certain diſtances from each other, and croſs theſe with others of the ſame diſtance, which divide the field into ſquares; and where the trenches interſect, the grain is put in, and covered. Three or four grains are commonly planted for each hill. The intermediate ground is afterwards ploughed at leiſure, as the plants grow, and want more looſe earth for the roots to ſpread in. The hills are made at the time of weeding; ſome looſe earth being then hoed up over the roots, and round the ſtems or ſtalks of the corn.

“ The corn is planted at different diſtances in different places. In the northern colonies, the Indian corn grows low; ſeldom exceeding four or five feet in height; and the leaves being proportionably ſmall, the plants do not require ſo much ground as in the ſouthern colonies, where they frequently riſe to fourteen or fifteen feet. The ſpace generally allowed for the loweſt plants, is three feet, and for the higheſt five or ſix. This diſtance may be more neceſſary in our manner of cultivating this corn; more ground being required to nouriſh three or four plants than one; for I do not know that we ever pluck up any of the plants. An advantage attending this method is, that the labour is leſs in hilling; three or four plants being earthed up in the ſame time as one; and there is more room for paſſing between the rows when the corn is to be weeded.

“ At the ſame time that the corn is weeded, the ground is looſened round the plants, with a hoe, and the hills are raiſed and enlarged from time to time, by adding more earth. The morning, before the dew is off, and the evening, are reckoned better for this work, than the middle of the day.

“ The hilling of the corn, as it grows, has been the univerſal practice: the deſign being to give the plant more nouriſhment, and to ſupport it better againſt the winds: but of late, ſome planters have thought it better to plant in holes: the reaſon is, that this plant requires a good deal of moiſture; and indeed nature, by the form and poſition of the leaf, appears to have intended the receiving of the rain that falls around, and conducting it to the ſtalk, and by that down to the roots: but a hill round the ſtalk, tends to throw the water off to a greater diſtance: and as to ſupporting the plants, they ſay the hills do not affect it, becauſe, by covering the ſtalks in that part from the air and ſun, which would harden and ſtrengthen them, the mould around them keeps them ſoft and tender, and thereby rather weakens them.

“ The panicles, or toſſils, contain the *farina fœcundans* of the plant, and therefore ſhould not be cut off till the grain in the ear is filled. If the toſſils of a whole field ſhould be cut off before that time, there would be no grain at all in the ears. This has been proved by experiment.

“ In the more ſouthern colonies, where hay is ſcarce, and the leaves of this corn are very large, they cut them off for fodder: but in the northern colonies, where there is plenty of hay, and the leaves of the corn are ſmall, they generally neglect cutting off the toſſils, and ſtripping off the leaves. They are left on the ſtalks, and the cattle, being turned into the fields, after the corn is gathered in, eat what they like of them: but they are not eſteemed ſo good as what has been cut in ſeaſon.

“ An eaſy way of taking the grain out of the ears is, to rub one againſt another, holding one in each hand.

“ When the ears are ſtript of their huſks, they are reckoned in the beſt ſtate for preſervation; much better than when the grain is rubbed off from the ear: for then, they ſay, inſects can get at the ſoft part of the grain, and eat into it, which they cannot do while the ſoft part is connected with the cob in the ear, and the hard flinty part of every grain turned outward, and the grains cloſe to each other.

“ To preſerve this corn, they make in North America a ſort of bins, or cages, which they call corn-cribs, 15 or 16 feet long, and five or ſix wide, widening upwards to the top a foot or more. They are made of ſapling poles, three or four inches diameter, framed roughly together, by notching the ends where they croſs the corners, at ſuch a diſtance from each other, as but juſt to keep the ears from falling through, that there may be a free paſſage for the air. Theſe bins ſtand abroad, and have a ſlight moveable covering, or thatch, to keep out the rain. The Indians burry their corn in holes in the ground, lined with mats and dry leaves.

The manner of uſing this corn in America, is various. It has this advantage over wheat, that ſubſiſtance may be drawn from your corn-fields long before the general harveſt: for the green ears roaſted, are delicate food; and as the corn ripens and grows harder, the ears boiled are good eating, with butter and ſalt. When it is ripe, the corn parched and ground into meal, is the hunting and war proviſion of the Indians, being light to carry, and affording good nouriſhment. They mix a little of it with water, and it needs no other cooking, having already paſſed the fire in the parching. The grain ſoaked in water, will part with its ſkin when beat in a large mortar with a wooden peſtle: then it is boiled, and eaten with milk. Being pounded coarſely, dry, it is alſo boiled and eaten as rice. Bag puddings, and baked puddings made of it properly, are very good. The meal is alſo boiled with water, to make what they call a haſty pudding, which they eat with butter and ſugar, or with milk. This haſty pudding, or boiled meal, being mixed with twice as much dry wheat flour, and worked into loaves, makes much better and pleaſanter bread than flour alone. All creatures fed with Indian corn, have firm and fat fleſh: the pork of corn-fed hogs, is reckoned the fineſt in the world for taſte and goodneſs; their fat is milk-white, and as hard as butter. The horſes of Virginia and Maryland, whoſe chief fodder is the leaves and ſtalks of this corn, are reckoned the hardieſt of the ſpecies, bearing moſt labour, and requiring leaſt care; and the people of thoſe countries where it is the common food of men, are healthy, ſtrong, and hardy."

This corn is thought to keep better than wheat, and has frequently been of infinite ſervice in many countries in times of ſcarcity of other grain. It anſwers all the purpoſes of the white pea, of about the ſize of which its grains are, and would certainly be a better ſubſtitute for the poor, than bean-flour, or ſome other ſorts, which have been uſed even in England, where maize may doubtleſs be cultivated to advantage in light ſandy lands, in which beans and peas do not thrive well. It is excellent for feeding poultry, either given whole to the larger ſort of fowls, or broken a little for the ſmaller. The Breſcians, in particular, who are remarkable for the fatneſs of their capons, uſe a great deal of it for this purpoſe. The Indians reckon it a good remedy in all acute diſorders; and it has been obſerved, that thoſe people are very little ſubject to the ſtone, which ſome aſcribe to their living upon this corn. They extract from its ſtalk, when green, a ſweet ſyrup, which anſwers all the ends of ſugar; and when the ſtems are diveſted of their ears, and dried, they make excellent fences, coverings of ſheds, &c.

The Indians, and ſome Engliſh, particularly where the ground is good, and has been well manured with fiſh, plant with the maize, in every corn hill, a kind of French beans, which run up the ſtem of the corn, and are ſupported by it: others plant potatoes, gourds or pumkins, and others again ſow turneps, in the intermediate ſpaces between the hills.

Some curious perſons, by way of experiment, have planted ſeeds of only one colour in the ſame field, without any other coloured ſeeds near them, and their produce has been intirely of the ſame colour: but when the rows have been planted alternately with grains of different colours, they have interchanged, and produced a mixture of all the ſorts in the ſame row, and frequently, as was ſaid before, on one and the ſame ſpike. It is even affirmed, that they will mix with each other at the diſtance of four or five rods, if no tall fence or building ſtands between, ſo as to intercept their communication.

Mr. Miller, who mentions this, very rightly recommends the horſe-hoeing huſbandry, as, in all reſpects, fitteſt for the culture of maize; and gives the following as a method in which it has ſucceeded beyond expectation.

The land, which was very light and ſandy, and far from being rich, was ploughed deep before winter, and laid up in high ridges till the ſpring, when it was broken fine with the harrow. It was ploughed again in April, laid level, harrowed ſmooth, and then ſowed in drills four feet aſunder, into which the ſeeds were dropped at the diſtance of about eight or nine inches from each other. When the plants were about three inches high, they were thinned with a hand-hoe, by cutting up ſome of them where they grew too cloſe, and the intervals between the rows were ploughed ſhallow, to deſtroy the young weeds: but when the ſtems were advanced, the ground in the intervals was ploughed deep, and the earth laid up to the plants on both ſides; and when the weeds began to grow again, a third ploughing was given, to deſtroy them. This kept the ground pretty clean from weeds till the corn was ripe, as the ſeaſon did not prove wet; for otherwiſe a fourth ploughing would have been neceſſary. Each of the ſtalks of theſe plants produced from three to ſix ſpikes of grain.

Sir Richard Bulkley, who planted ſome of this corn in Ireland, from ſeed which grew in Brandenburgh, had, from each of his grains, which were ſet a foot aſunder in rows about a yard diſtant from each other, from three to ſix ſtems, and upon each ſtem three ſpikes or ears of corn, with two hundred and forty grains in each ſpike. An amazing increaſe!

Some good huſbandmen in France, have cultivated this grain upon nearly the ſame principles as thoſe which Mr. Miller points out. The little differences in their methods may not be un-inſtructing: for which reaſon we ſhall here give the ſubſtance of M. Duhamel's account of their management of this corn.

" Maize thrives better in a light and ſandy ſoil, than in ſtiff and clayey land. It cannot do without dung; and the ground intended for it ſhould receive two good ploughings in March. A third ploughing, which is given towards the end of April, makes the furrows for the ſeed; and what clods remain after this, are broken by hand, the furrows then preventing the uſe of a harrow.

" A fine clear day is choſen in May, to ſow the ſeed, which is done by making at the bottom of the furrows, with a ſtick or other inſtrument, ſmall holes, into each of which two grains of maize are dropped. The furrows are a foot and a half aſunder; and the holes, at the ſame diſtance from each other, are diſpoſed in ſuch manner that they form a kind of quincunx.

" When the corn is riſen, the weakeſt of the two plants is plucked up, where both ſeeds have ſprung; and where neither of them has grown, two new grains are planted.

" Towards the middle of June, the ground is hand-hoed round each plant; and as they ſtand in the bottom of a furrow, the mould which crumbles down, from time to time, lays freſh earth to their roots, and helps to ſupport them. About the end of July, a ſlight hoeing is given them, which is the laſt; and in ſo doing the earth is laid toward the roots of the plants.

" The panicles of the male flowers, which grow at the top of each plant, and are well known not to contain any grain, are cut off about the middle of Auguſt. But care muſt be taken that the grain be impregnated before they are cut off; which may be known by the then turgid appearance of the outward covering of the ears: nor ſhould the panicles be cut off from all the plants at the ſame time; becauſe ſome of the ears are not impregnated till a fortnight after others. Theſe panicles are excellent food for cattle. When they are cut, or ſhortly after, all the leaves are ſtripped off the ſtalks, together with all the blighted and ſmutty ears: for it is ſaid that the good ears would not grow ſo large, nor the grains be ſo well nouriſhed, if they ſhould be left upon the ſtalks. All theſe leaves and ears are given as fodder to oxen; and it is remarkable, that thoſe creatures are fonder of the ſmutty ears than of all the reſt.

" The time for reaping maize is towards the end of September. The ears are then gathered by hand, and put into baſkets, in which they are carried and laid in heaps from ſpace to ſpace in the field; after which they are loaded in carts, carried home, and ſpread upon an even floor prepared for that purpoſe. They are then taken out of their ſheath or hood, and dried in the ſun before they are laid up in the granary; or elſe the grain is taken out at that time. Maize which has been well dried in the ſun will keep ſeveral years, and not be the leſs fit for ſowing. The granary ſhould be very dry, and the corn laid up in it ſhould be turned at leaſt every three months, to prevent its growing muſty, or being attacked by inſects.

" There are two ways of taking out the grain. The firſt, which is the moſt expeditious, is by threſhing it with a flail: but in this method a great deal of the corn is broken or bruiſed. The ſecond, and more common, is by by rubbing the ears hard againſt the edge of a flat piece of iron. This eaſily ſeparates the grains from the ſpike, or cob, without hurting them, and this remainder of the ear is very good food for oxen.

" As ſoon as the ears are gathered, the ſtalks remaining in the ground are plucked up, and laid by for winter fodder, for oxen. The field is afterward ploughed up as ſoon as poſſible: it being the general opinion of farmers, that the roots of the maize would otherwiſe continue to ſuck up the rich particles of the earth. Whether this be true, or not, their notion is, that if this ploughing ſhould be deferred, the next year's crop would certainly ſuffer by it.

" When maize is planted only for fodder, particularly of cows and oxen, it is ſowed very thick, and harrowed in, or covered with a rake, in a good ſoil, which has been ploughed twice, and well dunged: but it is obſerved, that in theſe thick ſowings, all the female flowers are barren, and produce no grain: and it likewiſe is ſo great an impoveriſher of land, that though the ground be dunged every time it is planted, wheat never does ſo well where this corn has grown, as in the neighbouring fields where it never was."

M. Aimen, M. D. in the province of Guyenne, where great quantities of this corn are raiſed, obſerves to M. Duhamel, 1. That it is important to ſow maize rather in the beginning than at the latter end of May; becauſe, if it is ſowed early, the plants will have acquired ſufficient ſtrength before the great heats, to ſhoot out then with vigour; nor will their ears be burnt, or liable to that barrenneſs to which they are ſubject when this corn is ſowed late; beſides which, the ſtalks will be ſtronger, and their ears larger and fuller of grain. 2. That the ears of maize are greatly hurt by cutting the panicles too late; and that they ought to be cut before the hoods are open. By leaving a plant with its male flowers at every twenty feet diſtance, all the female ears will be impregnated.

In two different, but ſucceſſive years, this gentleman ſingled out two rows of maize, the plants of which ſeemed to him equally ſtrong. He cut off the panicles of the male flowers of all the plants in the firſt row, before their hoods opened, and let the panicles of the other row remain till the uſual time of performing this operation: the conſequence was, that the female ears of the firſt row were much the largeſt and beſt filled with grain.

He likewiſe ſowed a row of maize at a diſtance from any other field planted with that corn, and cut off the panicles of that row before the hoods were opened; leaving only one plant with its male flowers at every twenty feet diſtance. At harveſt, he obſerved, 1. That all the female ears of all the plants were impregnated. 2. That the female ears of the plants which had loſt their male panicles early, were thicker, longer, and fuller of corn than any others. 3. That the female ears of the plants whoſe panicles had been cut late, were ſmaller and ſhorter, and that in ſome parts of them the grains were abortive.

To ſatisfy himſelf whether it be beſt to ſow maize thick, or thin, he planted three different ſpots of ground with this corn, on the third of April 1753. The ſeed uſed for the firſt, where the grains were placed about a foot and a half aſunder, according to the common practice of the country, in which experience had inſtructed the huſbandman, weighed one ounce and one pennyweight: the ſecond, in which the grains were only a foot aſunder, was ſowed with two ounces and two pennyweights of ſeed: and the third, in which they were but ſix inches apart, was ſowed with four ounces and a half. The firſt of theſe ſpots produced eighteen pounds and four ounces of grain: the ſecond, fifteen pounds ſeven ounces: and the third, eleven pounds two ounces. A manifeſt proof, as M. Duhamel obſerves, that ſome ſorts of grain will not thrive unleſs they are ſown very thin; and that, for want of this precaution, a great deal of corn is often loſt, and the crops are conſiderably diminiſhed.

As maize is a large plant, and requires much nouriſhment, it would certainly be right to try the culture of it with the horſe-hoe: to this end, it will be proper to plant the rows two feet aſunder, and the grains in them twelve or fourteen inches apart. All the neceſſary hoeings may then be given with the cultivator drawn by one horſe; and I believe, with Mr. Miller, M. Aimen, and M. Duhamel, that the corn will thrive the better for it, and the land be afterwards fitted for other grain. It is worth the while of thoſe who live in the countries where maize is cultivated, to try what will be the effect of this method.

MALANDERS, cracks in the bend of a horſe's knee, that diſcharge a ſharp indigeſted matter; they are often the occaſion of lameneſs, ſtiffneſs, and the horſe's tumbling.

This diſtemper is cured by waſhing the parts with a lather of ſope warmed, or old chamber-ley; and then applying over the cracks a ſtrong mercurial ointment ſpread on tow, with which they ſhould be dreſſed, night and morning, till all the ſcabs fall off: if this ſhould not ſucceed, anoint them night and morning with a little of the following, and apply the above ointment over it.

> Take of Æthiops mineral half an ounce; white vitriol one dram; ſoft green ſope ſix ounces: anoint with this often, but firſt clip away the hair, and clear the ſcabs. On their drying up, it may be proper to give a gentle purge or two; or the nitre-balls may be taken advantageouſly for a fortnight or three weeks. *Bartlet's Farriery.*

MALT, is barley prepared, to fit it for making a potable liquor called beer, or ale, by ſtopping it ſhort in the beginning of vegetation.

It is ſaid, that the ſoil on which barley grows makes a conſiderable difference in the grain, and that the barley fitteſt for malt is that which grows on a rich, light, or gravelly ſoil, and which has been raiſed from ſeed brought from a farm of a different ſoil and ſituation. The fulleſt and largeſt grains of ſuch a crop ſhould be choſen for making malt. It ſhould be heavy and perfectly ſound, and ſuch as has not ſuffered any accident in the field. Its being a little heated in the mow, is by ſome reckoned an advantage, becauſe the grain will be the more equally dried, and will conſequently the more equally imbibe water. If it has been ſo much mow-burnt as to look blackiſh when broken at the root end, or, as Mr. Combrune ſays, if it has ſuffered a heat of 120 degrees, it is unfit to make good malt. It is alſo found by experience, that barley taken immediately from the field does not malt ſo kindly as that which has been ſome time in the houſe, or mow. Special care ſhould be taken that it be free from the ſeeds of weeds; for theſe, in the malting, are apt to give the grain a bad taſte, which cannot be afterwards got rid of.

By germination, all the principles of barley are put in action. The heat which it undergoes in malting ſeparates and divides its parts; and the viſcidity which it before poſſeſſed is removed by the looſer texture of its oils, and their intimate union with the ſalt, which gives malt the ſweetiſh taſte that diſtinguiſhes it from barley.

In order to its being malted, the barley is put into a ciſtern lined with lead or ſtone, and covered with water about ſix inches deep above the barley, to give room for its ſwelling. All the good grain will ſink in the water; but, after ſtirring it, the imperfect or diſtempered grains will riſe to the ſurface. Theſe ſhould be ſkimmed off, and given to poultry or hogs, for they will never make good malt. By the water's gaining admittance into the barley, a great quantity of the air is expelled; as appears from the number of bubbles which riſe on the ſurface.

The barley is left in the water two or three days, more or leſs, in proportion to the heat of the weather and the dryneſs of the barley. A judgment is formed that grain is fully ſaturated with water, from its appearing turgid, and eaſily giving way to an iron rod dropped perpendicularly into it. Or, take a corn from the middle of the ciſtern, and hold it ſteadily, by the two ends, between the fore-finger and thumb: preſs it gently, and if it continues firm when ſo preſſed, and the ſkin does not break, it muſt ſoak longer: if it cruſhes together and feels mellow, and the ſkin crack, it is watered enough. Nicety in this is a material point, and can be learnt only by experience. If the grain ſhould be ſuffered to remain too long in the water, it would begin to loſe part of its ſweetneſs. When it has been ſteeped ſufficiently, the water is drawn off.

The water uſed for this purpoſe ſhould be that of a clear running ſtream, or rain water; or, if ſuch cannot be had, pond water, provided it be ſweet and clean, will do very well; or pump water, which ſhould be rendered ſoft if it be naturally hard. If the water made uſe of is any way tainted, it communicates to the malt a taſte which it never loſes. Mr. Combrune adviſes the adding of lime to the water in which the barley is ſteeped: but this ſeems to be improper, becauſe it appears from Dr Home's experiments that lime renders water hard.

From the ciſtern, the barley is laid in a regular heap, or couch, where it muſt remain thirty hours, or till it contracts a heat. It muſt then be worked in one or more heaps, and turned every four, ſix, or eight hours, according as the weather is cold or hot. When it begins to ſpire, it ſhould be turned every three or four hours, according to the temperature of the air; and as it comes (for ſo its ſpiring is commonly termed) the heap muſt be ſpread thinner to cool it, leſt it be heated too much, and the germination be carried on too faſt, by which the oils would be too much conſumed. The turning of it muſt be continued in proportion as it is more or leſs ſlow in growth, ſo that it may be brought tolerably dry to the kiln. When the roots begin to deaden, the couch muſt be thickened again, and often turned, that the growth of the roots may not revive. At this time, the ſpire ſhould be near piercing through the outer ſkin of the barley: for if it grows quite out, the ſtrength of the malt will be too much conſumed. After the malt is made thus far, the common practice is to lay it at once on the kiln: but the beſt way is to gather it all up in one heap, to let it lie in that ſtate twelve hours, and then to turn it every fourth hour, during the ſpace of twenty-four hours.

No perſon ſhould be ſuffered to tread on the malt with their ſhoes, while it is on the floor; becauſe many grains are inevitably bruiſed thereby, and theſe, vegetating no longer, afford the roots of the other grains a ſubſtance into which they extend their fibres, and are by that means intangled in bunches: and beſides this, the bruiſed corn acquires a degree of putrefaction which taints the liquor made of the malt intermixed therewith. Equal care ſhould alſo be taken, that the grain be not bruiſed by any other means.

Mr. Combrune thinks, that the time moſt proper for malting is when the temperature of the air is ſuch that barley begins naturally to germinate, at which ſeaſon the thermometer marks from between thirty-two to forty degrees. How far that time may be extended, experience alone can determine. The warmer the weather is, the greater muſt be the diſadvantage under which the maltſter labours; becauſe the motion of the fluids is then ſo ſtrong, that the proceſs goes on too quick, and the finer parts are apt to fly off; the conſequence of which is, that inſtead of a ſweet, the malt inclines to a bitter taſte, the oils being turned rancid. This is ſo univerſally experienced, that brewers carefully avoid purchaſing what is termed latter made malt.

The grain thus prepared for drying is ſpread on the kiln, where, meeting with a heat greater than is ſuited to vegetation, its farther growth is ſtopped. It is ſpread on the kiln three or four inches thick, and turned every three or four hours. The laying of it thicker is attended with inconveniencies, among which is particularly its being unequally dried; and therefore that ſhould be avoided. The ſtrength and duration of the fire is different, according as the malt is intended to be dried, pale, amber, or brown. The pale malt requires more leiſure, and leſs fire, than the amber or brown.

Pale and amber malt are dried with coke or culm, which not emitting any ſmoke, give the malt a brighter colour, and do not communicate that bad reliſh which malt has when dried with wood, ſtraw, &c. the ſmoke of which taints it. Coke is beſt, becauſe its fire gives a ſteady and conſtant heat, whereby the malt is dried uniformly. If wood, or any vegetable fuel is uſed, it ſhould be extremely well dried, in order that, being as free as poſſible from moiſture, it may yield the leſs ſmoke.

The ſize of the malt kiln is generally proportioned to the quantity of malt for which it is intended. Some build their kiln ſquare, and others make it round; but this laſt is undoubtedly the beſt form, becauſe the heat of the fire is more equally diffuſed therein, and the grain is of courſe more equally dried. Various ſubſtances have been made uſe of for covering the kiln, ſuch as tiles, plates of tin, and wire: of theſe, the wire is to be preferred, becauſe it does not contract ſo great a degree of heat as to parch the grain in contact with it: but, for this very reaſon, hair cloth is preferable to any other covering; becauſe, when any part of the malt is in immediate contact with a ſubſtance much more ſolid than itſelf, and therefore capable of receiving a proportionably greater degree of heat, the malt in contact with that heated body is parched or burnt, by heat which is not equally diffuſed through the whole maſs, which maſs cannot therefore be all equally heated. The hair cloth is ſpread upon ſmall wooden rafters, and theſe are ſupported by bars of iron laid acroſs the kiln.

An ingenious and attentive maltſter marked the degree of heat in the malt whilſt on the floor: and the reſult of his obſervations in this reſpect is as follows. During the firſt ten days that the malt was on the floor, the heat in it was between 50 and 60 degrees. During the next three or four days, the heat was increaſed from 60 to 65 and 67 degrees; and during the laſt days of its lying there, to 80, 84, and 87, which laſt was the degree of heat when the malt was put on the kiln. There cannot be any abſolute rule as to the difference of heat during the different times in the proceſs of malting, becauſe it muſt be ſuited to the heat of the air: at leaſt we have not yet ſufficient data whereon to found ſuch a calculation. The heat of the malt on the kiln when fit for pale malt was 120 degrees, and when it was fit for brown the heat was 147.

This intelligent artiſt's obſervation, that the malt was fit for what is called pale malt when its heat was at 120 degrees, ſuggeſts a caution which ſhould be moſt carefully attended to, namely, that whatever colour it be intended to give to the malt, the heat at firſt ſhould always be the ſame: thus, for example, malt which is dried to the degree of high brown, ſhould firſt be rendered pale malt, then amber, and ſo on progreſſively; not by a ſudden increaſe of the fire, but by a longer continuance thereof. In this manner, the whole body of the grain is equally and gradually dried; whereas a ſtrong and quicker fire would parch, or as it were ſinge the outſide, while the internal parts remain moiſt: and as that moiſture is afterwards evaporated, it muſt crack the ſurrounding hardened cruſt, whereby the grain is again damaged in another reſpect.

As ſoon as the malt is dry, it muſt be removed from the kiln, and ſpread thin, that it may cool to the temperature of the air. It cannot be ſuppoſed, that any of its parts are capable of retaining the fire in ſuch manner as not to ſuffer it to eſcape; though ſome have conceited that they do. In proportion as malts are dried, their particles are more or leſs ſeparated, and coming in contact with water, they ſtrongly attract from it particles which fill up their interſtices. In maſhing, this action between the malt and the water generates a ſmall degree of heat, but no way durable; though from hence aroſe the opinion, that brown malt is full of fire.

Barley may, at a medium, be ſaid to loſe, by malting, one fourth part of its weight, including what is ſeparated from it by the roots ſcreened off: but this proportion varies, according as it is more or leſs dried.

The condition of the barley, as to its greenneſs or ripeneſs, at the time of its being gathered in, is clearly diſcernable when it is melted. If it was gathered green, it rather loſes than gains in quantity, the malt becomes of a ſmaller body, appears ſhrivelled, and often is unkindly hard; whilſt, on the contrary, that which was cut at full maturity increaſes in malting, appears plump, bright, and clear, if properly carried through the proceſs, and, on being cracked, readily yields that fine mealy ſubſtance ſo much deſired by the brewers.

Malt which has not had a ſufficient time to ſhoot, ſo that its plume, or acroſpire as the adepts in malting call it, may have reached to the inward ſkin of the barley, remains charged with too large a quantity of it's unattenuated

ated oils. All thoſe parts which have not been put in motion by the act of germination, will, when laid on the kiln to dry, be ſo hardened, as not to be ſoluble in water, and conſequently will be loſt to the ſtrength of the drink.

When malt is ſuffered to grow too much, or until the ſpire has ſhot through the ſkin of the barley; though all that is left be malt, yet, as too large a portion of its oils will have been expended in vegetation, the malt will be greatly diminiſhed in proportion to what it ought to have been, and what remains cannot be fit to brew drink for long keeping, becauſe of the loſs of the oils.

Malt which has been duly worked on the floor, will, if it has not been ſufficiently dried on the kiln, be apt to germinate or ſprout afreſh; perhaps to conceive ſo great a heat as to take fire; and ſhould it continue long with a moderate degree of heat, the leaſt evil that can be expected, is that it will grow mouldy and have an ill flavour.

Malt well worked, but over-dried, will be ſo hardened, or its ſaponaceous quality will be ſo deſtroyed, that it will not imbibe from the air that moiſture which is neceſſary to mellow it, and render it fit for brewing: for when it has been previouſly ſoftened by the moiſture of the air, it mixes more eaſily and more intimately with the water, and by that means yields a more copious extract, than it would otherwiſe do.

Malt juſt, or but lately, taken from the kiln, remains warm a conſiderable time. Until it becomes as cool as the ſurrounding air, it does not mellow by the addition of a due quantity of moiſture from the air: and the wort made of ſuch malt requires a much longer boiling before it breaks, than that which is made of malt ſome months old.

The practice of thoſe maltſters who ſprinkle water on malt newly taken from the kiln, to give it the appearance of having been made a proper time, or, to uſe their own expreſſion, to plump it, is highly blameable. It is, in fact, a downright fraud, practiſed chiefly becauſe leſs grain then fills the buſhel: but a farther evil is, that if it be not uſed ſpeedily, it heats, ſoon grows mouldy, and ſuffers great damage.

Malt dried on a kiln not ſufficiently heated muſt require a proportionably longer time for it to receive the due effect of the fire: for want of which it will be in the ſame ſtate as malt not thoroughly dried. Or if the fire be too quick, or too fierce, inſtead of gently evaporating the water from the corn, it ſcorches the outward ſkin, and ſeparates it from the body of the grain. The malt to which this happens is called blown malt; of which Mr. Combrune obſerves, that, by the internal expanſion of its parts, it occupies a larger ſpace than it ought to do. He adds, that if ſuch a fire be continued, it changes ſome parts of the grain into ſo brittle a ſubſtance, that the malt is ſaid to be glaſſy. The particles which are thus hardened will not diſſolve, or but in ſmall proportion: ſo that they frequently occaſion an almoſt total want of extract, which, in the phraſe of the art, is termed, ſetting the griſt.

The goodneſs of malt may be known by the following marks. Bite a grain of it aſunder, and if it taſtes mellow and ſweet, breaks ſoft, and is full of flour from one end to the other, it is good. If it has a round body, and upon putting ſome grains of it into water, they ſwim on the ſurface, it is good. Barley ſinks in water, and malt that is not well made will do the ſame: but it is to be obſerved that this is not an invariable proof, becauſe, if the malt be broken, or in the leaſt cracked, it will take in water, and ſink. Malt that is rightly made will not be hard, but of ſo mellow a nature, that if drawn over an oak board, acroſs the grain, it will leave a white line upon the board, like a mark of chalk. Its ſmell alſo may be conſulted; for malt, though otherwiſe good, may have contracted an ill ſcent from the fuel, or from the water uſed in the ſteeping.

Before malt is ground, it ſhould be freed from the tails and duſt, which would otherwiſe heighten the colour of the wort, render the liquor muddy, and give it a bad taſte, which could not afterwards be got rid of. The cylindrical ſieve will be of excellent uſe for this purpoſe.

The malt muſt be broken, in order to its communicating its virtue to the water. If it be ground too ſmall, its flour will mix too freely with the water, and cauſe the wort to run thick. Many are of opinion that the beſt way is only to crack it, ſo that none of the grains may come out whole: for the intent is, that the water ſhould draw out an extract, but not be mixed with the mealy part, in the manner of a paſte, or gruel. Some think that malt is better ground by a ſtone mill, than by a ſteel one, becauſe the former bruiſes it, and the latter only cuts the grains.

After the malt is ground, it ſhould lie ſome time to mellow, in a cool room, where no ſun comes. The time for this is different, according to its kind. Brown malt may be ground at from three to fourteen days before it is uſed, in order that the corn, which is rendered uncommonly hard by that degree of drying, may be gradually ſoftened by the moiſture in the air; by which means it will become the more ſoluble in water. The pale malts require only one or two days. After lying thus in the air, leſs maſhing ſuffices; the ſtrength of the malt is more perfectly extracted, and the beer will be conſiderably ſtronger than it would be with the ſame quantity of malt taken directly from the kiln. Care muſt be taken that it get no damage in lying.

Mr. Combrune obſerves, that malt imbibes moiſture more readily by being ground and expoſed for ſome time to the air, than it does when whole; and that as the dampneſs thus abſorbed by the grain is in reality ſo much cold water, malt which has been long ground requires to be maſhed with hotter water than it would otherwiſe be neceſſary to uſe. *See the article* Brewing.

The reader is obliged for the following uſeful obſervations on the art of making malt to a very ingenious gentleman, who has practiſed the art many years.

Experience, and a conſtant obſervation on effects and their cauſes, have, ſays he, made me maſter of ſome pieces of knowledge relative to this ſubject, which your farming readers may probably think worthy their attention: the reſult of this experience I ſhall lay before them.

The firſt thing I ſhall mention, with regard to malt, is the benefit of changing the water whilſt it is ſteeping.

Some maltſters think this change of water no ways neceſſary; others, on the contrary, approve of it, but do it indiſcriminately in the ſame proportion during the whole ſeaſon. They are in both reſpects wrong; for the times when the water requires to be changed ofteneſt are at the beginning and latter end of the ſeaſon, in autumn and ſpring, when the weather is warm; for in the middle of the winter the weather is too cold to admit of the water being at all changed to any advantage. Suppoſe the barley to be left in ſteep forty-eight hours in the ſpring: if the weather is inclinable to be warm, the water may be in that ſpace of time changed three times; in other caſes twice may be enough; but the beſt rule to go by, is that which follows.

Every maltſter muſt know, that in the autumn and ſpring, if barley is left too long on the ſteep in the ſame water, the water will grow ſlimy, and ſometimes ſour: now I would adviſe the maſter to watch the changes of the water, and when he finds that it is ſmooth and oily to the touch, and that it is inclinable either to ſmell or taſte ſour, let him by all means have it inſtantly changed; but he muſt obſerve, if he regards his intereſt, a particular method even in doing this.

The uſual way of changing the water is, firſt to draw off that in which the barley was ſteeping, and afterwards, by pails full, or by pumping, fill the ciſtern again.

This I do not approve of, becauſe the barley when the water is drawn off lies cloſer, and is apt, in a very ſhort ſpace of time, to heat: this is a great damage to the commodity, and, without precaution, a conſiderable loſs enſues. Now my method has always been, firſt to get a hogſhead of water in readineſs near the ciſtern, which I cauſe to be thrown on the barley the inſtant the firſt water is drawn off; and as a hogſhead of water is ſufficient to wet eight buſhels of barley, I add afterwards as many hogſheads, ſave one, as my ciſtern will wet quarters. By theſe means I avoid the danger of the barley heating in the ciſtern.

The conſequences of not changing the water whilſt the barley is ſteeping, are often fatal to the malt, which ſorts of water near his houſe with ſome white hard ſope, ſuch as is made at Nayland; and that which lathers ſooneſt is moſt ſuited to his purpoſe.

I have already obſerved, that in the ſpring and autumn it is neceſſary to change the water often in which the barley is ſteeped: it ſhould likewiſe be remembered, that in theſe ſeaſons the making of malt, in all its parts, is a very critical buſineſs; particularly it is then neceſſary that the beds, or couches, ſhould be frequently turned, or the malt will not come kindly; but the tap root will be apt to ſhoot forth vigorouſly, ſtarving the other roots, and preventing them from accompanying it in its growth: this muſt be checked, and the remedy is, to turn the couch often, ſpread it thin, and give it a ſufficient quantity of air, at the ſame time keeping it cool and temperate. This will ſtop the progreſs of the firſt root, give the others time to ſprout, and the barley will malt kindly and regularly.

A thin ſkinned fine-coated barley is beſt for making malt, and it is not the worſe for not being very full bodied; yet would I by no means recommend a lean, half-ſtarved, unripe grain.

Barley, which has grown on lands highly manured, is not ſo good for making malt, as that which has been produced by land of a moderate richneſs without any manure: in fact, a luxuriant ſoil, whether naturally ſo, or enriched by art, is not, in general, beſt for yielding barley for the maltſter's uſe.

For the reaſons above mentioned, never chuſe to buy barley from the farmers who have large crops, as it is moſtly a full-bodied grain they have to ſell. I prefer, for malting, a grain which is the produce of a ſoil that is rather poor than rich, rather light than ſtrong, and more inclined to a gravel than a clay.

This grain is clean-coated, taper, and elegant in its form, is full of flour, almoſt tranſparent when watered, and will be ſufficiently wetted in forty-eight hours.

This grain increaſes in the malting, fills the buſhel well, and makes a fine, ſweet, wholeſome, clean, full-bodied malt, from which the beſt of beer may be brewed, either brown or pale, according as the malt has been dried higher or lower.

Now I have mentioned drying of malt, a few cautions on that head may not be amiſs.

My practice has been to give my malt as much drying as I could on the floor: this is not only a great ſaving of fuel to me, but is alſo attended with ſeveral other advantages.

I find that my malt, by being thus gradually diveſted of its outward moiſture, does not ſhrink ſo much when it comes to be laid on the kiln; of courſe it meaſures to more advantage: it is beſides of a better quality, having acquired no foreign taſte in drying.

It may very eaſily be obſerved, that if malt is laid very damp on the kiln, a thick miſt, or ſmoky vapour, will immediately ariſe from the ſurface of it, which, being repelled and condenſed by the cold circumambient air, falls again on the malt, where, by the heat from the furnace, it is a ſecond time rarefied, and aſcends in clouds of ſteam.

This alternate rarefaction and condenſation of the moiſture is of great diſſervice to the malt, giving it often a diſagreeable muſty flavour, and making it beſides more unfit for keeping.

Now, by my method of ſuffering the malt to receive a part of its drying on the floor, this inconvenience is, in a great meaſure, avoided; for the groſs moiſture is already evaporated before it is laid on the kiln, and that which remains creates no great degree of ſteam, provided the fire in the furnace is not at firſt made to burn too fierce.

With this precaution I have often made pale malt as fine as I have any where ſeen, ſuch as ſome gentlemen, who long dealt with me frequently, nay, conſtantly, praiſed. In drying this malt, I took care that there was, during the whole time it was on the kiln, but a very moderate, yet equal, fire in the furnace.

If I had an inclination to have any malt high dried (for ſome like brown malt better than pale) when the moiſture was nearly evaporated, I cauſed the fire to be gradually encreaſed till it roared again in the furnace, taking care that the malt ſhould be properly ſtirred, leſt it proved kiln-burnt; and by this method I had a fine, ſweet, brown malt, fit for making harveſt beer, ſuch as ſome farmers are very fond of brewing.

Many are of opinion, that brown malt, uſed in the ſame proportion with the pale, will make the ſtrongeſt beer; but this is certainly a miſtake; for I have often made the experiment with great preciſion, but could never find any material difference, and what difference there was at any time, ſeemed to me to be rather in favour of the pale than the brown malt: this may eaſily be accounted for, as the flour in the pale malt always remained ſound and uninjured in the drying; whereas the brown malt would ſometimes, notwithſtanding all the care of the maltſter, be injured or parched by the fire, and that part which was parched had of conſequence loſt its ſpirit and virtue.

I muſt, however, on this occaſion, make one neceſſary remark, which is, that ſome pale malts are ſlack dried: theſe, I own, make a raw unwholſome liquor, which will not keep well; but if the pale malt is gradually and ſlowly dried by an uniform gentle heat, it will certainly anſwer the character I have already given of it, and will, beſides, (I have experience for my voucher) keep as well as any brown malt whatever.

Maltſters in general are too little nice in the barley they buy. I have already ſaid ſomething on this head, to which I ſhall add, that I would by no means have them ever bargain for mixed grain: what I mean by mixed grain, is barley grown on various ſoils, and in different fields. There is a ſure diſappointment in buying ſuch grain, as the kerns will ſpire at different times, and ſome of them not at all; ſo that, after the couch is dried, ſome part of it will not be half malted, and a great deal of the remainder not malted at all.

In order to avoid this misfortune, for ſuch it is, as the maltſter's cuſtomers will, with too much reaſon, find fault with his commodity, let him by no means attempt to buy tythe barley, for that he is ſure is mixed: I experienced myſelf, many years ago, a great loſs by a purchaſe of the kind. A neighbouring farmer, with whom I was well acquainted, brought a ſample of barley to market: I looked at it, and though it was not very fine, I bought it, on account of his letting me have it ſix-pence a quarter cheaper than I could then buy of others: the lot conſiſted of one hundred quarters; but when it came home, and I had tried ſome of it, I think about ten quarters, I was greatly ſurpriſed to find the malt ſo bad, when examining the barley with great attention, I ſoon diſcovered the reaſon of it. Meeting the farmer, of whom I had bought it, within a day or two afterwards, I aſked him how he came to ſell me mixed barley, adding, that I always thought he kept his grain with more care ſeparate: he ſoon unravelled the myſtery, by telling me, that it was the parſon's barley, not his own, which he ſold me.

When I heard this, I was not a little diſpleaſed; however, reſolving to make the beſt of a bad bargain, I carried a ſample of it to market the next day, and ſold it to a hog-feeder for eighteen-pence a quarter leſs than I gave for it. This was ſome loſs; however I was glad to get off ſo well, as I would not have made the whole into malt, and have impoſed on my cuſtomers for an hundred pounds.

To ſhew that I am not ſelf-intereſted, I will inform your readers of a method by which they may diſcover whether malt has been made of mixed, or in part unripe barley. Take a bowl of water; throw into it a couple of handfuls of the malt; give it a gentle ſtirring, and the barley which has not been malted will ſink to the bottom; the half-malted grains will have one end ſunk, being in a vertical poſition; and the true good malt will ſwim. This experiment I have often made, and never found it deceive me.

The ſame barley, though ever ſo good, will not malt alike well at all times: for inſtance, take it as ſoon as it is houſed, it comes well, but whilſt it is in its ſweat, by no means; yet after it has done ſweating, it comes well again.

In the ſame manner, barley which has been got in early in a very dry ſeaſon, makes but indifferent malt; whereas the ſame barley, if it is left abroad till rain falls on it to looſen the huſk from the kernel, malts very well, and yields a large increaſe.

Alſo, old barley, mixed with that of the laſt harveſt, does not malt well, for the reaſons above mentioned; it does not all ſpear, or put forth its beard, at the ſame time.

Theſe I know are niceties which few maltſters attend to; yet I am certain that an obſervance of them, and ſome few more particulars, would increaſe their profits nearly ten per cent.

A great many maltſters in the counties of Hertford and Eſſex, make prodigious quantities of malt for the London market; and there are often diſputes happen between the maltſters and the factors and buyers at Mark-lane, about the malt not holding out meaſure; the reaſon of which many of the country dealers are unacquainted with, and therefore know no other way of guarding againſt it, than by throwing in a buſhel or two extraordinary: this is ſome abridgment of their profits, and is beſides often unneceſſary. One reaſon for this deficiency, is the avariciouſneſs of the maker, who is willing to have as large an increaſe as poſſible, to the amount of ſix pecks in eight buſhels; whereas, if the malt is intended for the London market, four pecks is all that can, with propriety, be allowed; for it muſt not be drawn too long; and this malt requires more cleaning by the ſcreen, &c. than that ſold in the country.

Malt, if it is not thoroughly cleaned, will heat in the hold of the veſſel that carries it; and the tails, being looſened, will fall off; the neceſſary conſequence of which muſt be a deficiency when it comes to be meaſured a ſecond time at the wharf or ware-houſe: now, to prevent any altercation or diſpute, let the maltſter always cauſe his commodity to be well ſcreened before it is meaſured into the ſacks to be carried on ſhipboard: he need then put up no more than the meaſure; he will gain himſelf a character as a clean good workman; and I will anſwer for it, that the factors, if he makes his malt according to ſample, will readily give him one ſhilling a quarter more than his neighbours.

MALT-DUST, the duſt, &c. that ſeparates from the malt in the act of drying.

The following obſervations on the benefit of malt-duſt, as a manure for a ſtiff ſoil, with a relation of ſome experiments made to aſcertain its virtues, appeared in the *Muſeum Ruſticum*, *vol.* III. *page* 277.

For the benefit of your farming readers, ſays this gentleman, I ſhall communicate a few experiments I made ſome time ſince, in order to try the virtue of malt-duſt as a manure for a crop of wheat.

I had often heard it aſſerted, that malt-duſt was much better ſuited, as a manure, to barley than wheat; for the latter lying a whole year in the ground, and the malt-duſt being ſown with it, the virtues of the manure were exhauſted long before the ſummer, when the corn principally wants nouriſhment; being advanced in its growth, and ſerved chiefly to make the wheat winter-proud.

Others, contradicting this aſſertion, ſaid it was beſt for wheat, and made it appear, that it often cauſed very good crops of corn, particularly after a hard winter.

Being determined in my own mind to try ſome experiments, in order to determine this matter, I pitched upon a field of ten acres, which had borne a good crop of horſe-beans; after which it was ſown with turneps, which being fed off, it was ſummer-fallowed, being intended for wheat.

The ſoil was a ſtiffiſh loam; it was in good heart, and tolerably clean.

I divided this field by deep furrows into ten equal parts, each containing one acre, numbered 1, 2, 3, 4, 5, 6, 7, 8, 9, and 10.

The whole field, during the courſe of the fallowing, had four ploughings, which reduced it to a fine tilth.

When wheat ſeed-time came, I ſowed number 1. broadcaſt, with three buſhels of wheat, and ploughed it in, laying on no manure whatever.

Number 2. I ſowed with the ſame quantity of wheat, after which I ſtrewed over it ten quarters, or eighty buſhels of malt-duſt, and ploughed that and the ſeed in together.

Number 3. I ſowed alſo with wheat in the ſame manner, except that I deferred ſtrewing on the malt-duſt, till the latter end of January.

Number 4. had a dreſſing of dung in the ordinary way, and was ſowed with three buſhels of wheat like the other parts.

Number 5. was dreſſed by ſheep-folding, and was alſo in like manner ſown with wheat.

Number 6. was ſown with wheat in the ſame quantity; and in February, after ſowing, received a half dreſſing of very rotten dung, which had been ſeveral times turned and mixed.

Number 7. after receiving a ploughing in the ſpring, was ſown with ten pecks of barley, which was harrowed in, and no manure at all applied.

Number 8. was ſown with barley, as above, but had ten quarters of malt-duſt laid on it.

Number 9. had in the winter a good dreſſing of dung, and was in the ſpring ſown with the ſame quantity of barley.

Number 10. was ſown with barley, like number 8. only it had five inſtead of ten quarters of malt-duſt laid on it.

It may be neceſſary, perhaps to obſerve, that all the pieces of wheat were ſown the firſt week in October, and all the barley the ſecond week in March.

Soon after Chriſtmas I went to take a view of my wheat, when I found that the acre marked number 2. looked moſt forward and flouriſhing; though I muſt own there was in appearance but little difference between that and number 4.

The numbers 1, 3, and 6. neither of them looked ſo vigorous as thoſe already noticed; and number 5. ſeemed rather thin on the land; but the wheat plants were in good condition and healthy.

In May I took another view of my wheat crops, and found number 1. tolerably clean, and promiſed well.

Number 2. gave me hopes of a large crop, and was ſurpriſingly clear of weeds.

Number 3. was greatly improved ſince the laying on of the dreſſing of malt-duſt.

Number 4. looked very vigorous and ſtrong, but was very foul, having ſeveral ſorts of weeds not to be met with in other parts of the land.

Number 5. was thin of plants, and they did not branch much; however, they ſtill ſeemed healthy and ſtrong.

Number 6. was like number 3. greatly improved; but it was foul, and, what appeared ſtrange to me, had many weeds of a nature quite different from thoſe with which number 4. was infeſted, though the dung laid on both theſe parts was taken from the ſame heap.

I, at this time, alſo looked at my pieces ſown with barley, when I found number 7. promiſing and clean.

Number 8. was forwarder, and flattered me with the proſpect of a large crop.

Number 9. was forward and fine, but foul with weeds.

Number 10. bore much the ſame appearance as number 8. and promiſed as well.

At harveſt number 2. of the wheat was firſt fit to reap, after which ſucceeded number 4. the reſt were ready nearly at the ſame time.

Of my barleys, number 8. and 10. were firſt ready to mow.

I ſuppoſe it is unneceſſary to obſerve that thoſe crops which were cleareſt of weeds were the ſooneſt fit for carrying.

I ordered theſe crops to be all laid ſeparately; and as I was obliged, juſt after Michaelmas, to go up to London, about ſome particular buſineſs, I left orders with my bailiff, that they ſhould all be ſeparately threſhed and dreſſed as early as might be in the winter.

The produce of the ſeveral crops was thus diſtinctly noted to me, for I had ordered that particular care ſhould be taken not to mix one with the other, and my orders were, I found, on enquiry, punctually carried into execution.

	Buſh.	Pecks.
Number 1. unmanured, yielded of wheat –	20	1
Number 2. manured with malt-duſt when ſown – – – – – – – – – – – –	28	3

Number 3. manured with malt-duſt after Chriſtmas, by way of top-dreſſing	41	0
Number 4. manured with dung in the ordinary way	32	2
Number 5. folded with ſheep	29	3
Number 6. dreſſed with rotten dung in February	30	0
Number 7. unmanured, yielded of barley	32	3
Number 8. manured with ten quarters of malt-duſt when ſown	48	0
Number 9. manured with dung in the winter	40	2
Number 10. manured, when ſown, with five quarters of malt-duſt	44	0

I muſt, with your leave, treſpaſs upon your reader's patience, till I make a few obſervations on the above ſtate of the produce of my crop.

Firſt, I conclude, that when malt-duſt is uſed as a manure for wheat, it is beſt to lay it on by way of top-dreſſing after the corn is come up, as the crop of number 3. yielded above twelve buſhels more than that of number 2. and I am apt to think that the virtue of the malt-duſt laid on number 2. was exhauſted before it could be of any eſſential ſervice to the crop; whereas, in number 3. the manure began to yield forth its virtues juſt as the wheat plants began to be in want of a freſh ſupply of nouriſhment. It was alſo obſervable, that the grains of wheat which grew on number 2. were thinner, and had leſs ſubſtance, than thoſe of number 3. the grain of which was fine, plump, and heavy.

The produce of number 4. convinces me that malt-duſt is, in many caſes, a better manure for wheat than dung, not only as it gives a larger encreaſe, but alſo becauſe it does not ſtock the land with deſtructive and devouring weeds.

The wheat grown on number 5. was as fine as that of number 3. but conſiderably leſs in quantity, as appears by the account.

I do not much approve of the method purſued in number 6. yet is it a good alternative, if the farmer happens to have too little dung to dreſs all his fallows.

I judge alſo malt-duſt to be a very good and profitable manure for a barley crop; but the yield of number 10. being forty-four buſhels, and of number 8. only forty-eight buſhels, which laſt is not an encreaſe in proportion to the additional quantity of manure laid on, I thence judge that eight quarters, or ſixty-four buſhels, of malt-duſt, is the proper quantity of malt-duſt to lay on an acre for a barley crop, and that at the time of ſowing.

When I ſpeak of malt-duſt, I mean the kiln-duſt, which falls from the malt in drying: as to the tail-duſt, which falls through the ſcreen whilſt the malt is cleaning before it is put up in ſacks, that may be applied to a better uſe, being generally given to pigs, and often to cows, in which laſt caſe it makes them give a great deal of milk.

It has been ſuggeſted that the virtue of malt-duſt, as a manure, laſts only for one crop; but this is a miſtake, for when this manure is laid on in January or February, a good crop of barley may be had after the wheat.

It (I mean malt-duſt) is of a very warm nature: this has induced many farmers to think that it will burn a crop; and I will not anſwer for it but it might do ſo on a hot gravelly ſoil; but on clay land, or a ſtiff loam, it ſeldom or never does any damage: and indeed the only danger is a dry time enſuing after it is ſpread on the land, for the firſt ſhower of rain waſhes it in, and ſecures the crop from all hazard of being burnt.

Many of my acquaintance, beſides myſelf, have found that malt-duſt is for a ſtiff ſoil a better manure than dung; but the diſpute among them was, whether it was moſt profitable to lay it on when the wheat was ſown, or by way of top-dreſſing in January or February: however, ſince I made the above experiments, they are all converts to my opinion, and are determined in future always to dreſs their heavy wheat land with it after Chriſtmas.

One thing more in recommendation of this my favourite manure let me add before I conclude, that nothing ſurpaſſes it when laid on cold graſs grounds, to the amount of about eight quarters, or ſixty buſhels, on an acre, but not leſs.

Such as have not ſeen its effects in this way applied, would be ſurpriſed at the large encreaſe of ſweet feed which it occaſions: in ſhort, whoever finds it neceſſary to dreſs ſuch land, and can get malt-duſt in a ſufficient quantity, will do well to uſe it, as they will be puzzled to find any thing in the extenſive circle of manures better adapted to the purpoſe.

MANGER, the place or veſſel in which the horſe's corn is put.

MANURE, a general name for ſoil of all kinds laid upon land to improve it. *See* DUNG.

The following Letter ſent to Dr. Templeman, *Secretary to the Society for promoting Arts,* &c. *to be by him communicated to the Committee of Agriculture, in Recommendation of a new Manure, is of too much Importance to be omitted here.*

" SIR,

" As a farmer, like a chemiſt, ſhould loſe none of his materials, but make even his waſhings, runnings, and reſiduums, turn out to his advantage, I have ſent you ſome account of an experiment I have made in manuring of land, which I beg you will lay before the committee of agriculture, that they may communicate it to others.

" I am poſſeſſed, Sir, of a farm of near three hundred pounds a year, and have in my yard, what you uſually ſee in moſt farmers yards, two receſſes or pools, as reſervoirs of dung and water. Theſe reſervoirs in wet weather are continually running over; and of courſe part of the matter contained in them is carried off, by the neceſſary drains, into the highways, ditches, and rivers.

" As much of the eſſential quality of the dung is loſt in this manner, (for part of the ſalts, whether fixed or volatile, will be waſhed into the pools, and when they over-run, will be conveyed into the ditches, &c.) I thought it a part of good huſbandry to carry this ſuperabundant water, or manure, (for ſo we may juſtly call it) on my land, which I did by means of a watering-cart, not unlike thoſe with which the roads near London are watered in the ſummer time to allay the duſt.

" That the experiment might be the more obvious and certain, I firſt tried it (in the beginning of March, 1763) on a few acres in the middle of a large meadow, and on ſome lands in the middle of a large field of wheat, where, in a little time, I found a conſiderable encreaſe, in growth, both of graſs and grain; and at hay time and harveſt, both the one and the other were much better crops than what the ſame lands produced that were not ſo manured.

" As a man, or even a boy, with one of theſe carts, and one horſe, may manure a great deal of land in a day, provided it be near the yard, I would recommend the practice to all my brother farmers; for the expence is nothing, but the value of the time of the boy and the horſe; and the encreaſe, by what I have ſeen, will be very great.

" This manure may be alſo laid, to great advantage, on land that is freſh ſown with barley, oats, or any other grain; but on graſs it ſhould be only laid in the winter time, when the rains will waſh the ſalts off the blade; or in the ſpring, when the lands are laid up for hay; as the cattle will not feed on the graſs, while the dung, or ſalt, adheres to the blade of it.

" This dung-water ſhould likewiſe be carried on the land, not at a time when it rains, but in the dry weather, and at a time when the dung-water in the pools is of a deep brown colour, and ſtrongly impregnated with ſalts. By this means the land may be manured from time to time, and the pools kept almoſt empty for the reception of freſh matter every time it rains; and nothing will be loſt.

MARE, the female of the horſe. *See the article* HORSE.

Such mares as are deſigned for breeding, ought to be as free from defects as poſſible, and ſhould, no more than the ſtallions, have either moon-eyes, watery-eyes, or blood-ſhot-eyes; they ſhould have no ſplint, ſpavin, or curb, nor any natural imperfection; for the colts will take after them: but choice ſhould be made of the beſt and ableſt, the moſt high ſpirited, beſt coloured, and fineſt ſhaped; and the natural defects that may be in the ſtallion, ſhould be amended in the mare, as well as that which is amiſs in the mare ſhould be amended in the ſtallion.

As for her age, ſhe may be covered when three years old; but the moſt convenient time is after four, when ſhe will nouriſh her colt beſt; and though ſhe may breed till ſhe is thirteen, yet ſhe is not fit for it when ſhe is paſt ten, for the colt of an old mare is commonly heavy. Before a mare is covered, ſhe ſhould be in the houſe about ſix weeks, during which time ſhe ſhould be well fed with good hay and oats well ſifted; and in order to render her conception the more certain, near a quart of blood may be taken from each ſide of her neck, about five or ſix days before covering. Another method to bring a mare in ſeaſon and make her retain, is to give her, for the ſpace of eight days before you bring her to the horſe, about two quarts of hemp-ſeed in the morning, and as much at night; and if ſhe refuſes to eat it, to mingle it with a little bran or oats, or elſe to let her faſt for a while: and if the ſtallion alſo eat of it, it will greatly contribute to generation.

Mares go with foal eleven months and as many days as they are years old; and therefore the propereſt time for covering them is in the beginning of June, that ſhe may foal the May following, when there will be plenty of graſs, which will afford the mares a great abundance of milk for nouriſhing their foals: but a mare ſhould never be covered while ſhe is bringing up her foal, becauſe the foal to which ſhe is giving ſuck, as well as that in her belly, will be prejudiced by it, and ſhe herſelf ſooner ſpent. After covering, let her, for three weeks or a month, have the ſame diet as before, and kept clean in the ſtable till the middle of May, with her feet well pared and thin ſhod: take her in again about the latter end of September, if not before, and keep her to the end of her foaling. If ſhe cannot readily bring forth, hold her noſtrils ſo as to ſtop her taking wind; and if that will not do, diſſolve madder, to the quantity of a walnut, in a pint of ale, and give it her warm. In caſe ſhe cannot void her ſecundine, or after-burden, boil two or three handfuls of fennel in running water, then put half a pint of that liquor into as much ſack, or, for want thereof, into a pint of ale, with a fourth part of ſallad-oil, mixed together, and pour it luke-warm into her noſtrils, holding them cloſe for ſome time: otherwiſe give her green wheat, or rye, the laſt of which is beſt.

If the mare has but little milk, boil as much as you can get from her, with the leaves of lavender and ſpike, and bathe the udder with it warm, till the knobs and knots are diſſolved. She ſhould now drink only white water (which is bran put into water;) give her alſo ſweet maſhes: and a month after foaling, let her have a maſh with ſome brimſtone or ſavin in it.

MARYGOLD, a flower much uſed as a pot-herb, and therefore planted in moſt kitchen-gardens.

Marygolds are raiſed from ſeeds ſown in March or April, in the place where the plants are to remain. They require no other culture than keeping them clean from weeds, and thinning them to the diſtance of about ten inches aſunder, that their branches may have room to ſpread. They will begin to bloſſom in June, and continue in flower till the froſt kills them. Their ſeeds will ripen in Auguſt and September, and, if they are ſuffered to ſow themſelves, will produce a plentiful crop of young plants in the next ſpring: but as theſe will conſiſt of a mixture of good and bad ſorts, it is moſt adviſable to prevent this ſpontaneous growth, to ſave the ſeeds of the beſt flowers only, and to ſow each variety, whether ſingle or double, by itſelf.

MARLE, a kind of dry, ſoft, foſſile earth, uſed in manuring land.

Marle is either grey, blue, brown, yellow, red, or mixed, and is known by its pure and uncompounded nature: beſides which, it is diſtinguiſhed by ſeveral other marks, ſuch as, its breaking into little ſquare bits; its falling eaſily to pieces, by the force of a blow, or upon being expoſed to the ſun or froſt; its feeling fat and unctuous; and its looking, when dry, after having been expoſed to the weather for ſome time, as if it was covered with a hoar-froſt, or ſprinkled with fine ſalt. Even when mixed with the land intended to be manured by it, the whole ſurface of the ſoil will have that whitiſh appearance. But the moſt unerring way to judge of marle, and know it from any other ſubſtance that may reſemble it, is, to break a piece as big as a large nutmeg, and, when it is quite dry, drop it into a glaſs of clear water, where, if it be the right ſort, it will ſoon diſſolve into a ſoft and almoſt impalpable pap, ſhooting up many ſparkles to the ſurface of the water. Some marles efferveſce but little with acids: but they ſhould always be put to that trial; becauſe, the more they efferveſce with them, the more valuable they are as manures. In hot weather, good marle will ſlake with the heat of the ſun, like lime; eſpecially if any rain follows a hot day.

The farmers in Staffordſhire reckon the ſoft blue marle, which is moſt commonly found under clay, or low black ground, at the depth of ſeven or eight feet, the beſt for arable land, and the grey ſort the beſt for paſture. That which is of a browniſh colour, with blue veins in it, and little lumps of chalk or lime-ſtone, generally lying under ſtiff clays, and very hard to dig, is moſt eſteemed in Cheſhire. The marle which is uſually found at the depth of about two feet, or a yard, on the ſides of hills, and in wet boggy grounds which have a light ſand in them, is very fat and cloſe, and reckoned the ſtrongeſt of all marles; for which reaſon it is particularly good for ſandy lands. This is commonly called peat-marle, or delving-marle. The paper-marle, as it is ſometimes called, frequently lies near coals, and flakes like leaves or pieces of brown paper, than which it is of a ſomewhat lighter colour. That which ſome writers call clay-marle, becauſe it looks like clay, is very fat, and ſometimes mixed with chalk-ſtones. Steel-marle breaks of itſelf into ſquare cubical bits. Theſe two laſt kinds generally lie under ſand or clay; ſometimes about a yard deep under the former, but often much deeper under the latter.

Stone, ſlate, or flag-marle, which is a kind of ſoft ſtone, or rather ſlate, of a blueiſh colour, is generally allowed to be the beſt. It eaſily diſſolves with froſt or rain, is found near rivers and on the ſides of hills, and is a very laſting manure. An ingenious gentleman, paſſing lately through Bedfordſhire, obſerved, that the people employed to mend the highways, were laying upon them a blueiſh kind of ſtone. Struck with the novelty of the appearance, he ſtopt, took up a lump, and ſoon found it to be this blue marle, which the ignorant peaſants were uſing inſtead of real ſtone. The conſequence was, that, when he returned the ſame way ſome time after, a heavy ſhower having fallen, the whole road where this ſubſtance had been ſo injudiciouſly ſpread, was become a perfect quagmire.

Mr. Markham reckons four ſorts of marle, in Suſſex; viz. grey, blue, yellow, and red. The blue is accounted the beſt, the yellow next, and then the grey. The red is the leaſt durable. A great deal of the marle in the north country runs much upon the loam; but that in Suſſex is more like fuller's earth, and therefore muſt certainly be the fatteſt.

Mr. Mortimer ſays, he ſaw a ſample of marle from Derbyſhire, which was very fat, though it contained ſo much ſand, that, when wet, it could not be worked into a ball, or be made to hold together. This marle did very well upon clayey land, becauſe it was of an opening quality.

In many parts of moſt counties in England, marle diſcovers itſelf to the moſt negligent eye; particularly on the ſides of broken hills, or deep, hollow roads. Many rivers are bordered with a vaſt treaſure, which is plundered by every flood. Boggy lands frequently cover it; and, in them, it ſeldom lies above three feet deep. It is ſomewhat lower under ſtiff clays, and marſhy level grounds. The loweſt parts of moſt ſandy lands abound with it, ſometimes at the depth of three feet, and ſometimes at ſeven, nine, or more. The depth of the marle itſelf can ſeldom be found; for, when the upper cruſt of the earth is removed, all that can be ſeen, or dug, is marle, to ſo great a depth, that there are few, if any, inſtances of a marle-pit's having been exhauſted.

Nothing is more common than to find the ditches which incloſe a field, dug ſo deep that they have penetrated ſix or ſeven inches into a bed of marle, without the farmer's taking any notice of it; though the extraordinary ſhooting and increaſe of the graſs which is put forth by the marle thrown up on the ſides of the bank, might, one would think, be a means of diſcovering it. Where the marle is thus accidentally diſcloſed, it not only turfs the ſides and tops of the banks, and thereby ſecures them againſt all injuries of the weather, but makes the graſs grow ſo long and thick, that, when beaten down by winds, it hangs as if it thatched the earth which nouriſhed it, and carries off the rain, without letting any great quantity penetrate through it.

The marquis of Turbilly, in his excellent directions for clearing and breaking up land, recommends, for boring it (in order to know what different layers of earth, ores, quarries, ſprings, &c. lie underneath, and at what depth, by which means the better judgment may be formed of the plants moſt proper for the ſoil), an inſtrument of his own inventing, as far ſuperior to any thing that has yet been thought of for that purpoſe. A deſcription of it may be of ſervice to every ingenious improver of land. *See the article* BORER.

Marle is very common in Ireland, where it ſeldom lies above a foot or two below the ſurface of the ſoil; luckily for that country, which is extremely boggy. But in France, though they have marle in many places, they are often obliged to dig for it very deep, particularly in the province of Artois, where it generally lies eighty or ninety feet under ground, in beds about five feet thick, at the bottom of which frequently is water, which breaks in upon the workmen. On account of this great depth of the marle-pits there, extraordinary care is taken to ſet up marks, and rail them in, to prevent the fatal accidents which might otherwiſe happen. The ſame is, indeed, done in England; but not ſo ſtrictly as it ought to be.

Authors differ widely both as to the quantity and the manner of uſing almoſt all the manures they treat of; points which muſt, in a very great meaſure, depend on the quality of the ſoil, and the ſtrength of the manure, of whatever kind it be, and in which experience will ever be the judicious farmer's ſureſt guide. In marling, it is particularly neceſſary to find the true proportion which the land requires, and better to err in laying on too little, than too much; becauſe, more may be added at pleaſure; whereas, by over-doing it, the firſt year's crop often fails, becauſe the body of the marle has not been ſufficiently opened; and, in that caſe, it will ſometimes be two or three years before the ground comes to a proper temper. The beſt directions that can be given to the farmer in the application of this manure to light ſoils, is, to lay on the quantity which will give the degree of coheſion wanted in thoſe ſoils. A general rule cannot be laid down in this reſpect; becauſe, the quantity of marle requiſite to effect the deſired end, muſt be different, in proportion to the degree of lightneſs of the ſoil.

Pliny ſpeaks of marle as a ſpecies of improvement known to the Greeks, but more peculiar to Britain and Gaul. He calls it, the fat of the earth, and compares it to the glands in the human body, which are lapped in a coat of fat. As this manure, ſo far as we can find, was not uſed, and probably not to be found, in Italy, it ſhews how attentive the Romans were to agriculture, wherever they carried their victorious arms; ſince, notwithſtanding the continual alarms they lived in from the natives here and in Gaul, they found time to diſcover and perfect a means of improving land, particularly ſuited to the ſoil and climate, and, of all others, the cheapeſt and moſt laſting.

Before we quit this ſubject, we muſt obſerve, with Dr. Home, that a body very ſimilar to marle in its appearance, but eſſentially different in its effects, is often found in the ſame bed with the beſt marle. It is of a darkiſh lead-colour. Inſtead of fertilizing the earth, it renders even the beſt ſoils incapable of bearing any kind of vegetables for many after. I have ſeen, ſays that gentleman, the ſpots on which it was laid, entirely barren three years after; and have heard of its bad effects continuing in other places for a much longer time; nor is it certain when they will ceaſe. A body ſo very deſtructive to agriculture, deſerves to be well characterized, in order to its being ſhunned; and ſhould be thoroughly examined, that we may know whence proceeds this noxious quality, and how to cure it when it has taken place.

Marle takes a ſmooth poliſh from the inſtrument with which it is wrought. A piece of this taken up, when it has not been much expoſed to the influence of the air, differs greatly in taſte from marle. Inſtead of the ſmooth unctuous taſte of the latter, it is acid, and remarkably aſtringent. It agrees with marle, in crumbling in water, but differs remarkably from it in not raiſing any effervescence with acids, nor in the leaſt deſtroying their acidity. It turns the ſyrup of violets red; which ſhews that it contains an acid: whereas marle, like all abſorbent earth, gives it a green colour. The trying of marle with acids is therefore the more neceſſary, to guard againſt uſing this pernicious ſubſtance.

It appears from experiments made by the doctor, that this pernicious ſubſtance conſiſts of an earthy body like clay, about an eighteenth part of ſalt of ſteel, and a ſmall proportion of the vitriolic acid: from whence he concludes, that good marle is the proper cure where this noxious earth has been inadvertently uſed; becauſe it corrects the acid, and decompoſes the ſalt.

The following account of marle was ſent by a very intelligent gentleman to the editors of the *Muſeum Ruſticum.*

A ſhort Diſſertation on Marle.

It is taken out of the bowels of the earth at ſeveral depths, is of divers colours as after named, and ſome ſorts have often two or three colours intermixed. It is unctuous, of a ſlippery nature, and in goodneſs pure; ſoon relents after rain, and, when dry, ſlackens like lime, and at laſt diſſolves into the fineſt powder.

I intend to leave with you ſome ſpecimens of two kinds of marle (which you may give to the gentlemen or farmers who deſire them): they are what I have collected in Middleſex, which county abounds with good marle; but it is not uſed by the gentry, or farmers, ſo much as it ought, becauſe they have ſo readily dung, ſoot, aſhes, and other compoſts, from London.

In order to diſcover marle, the beſt way is to uſe the auger, and obſerve the ſtrata taken up from time to time by it.

I have found, after I have got through the ſurface, which is about a ſpade and half deep, that the next earth was a very ſtrong, coarſe, bed of clay, five or ſix feet deep; afterwards, getting through it, the auger brought up marle, viz. that which appears of a fine light-brown colour, and ſome of it mixed with blue veins (which I will here call pigeon marle, by way of diſtinction): here was a bed of this pigeon marle of five or ſix foot deep, and after that followed another kind of marle, which I will call toad marle, by way of diſtinction; this is heavier, and without any veins of blue.

When either of theſe marles are dug out of the pit, the ſpade cuts them like ſo much ſoap; and the laſt-named marle looks very blackiſh and dark, and may be, and I believe is, in ſome countries, called toad marle, from its reſemblance in colour to that animal; but this marle being expoſed to the air alters the colour very much. This appears to me to be the ſtrongeſt marle.

Marle may be diſcovered ſometimes near the ſurface, by carefully obſerving the ditches and fences of your lands.

It is frequently found near rivers, or brooks, and ſometimes may be diſcovered on the banks of ſuch waters.

To know when you have found true Marle, try it by Air, Fire, and Water, or Vinegar.

Firſt, By expoſing a large lump of three or four pounds in the air, which, if true marle, will, in a little time, by the nitre, dews, &c. break into ſmall parts; and there will be an hoary, or white, congelation on that part of it which is expoſed to the ſun.

Secondly, When your marle is dry, break it into ſmall particles, and put an handful into an hot coal fire, and it will crackle as if ſo much ſalt had been put therein.

Thirdly, Place a piece of the dried marle in a glaſs, and thereon gently pour as much water as will cover it. If true marle, it will then gradually moulder, and diſſolve into a liquid ſoap. Let not the glaſs be ſhaken, that you may obſerve the ebullition (which is material); or you may, in like manner, try it with vinegar, where the effervefcence, or ſtruggling, will be much ſtronger than in water.

The Virtues of Marle.

It is the beſt manure for ſandy, dry, gravelly, or light lands of any kind. It is excellent for moſſy lands. It is, indeed, good for all other lands, of what nature ſoever, even clay, provided care be taken in laying on a proper quantity, and that the ſame be well diſſolved.

Care muſt be taken in the quantity uſed; if too little, you may eaſily add; but if too much is laid on the land, you cannot take it away.

It is uſed in ſome countries for arable lands only: yet it is as good for graſs or paſture lands, but does not the firſt, and ſeldom till the ſecond year, ſhew forth its utility; and then you will obſerve the graſs to ſhoot out a dark, or blackiſh colour, which afterwards turns to the fineſt green; and with it come up quantities of white clover-graſs, which hath occaſioned me ſome difficulty with the farmers to convince them I had not ſown the clover-ſeed.

If lands are properly marled, they will continue good for twelve or fourteen years for the plough; and for paſture, or graſs-lands, much longer.

I would recommend that the plough be not ſuffered to enter into the land till the marle is thoroughly diſſolved.

Fiſh thrive prodigiouſly, and grow fatter in marle-pits than any other ponds.

Quantities to be uſed.

A great difficulty this to aſcertain the quantity.

In ſome countries they will tell you of laying three hundred loads to an acre, others more, others leſs; but they no where aſcertain what is a load. In Cheſhire and Lancaſhire their loads are ſcarcely ſix buſhels, and they uſe a ſmall cart made for the purpoſe, drawn by two or three ſmall horſes.

If the land is gravelly, ſandy, or light, let as much be laid on it as will make a good thick coat to bind and ſtiffen the ſoil.

But let the land be what it will, ſo much ſhould, in all events, be laid on as will make a thin coat over the entire ſurface.

Upon my lands, which are graſs and paſture, of a tolerable mould, on a clayey ſoil, and which were left, about eight years ſince, in a bad plight, by the late tenant, I firſt attempted to lay ten loads to every acre, (by a load I mean as much as three large, well-fed, ſtrong horſes could draw) but found it was too little, and would not meet in the ſpreading.

I immediately doubled the quantity, and two years afterwards I added another coat of fifteen loads more to every acre, and find it anſwers very well for hay and paſture. I need not ſay horſes and cows are fonder of this hay and graſs than of that wherein the dung may be taſted and ſmelt.

A work of this kind ſhould be ſet about by the end of Auguſt, or beginning of September; and the loads ſhould be ſhot into ſmall heaps, as the Middleſex farmers ſhoot their dung, viz. two or three buſhels in each heap; and a man muſt be ready to ſeparate it, that the nitre, air, dews, and rain, coming on the large pieces, may act, and cauſe them to break, as of themſelves, into ſmaller parts.

After the marle has been laid upon the ground, and you ſee that the air, nitre, &c. have looſened the great lumps, and they are ready, on a ſlight touch, to fall into pieces, a perſon ſhould be ordered (when the weather and marle are quite dry) to break and ſpread the pieces to complete your coat; and you ſhould avoid as much as poſſible, leaving any large pieces to lie and diſſolve without being ſpread on the ſurface, but cauſe them to unite therewith.

In the beginning of February, and in dry weather, I cauſe an old gate to be well buſhed, and a heavy weight laid on it, to be drawn by one horſe over the whole field, in order that every part may have its due proportion.

If you intend to plough your lands, the preceding cautions are not ſo neceſſary, as the plough and harrows will ſpread and intermix the marle with the ſoil ſufficiently; but if you uſe the drill-plough, the above hints may be uſeful.

It would take a volume to give an exact and full hiſtory of marle, its virtues and uſes, and to ſhew that it was uſed by the Romans, and many years diſcontinued, and eſpecially till the houſes of York and Lancaſter were united, and then revived in ſome few counties; and the great benefits received by marling in Suffolk and Norfolk within a few years paſt.

We very well know that gentlemen and farmers are a long while ere they care to venture on the practice of marling from theory, and principally from not having ſeen or known what is, and what is not, true and genuine marle, and from being unacquainted with the rules or modes to judge and determine upon it: therefore, if this ſhort account will obviate their doubts, and in any way contribute to the advancement of agriculture, vegetation, and paſturage, my deſign is anſwered.

There are variety of colours in marle, viz. blue, white, yellow, red, and other colours, which make no material difference, provided they be earthy and fat, or ſlippery as ſoap, and as free as poſſible from a mixtre of ſand, gravel, or ſtone.

DICE MARLE, a name given by the people of Staffordſhire to a reddiſh marle, that breaks into ſmall ſquare pieces like dice, or into thin flakes, in the manner of lead ore, and looks ſmooth on the ſurface.

MARSHY LANDS, a ſort of paſture or grazing grounds, lying near the ſea, rivers, or fens.

As to lands lying near rivers, the great improvement of them is their being overflowed, which brings the ſoil of the uplands upon them, ſo that they need no other mending, though kept conſtantly mowed. The great inconveniency of theſe lands is their being ſubject to floods, which high hills near the ſides of rivers, and the long courſe of them, beſpeak to be frequent: and, though the richeſt land generally lies near ſuch rivers, yet there is the greateſt danger of the crops being ſpoiled, eſpecially when they are not incloſed, and therefore cannot be fed with cattle. This, when feeding bears any thing of a price, would be the very beſt way of managing theſe uncertain lands; and incloſing them would be highly beneficial on this account. *Mortimer's Huſbandry.*

The marſh-lands in Lincolnſhire, and many other parts of England, produce a ſort of graſs, which feed ſheep in a bettter manner than that of almoſt any other land, in regard to their ſize, and the quantity of wool. The ſheep about Grimſby, and ſome other places in this county, produce ſuch luſty wool, or, as they call it, wool of ſo large a ſtaple, that three or four fleeces uſually make a tod of twenty-eight pounds weight. Several hundred loads of this wool are yearly carried from theſe places to Norfolk, Suffolk, and other parts of the kingdom, for the cloth manufacturers. They ſend this in large packs, which they call pockets, each containing about five and twenty hundred weight. *Philoſ. Tranſ.* Numb. 223.

When marſh lands lie flat, it is neceſſary for the owner to keep all the water he can from them. The ſea-water in particular is to be kept from them as much as poſſible; and this is uſually done at a very great expence, by high banks and walls.

Two things greatly wanting in theſe lands, in general, are good ſhelter for the cattle, and freſh water. The careful farmer may, however, in a great meaſure obviate theſe, by digging in proper places, large ponds to receive the rain water, and by planting trees and hedges in certain places towards the ſea, where they may not only afford ſhelter for the cattle, but keep off the ſea breezes, which often will cut off the tops of all the graſs in theſe places, and make it look as if mowed.

Theſe lands fatten cattle the ſooneſt of any, and they preſerve ſheep from the rot. It would be of great advantage to them, if there were raiſed, in the middle of every large marſh, banks of earth in a croſs, or in the form of two ſemi-circles, and theſe planted with trees; theſe would ſerve as a ſhelter for cattle, let the wind blow from what quarter it would, and would ſoon repay the expence of making.

There are, in different parts of England, very large quantities of land upon the ſea-coaſts that would be worth taking in, though no one has yet thought of doing it. The coaſts about Boſton, Spalding, and many other parts of Lincolnſhire, give frequent inſtances of this, where the ſea falls from the land, ſo that on the outſide of the ſea walls, on the owſe, where every tide the ſalt water comes, there grows a great deal of good graſs, and the owſe is firm to ride upon when the water is upon it.

This owſe, when taken in, hardly ſinks any thing at all, and they dig the walls from the outſide of it, all the earth they are made of being taken from thence, and the ſea, in a few tides, filling it up again: and though the ſea, at high water, comes only to the foot of the bank, yet once in a year or two, ſome extraordinary tides go over the banks, though they are ten feet high. Theſe banks are fifty feet broad at the bottom, and three feet at the top; and the common price of making them is three ſhillings a pole, the earth being all carried in wheel-barrows, and face towards the ſea, where the greateſt ſlope is, being turfed. *Mortimer's Huſbandry.*

MATFELLON. *See* BLUE BOTTLE.

MAY-WEED, a wild ſpecies of chamomile, a trailing pyrennial plant, which puts out roots from its branches as they lie on the ground. By this means, and by ſcattering its ſeeds long before the corn is ripe, it ſpreads and multiplies greatly. It flowers in May, and thence has acquired the name of May-weed.

The means of extirpating it are, ſummer fallows, repeated good harrowing, and burning the collected roots, as before directed, in ſimilar caſes, or, which will be found ſtill more effectual, the frequent hoeings practiſed in the New Huſbandry. What eſcapes theſe clearings ſhould be very carefully pulled up by hand; for the common weeding-hook will not go deep enough to take out the whole of the long ſlender tap root of this plant, of which every remaining bit that has a knot in it will produce new ſhoots. Nor ought the farmer to regret this ſmall additional expence, to get rid of one of the moſt fatal enemies his corn can have. Mr. Liſle aſſures us, that as good a crop of wheat as one would wiſh to ſee all the winter time was, to his knowledge, ſo deſtroyed by the coming up of May-weeds and poppies in the ſpring and ſummer, that it did not at laſt yield ſo much as the ſeed.

MEAD, a liquor made of honey, and held in great eſtimation by moſt of the northern nations, but perhaps not eſteemed here ſo much as it might deſerve, if due care was taken to prepare it properly.

All the writers who have hitherto treated of this ſubject, have given into a capital error with regard to the ſtrength of this liquor, by directing too great a proportion of honey to be diſſolved in the water. The uſual practice of making it ſo ſtrong to bear an egg, is very wrong. The liquor is thereby rendered a meer ſtum, and this bad quality is ſtill increaſed by the long boiling generally practiſed. It is ſcarcely poſſible to procure honey ſo pure, but that ſome bee-bread, wax, or other ſubſtance, is mixed with it; and this cannot be perfectly ſeparated from it, ſo far as I know, but by boiling. On this account the boiling of mead ſeems indiſputably neceſſary. In order the more effectually to ſeparate theſe impurities from the liquor, it will be adviſable to mix ſome whites of eggs with it before it is put on the fire, and it will be particularly neceſſary to ſkim off the thick ſcum that riſes, the moment the liquor begins to boil; and this muſt be attentively continued ſo long as it boils. The only intention of boiling being here to ſeparate the impurities, and to make a perfect union of the water and the honey, both which purpoſes are very ſoon obtained, it evidently appears, that the boiling need be of but very ſhort duration. This becomes here more particularly neceſſary, becauſe the liquor will be the leſs diſpoſed to ferment kindly, the longer the boiling has been continued. It is perhaps owing to the ſingle article of long boiling, that mead has hitherto lain under ſo great diſcredit; becauſe it then never fermented ſufficiently to take off its luſcious ſweetneſs; whereas, had it undergone a due fermentation, that ſweetneſs would have gone off, and the mead would have attained a fine racy flavour.

Some notable houſewives have added hops to their mead. This helps to take off its ſweetneſs, and, as the bitterneſs of the hop goes off, gives it a pleaſant flavour. A ferment is here, as in all liquors that are boiled, generally wanted to bring on a perfect fermentation: but as the leaſt taint in the ferment is communicated to the whole liquor, particular care ſhould be taken that it be very ſweet and good. Mead, judiciouſly managed on theſe principles, will keep for years, and be improved by age. The racking, fining, &c. of this liquor, are the ſame as thoſe of other white wines.

MEADOW, a general name for paſture or graſs-lands, annually mown for hay; but is more particularly applied to lands which are ſo low as to be too moiſt for cattle to graze upon them in winter, without breaking the ſward.

Meadows, being generally enriched with the fine mould waſhed down from the adjacent riſing grounds, are uſually of a good ſoil, and ſeldom require any other improvement, than the removing of temporary imperfections. But they may likewiſe be of ſuch a nature as to ſtand in need of a more particular treatment: as is the caſe when their ſurface is a moſſy looſe earth, or when it is of a binding or clayey quality.

If, through long neglect, a coarſe ſtrong graſs, ruſhes, or other buſhy plants, be ſuffered to remain upon the ground till they rot there, they will, in ſome years, form a looſe ſpongy ſubſtance, ſomewhat reſembling moſs. In this caſe, the firſt neceſſary ſtep is to pare off and burn that looſe ſurface, or at leaſt ſo much of it as to enable the plough afterwards to reach the better ſoil underneath. The manner of doing this has already been explained ſo very amply, that it will be ſufficient to add here, that this looſe upper earth muſt be ſo ſtrengthened as to afford ſufficient ſtability to the roots of whatever plants are ſown on it, by mixing it well, either with the better ſoil underneath, or with marle, clay, or rich loam, brought to it from the neighbouring grounds, or with the compoſts before directed for this purpoſe.

If the ſoil is clay, or a ſtrong binding earth, the treatment of it is much the ſame, whether it be meadow or upland paſture. Such ſoils, by retaining water in every hollow place, become what the farmers call ſour, and produce a coarſe graſs, compoſed, as Mr. Miller obſerves, of bad weeds, of which the ſeveral ſorts of docks make no ſmall ſhare. Although many of the meadows produce a great burden of what the country people call hay, yet this is fit only for ſuch cattle as, by hard labour and hunger, are driven to eat it: for horſes which have been accuſtomed to feed on good hay, will almoſt ſtarve rather than touch this. A plain proof of its being diſagreeable to all cattle, is, that when they are turned in, after it has been mowed, we often ſee the ground covered with rank weeds, which they will not meddle with.

When a paſture is in the ſtate above deſcribed, if there is a ſufficient depth of ſoil to admit of it, the ſurface ſhould be pared off, and burnt: and as ſuch places are uſually over-run with ant-hills, theſe ſhould alſo be burnt; after which, by the addition of proper manure, and by the help of deep plowing, the land ſhould be brought into fine tilth. The deeper this improvement goes, the deeper and more laſting will the graſs be. We have been informed of a particular inſtance of the good effects of this method, by which the gentleman who practiſed it had graſs which continued for years in a ſtrong ſtate of vegetation, and was conſtantly near a month forwarder than that of his neighbours, whoſe ſoil and ſituation were exactly the ſame.

Let not any one be deterred by the expence attending this improvement: for the crops of grain and other plants taken while the ſoil is thus preparing, will nearly repay all the charges, and the ground will afterwards yield much more plentiful crops of graſs; at leaſt for a number of years. But as clayey lands require more frequent and more thorough repairs than other ſoils, the returns of tillage propoſed by Camillo Tarello will be the moſt proper means of managing them.

He would have farmers divide their paſtures in four parts, keep one of theſe parts under grain or pulſe, during five years, and at the expiration of that time lay it down to graſs as before; and ſo proceed with every other part. He propoſes, that the firſt breaking up ſhould be by paring and burning, and thorough plowing. But if we may differ from him in opinion, we think it is needleſs to keep the ground ſo many years in tillage, unleſs this ſhould ſuit the huſbandman's convenience for the culture of particular plants. In this caſe, the paſture may be divided into five or ſix parts. After each part has thus been in tillage, Tarello adviſes breaking up again the ſpot firſt began with; though not by burning now, but only by plowing, in order to ſow it as before. "This, ſays, he, will be profitable to the huſbandman, and improve the paſture. It will benefit the huſbandman, becauſe he will thereby raiſe a greater quantity of corn; and it will do good to the paſtures, becauſe nothing is more ſerviceable to them, than this renewal of their ſurface, as is atteſted by Columella. Let not the huſbandman imagine that he will have leſs hay when only three fourths of his uſual extent of land are under graſs: for, in fact, it is not the quantity of the land, but the care which is taken of it, that gives plenty of hay."

When a ſoil of this kind is laid down for meadow, great care ſhould be taken to ſlope it down gently, from the middle, in ſuch manner that no water may reſt on any part of it. If the extent is large, ſmall ditches ſhould interſect the meadow into as many diviſions as ſhall be neceſſary to form a ſufficient drain for the waſte water, and the ſpaces between theſe ditches may be gently raiſed. In an upland paſture on ſuch a ſoil, ridges ſhould be raiſed inclining a little from the horizontal, that the furrows may be ſo many drains, as before directed in the plowing of ſuch ſoils, to prevent their becoming ſpewy or wet: for as the rain cannot deſcend beyond the clay, it will glide along it, till, collected in ſuch quantities as to form a ſmall ſtream, it iſſues forth at the ſurface, uſually loaded with ſome mineral quality imbibed from the earth underneath.

When the ſoil is a rich or light loam, the plough will not be ſo neceſſary; as ſuch meadows or paſtures may be repaired by the means which will be pointed out in the directions hereafter given for the improvement of the meadows already laid down to graſs. *See the article* GRASS *and* PASTURE.

Black, rich mould, requires but a moderate quantity of water: juſt ſufficient to give action to the fertilizing particles it contains. The watering here ſhould be frequently repeated, rather than long continued.

It is a general rule, that ſandy or gravelly ſoils require watering the moſt of any; becauſe whatever moiſture they receive, ſinks through them too ſpeedily. But it may be doubted, whether this very reaſon for watering them be not one of the greateſt of objections againſt their being watered, at leaſt ſo much as is generally directed: for the water not only paſſes rapidly through theſe ſoils, but it may carry down with it through the ſand or gravel, the finer and richer particles of the ſhallow mould uſually found upon ſuch ſoils, and thereby rather impoveriſh their ſurface. It would therefore ſeem adviſable, to let water in upon ſuch ſoils only occaſionally, to refreſh their verdure, when their ſurface is too dry: and to give it a pretty quick current, that it may reach to a greater extent of ſurface: for if it runs ſlow, it ſinks too faſt.

It is a queſtion whether paſtures newly laid down to graſs, after having been arable land, ought to be watered at all during the firſt year. The judicious author of one of the ingenious diſſertations in the Memoirs of the Berne Society conſulted on this ſubject an intelligent farmer, who had experienced the effects of watering, and of not watering, theſe new paſtures, as ſome call them, and was anſwered; that they had yielded the greateſt quantity of graſs the firſt year, when they had been watered, but that the crops had always dwindled in the ſucceeding years: whereas thoſe that were left dry till autumn, and then only begun to be watered, had made ample amends during the following years, for the ſcantineſs of their produce in the firſt. This huſbandman was therefore of opinion, that it is beſt not to water theſe meadows before the autumn; and he added a farther very ſenſible reaſon, namely, that as theſe new meadows ſtill retain ſome portion of the manure laid upon the land the year before, when it was ſowed with corn; the letting in of water upon them, while the mould is yet extremely looſe and light, will be apt to carry off thoſe rich remains of manure, which will otherwiſe incorporate with the ſoil, as it acquires more conſiſtence.

A very wrong cuſtom which prevails among our farmers, in general, with reſpect to low meadows, is, that of flowing them during the whole winter. The roots of all the ſweeteſt kinds of graſſes are thereby deſtroyed, and only ſuch left as are natives of marſhes, which are coarſe and ſour, and which no cattle will eat.

The method which Mr. Miller propoſes for the management of theſe meadows, is never to flow them till the middle or latter end of March, excepting once or twice in the winter, when ſuch floods happen, as bring down a great deal of ſoil from the upper lands: for then it will be of great ſervice to let ſuch water in upon the meadows, that the ſoil may ſettle there: but the ſooner the wet is drained off after this is lodged, the greater will be the benefit done to the meadows. By letting on the water frequently, from the end of March to the middle of May, the growth of the graſs will be greatly aſſiſted, and there will not then be any danger of deſtroying its roots.

River water, which is univerſally acknowledged to be the beſt for this purpoſe, cannot be ſo beneficial when the ſtream overflows its banks, and runs rapidly over the paſtures, as when its courſe is ſlow; and ſtill much leſs than when it ſtagnates. It therefore is adviſable to fence in every meadow liable to be thus overflowed, in ſuch manner that it cannot be flooded, but at the owner's pleaſure, by opening proper ſluices. But as the produce of many meadows will not bear this expence, the proprietor, or farmer, ſhould, if poſſible, prevent the too haſty current of the water, by raiſing at their upper end, or wherever elſe it may be neceſſary, ſuch fences as ſhall render the water which flows ſidewiſe upon the meadow, rather a back, or ſtanding water. Great advantages will ariſe therefrom. The finer mould will no longer be carried away by the ſtrong current of the river, which, inſtead of robbing the ſoil, will then depoſit a rich ſediment, and thereby greatly fertilize the land.

The water of mineral ſprings ſhould not by any means be brought upon paſtures; becauſe they are either deſtructive of graſs, or produce only a very harſh coarſe kind of it.

We ſhall cloſe this ſubject with the following remarks made by the judicious author of one of the before-mentioned diſſertations in the Memoirs of the Berne Society, and which deſerve the ſerious attention of every huſbandman who would water his paſtures with due care.

"Many people imagine, that the whole art of watering meadows conſiſts in making good channels, and in opening and ſhutting the ſluices at proper times. But this is not enough: for ſo long as the water flows in a meadow, the farmer ſhould viſit all his channels once or twice a day, with a ſhovel, hoe, or three grained fork in his hand, and examine carefully whether any of them want cleanſing or repairing. Sometimes he will find a channel choaked with ſlime; in other places he will ſee the water ſpread too far, or not far enough; and in others again he will obſerve it not riſe high enough to overflow its channel, ſo that the neighbouring ground is not watered at all. He will immediately endeavour to remedy theſe defects, according to the exigency of the caſe, whether by clearing away the muddy ſlime, heightening the banks of the channel, lowering them, giving a freer current to the water in ſome places, and checking its courſe in others, according to the nature of the ſoil; or by cutting new channels in ſome places, and laying ſods or ſluices acroſs others, to divert the ſtream from ſuch parts as are ſufficiently moiſt, and turn it to others which want watering: for it frequently happens that, even in the ſame meadow, though not a large one, there are very different ſoils, each of which requires the aſſiſtance of water, but in different degrees. In ſhort, the careful huſbandman will not ever viſit his paſtures without noticing in them things which may be altered and amended."

The farmer who has improved his meadows according to the foregoing directions, may expect abundant recompence in plentiful crops of graſs.

When graſs is to be fed off, it ſhould not be permitted to ſtand till it grows high, becauſe the cattle will then trample under foot great part of it, which they afterwards will not eat. The prudent huſbandman will alſo vary the kinds of cattle fed upon it. *See the article* HAY.

MEDLER, a ſpecies of fruit-trees, and may be raiſed by grafting or budding them upon the common white thorn. This is the uſual way of propagating the American ſorts, which are of the hawthorn kind; but the beſt way to raiſe the other ſorts is from their ſeeds. All medlars and will take when they are grafted or budded upon each other. They will alſo take upon ſtocks of pears, or of quinces, and both of theſe will take upon the medlar ; ſo that there is a great affinity between them. All the American ſorts will grow twenty feet high, if they are not ſtinted by grafting.

Medlars may alſo be raiſed from their ſeeds, which, if put into the ground in autumn, ſoon after they are ripe, will come up the following ſpring : but if they are not ſet till the next year, they will not ſhoot till the year after.

MELILOT, a plant of the trefoil kind, and grows in ſuch abundance among the corn in many parts of England, particularly in Cambridgeſhire, as to be a moſt troubleſome weed ; for it is hardly poſſible to ſeparate it from the corn in reaping, ſo that they are houſed together, and the ſeeds of the melilot, which ripen about the ſame time as the corn, are threſhed out with it, after which, they being likewiſe heavy, it is very difficult to ſeparate them. If but a few of theſe ſeeds are ground with the corn, they will ſpoil the flour ; for the bread, or whatever elſe is made with it, will have a ſtrong taſte and ſmell like melilot plaiſter. The roots of this plant are ſtrong and woody, and from them ſpring out ſeveral ſtalks, which riſe from two to four feet high, according to the goodneſs of the land. Theſe ſtalks branch out, and are garniſhed with trifoliate leaves, having oval ſawed lobes of a deep green colour. The flowers are produced in long ſlender ſpikes, which ſpring from the wings of the ſtalks. They are of a bright yellow, ſhaped like the other butterfly flowers, and are ſucceeded by naked ſeeds, which ripen in Auguſt.

MELON, the name of a well-known plant cultivated in kitchen-gardens.

To have a continuation of melons, they ſhould be ſown at two, or rather three, different times. The firſt, if the ſeaſon be forward, ſhould be in the ſecond week in March ; but otherwiſe it will be better to defer it for a few days longer ; becauſe the ſucceſs of theſe plants depends greatly on their being raiſed ſtrong, which they cannot well be if the weather ſhould prove ſo bad after they are come up, that a ſufficient quantity of freſh air cannot be admitted to them. The ſecond ſowing ſhould be at the end of March ; and the third, if there be a third, ſhould be about the tenth or twelfth of April. Theſe are the directions of Mr. Philip Miller, whoſe long experience and excellent obſervations have enabled him to treat this ſubject ſo much better than any other had ever done before him, that we cannot do juſtice to him, or to our readers, but by giving the ſubſtance of his judicious inſtructions on this head ; eſpecially as they contain ſeveral new and eſſential improvements.

The melons which beſt deſerve culture are, the Cantaleupe, the Romana, the Succado, the Zatte, the ſmall Portugal, and the black Galloway : for our common ſorts, and thoſe which moſt of the trading gardeners around this metropolis raiſe for the markets, where their ſize is chiefly regarded, are not worth the trouble and expence beſtowed upon them, otherwiſe than as they bring in a profit to the cultivator.

The Cantaleupe, as it is called, by way of pre-eminence, particularly by the Dutch, who cultivate very few other ſorts, and never ſubjoin the word melon when they ſpeak of this, though they apply that diſtinctive appellation to every other kind, is held in the greateſt eſteem by all the curious in Europe. It derives its name from a place (where the pope has a country-ſeat) about fourteen miles from Rome, where it has long been cultivated : but it was firſt brought thither from that part of Armenia which borders on Perſia, where this fruit grows naturally in vaſt abundance. Its outer-coat is very rough, full of knots and wart-like protuberances ; and its fleſh, which is generally of an orange colour, though it is green in ſome, but theſe are not ſo good, is ſingularly delicious, when in perfection, and remarkable for the ſafety with which it may be eaten ; for it does not offend even the moſt tender ſtomachs.

The Romana is a good melon, when it is well conditioned, and produced by a perfectly healthy plant, in a dry ſeaſon. It may be ripened ſooner than the Cantaleupe, and therefore merits the attention of thoſe who are fond of having early melons.

The Succado is alſo a very good ſort, and will yield early fruit : but neither it, nor the Romana, can be compared to the Cantaleupe, when this laſt is in ſeaſon.

The Zatte melon is likewiſe well taſted ; but its fruit is ſo very ſmall (ſeldom exceeding the ſize of an orange), and the fleſh in it ſo little, that it is ſcarcely worth cultivation. It is ſomewhat flat at both ends, and its coat is warted like that of the Cantaleupe.

The ſmall Portugal melon, which ſome call the Dormer melon, may alſo be cultivated for an early crop. It is a pretty good fruit, and grows plentifully ; for which reaſon people who chooſe quantity rather than quality, and many whoſe palates are not nice, give it a ſort of preference to moſt other ſorts : but it falls greatly ſhort of the Cantaleupe, in point of flavour.

The black Galloway, which was brought from Portugal, many years ago, by Lord Galloway, is the beſt of all melons for an early crop ; for it will ripen in a ſhorter time from the ſetting of it, than any other ſort ; and its fruit is by no means bad when it is ſuffered to ripen naturally. This would, therefore, certainly be a very proper ſort to cultivate even in the open field, according to the principles of the New Huſbandry, by a proper application of which to the melon, we have juſt ſeen how well M. de Chateauvieux ſucceeded. The ſeeds of the right black Galloway are, indeed, not eaſily met with now in this country ; becauſe it has degenerated by growing among other ſorts, the male duſt (farina) of whoſe bloſſoms has been wafted to, and has impregnated, the flowers of this : for, to preſerve any particular ſort of melon in perfection, no other plant of a different kind, though of the ſame genus, no cucumber, no gourd, nor any ſimilar growth, ſhould be permitted to blow near it.

To the want of care in this important, though too generally unheeded, caution, is owing the complaint of many lovers of this fruit, who, not knowing the true cauſe, have imputed the gradual diminution of the goodneſs of their melons to their having been too long cultivated from ſeeds ſaved in the ſame garden, and have therefore held it to be abſolutely neceſſary to procure a frequent change of ſeeds from diſtant parts. That a change of ſeeds now and then is beneficial, and even adviſable, is readily allowed in regard to this, as well as for all other vegetables ; but the great difficulty is, to get them from people who have ſaved them with due care ; for all hired, or otherwiſe mercenary, gardeners, are apt to be very blameably negligent in this reſpect. Even Mr. Miller, though a member of the botanic Academy at Florence, and very ſolicitous to have the right ſort, could not, for ſeveral years, procure any good ſeeds of the true Cantaleupe melon, notwithſtanding that ſeveral parcels were ſent to him from Italy, as ſuch, by perſons who, he thought, could not be deceived in their choice, and who lived near the place of their growth. He therefore judiciouſly warns all perſons not to depend upon ſeeds brought from abroad, either by thoſe who import them for ſale, or by gentlemen ; and declares his own reſolution, founded on repeated diſappointments to be, never more to try any of them, unleſs he receives them from a ſkilful perſon who has himſelf eaten of the fruit from which he ſaved them : “ for, adds he, in Italy, Spain, Portugal, and many parts of France, the gardeners are very careleſs in the choice of all their ſeeds, but of the melons they are remarkably ſo ; and as for thoſe which come from Conſtantinople, Aleppo, and other parts of Turky, I have rarely ſeen one melon produced from thoſe ſeeds, which was tolerable.”

Melon ſeeds ſhould be at leaſt three years old, and not more than ſix, or at moſt ſeven, when they are ſown : for though they will grow at the age of ten or twelve years, and at leſs than three, yet the fruit produced by them will, like that of light ſeeds which ſwim upon the water when taken out of the pulp, not be near ſo thick fleſhed, ſo firm, ſo moiſt, or ſo well taſted, as what is raiſed from heavy ſeeds kept to a proper time, even though they be taken out of the ſame melons. Mr. Miller has made the trial ſeveral times, and always found this to be the event. The culture of all ſorts of melons, of which there are many varieties beſides the above-mentioned, though not of value enough to be particulariſed here, is exactly the ſame. The two firſt ſowings of them, that is to ſay, thoſe made in March, ſhould be under frames, and therefore theſe may be placed at the upper ſide of a cucumber-bed, if there be one in readineſs; otherwiſe a hot-bed muſt be made on purpoſe for them, with new horſe-dung, in the manner before directed for cucumbers, like which they are to be raiſed and managed in all reſpects, till they are planted out where they are to remain. The third ſowing, of which the plants are generally reared under bell or hand-glaſſes, or under frames covered with oiled paper, ſhould not be earlier than the tenth or twelfth of April, leſt theſe plants, if they thrive well, ſhould extend their ſhoots to the ſides of the glaſſes before it will be ſafe to let them run out, on account of the ſharp morning froſts which are frequent in this country even in the middle of May: nor muſt they, on the other hand, be cramped in the glaſſes, becauſe they would then be in equal danger from the heat of the ſun in the day-time. If they do grow ſo as to exceed the limits of their glaſſes ſooner than it may be ſafe to expoſe them to the air, the projecting ends of their vines muſt, in that caſe, be ſheltered with mats, to defend them from the cold. For theſe reaſons it is moſt adviſable to ſet the ſeeds of ſuch plants as are to be reared under hand-glaſſes, a little later than thoſe which are intended for the much more ſpacious coverings of oiled paper: and likewiſe for the ſame reaſons, it is beſt in this climate, not to attempt to have melons ripe earlier than the middle of June, from which time they may be had in plenty till the end of September, if they are rightly managed: nay, when the autumn has continued favourable, Mr. Miller has had them very good, even till the end of October.

When the beds, or, as the gardeners term them, the ridges, in which theſe plants are to be ſet to remain, are of a proper warmth (but not before, leſt the too great violence of the heat at firſt ſhould burn the earth laid upon them) a covering of two inches thick of mould will be ſufficient to begin with, except in the middle of each light, where a hill of it ſhould be raiſed eighteen inches high, or more, terminating in a flat cone, in the top of which the plants are to be placed. In two or three days, this will be ſufficiently warmed to receive the plants, which always ſucceed beſt when they are tranſplanted young; and the moſt proper time for removing them is the evening, when a little wind is ſtirring. They ſhould be carefully taken up with a trowel, ſo as to preſerve all their fibres, and as much earth as poſſible about them; for theſe plants are much tenderer than thoſe of cucumbers. The Cantaleupe melon is particularly ſo: for it will be long before that recovers itſelf, after being tranſplanted, if this is not done ſoon after it has put out its third, or what the gardeners call its rough leaf. If this happens before the beds are ready, the beſt way is, particularly for the Cantaleupe, which requires the niceſt management, to take up the plants, as ſoon as they are fit for removing, to put each of them into a ſeparate ſmall garden pot, and then to plunge theſe into the hot bed where they were raiſed, or into a cucumber bed, if there be room, in order that they may be brought forward; and when the bed or ridge where they are to remain is ready, they may be turned out of the pots, with all the earth about their roots, ſo as not to receive any check by the tranſplanting. This may be the more eaſily done, as only one melon plant ſhould be ſuffered to grow in each light, and there will not be any danger of hurting their roots when they are removed in this way. When they are well placed on the top of the little mounts, or hillocks, before mentioned, they ſhould be watered gently, and this ſhould be repeated once or twice, till they have taken good root, after which more water will ſeldom be wanted, or adviſable; becauſe too much wet makes them canker at the root, and then they never produce good fruit. When the plants are well fixed in this new bed, a greater quantity of earth ſhould be laid on it, beginning at the hillocks, that their roots may be enabled to ſtrike out horizontally; and as this earth is added from time to time, it ſhould be preſſed or trodden down as cloſe as poſſible, till it is at laſt raiſed at leaſt a foot and a half thick upon the dung all over the bed. The frames ſhould alſo be raiſed in proportion, that their glaſſes may not be ſo near the plants, as to make the ſun ſcorch them: but in this raiſing of the frames, great care muſt be taken to ſtop every crevice all around, ſo that no cold air may be able to penetrate through them.

The earth, which the Dutch and German gardeners, who are very exact in that reſpect, lay upon theſe beds, conſiſts of one third of hazel loam, one third of the ſcouring of ponds or ditches, and one third of very rotten dung. They prepare this compoſt at leaſt one year, but oftener two years, before they uſe it; frequently turning it during that time, the more thoroughly to blend and ſweeten it: but Mr. Miller has found, by experience, that melons ſucceed beſt in this country, when they are planted in two thirds of freſh gentle loam, and one third of rotten neats dung, well mixed, and frequently turned over during one year before they are wanted, ſo as to enable them to enjoy all the benefit of a winter's froſt and ſummer's heat; and of this a ſufficient heap ſhould always be kept in readineſs, under a ſhed, well ſheltered from heavy rains, which would carry off its goodneſs.

When the plants have four leaves, and conſequently a joint, their tops above that joint ſhould be pinched off with the finger and thumb, to make them put out lateral branches, for theſe are to produce the fruit; and when there are two or three of theſe branches, their extremities muſt alſo be pinched off, as ſoon as they have got two or three joints, to force out more, and theſe again muſt be treated in the ſame manner, that there may be runners enough, as the gardeners call them, to cover the bed. Care muſt be taken not to bruiſe the plants, when the tips of their ſhoots are thus pinched off, nor muſt they be cut with a knife, becauſe the wound will not heal ſoon in either of theſe caſes. Neither ſhould a greater number of lateral ſhoots than is neceſſary to cover the bed properly, be forced out by cropping off their ends, leſt more fruit ſhould be produced than the plant can poſſibly nouriſh. The farther management of theſe plants is the ſame as that of cucumbers, only it is to be obſerved, that melons require a greater ſhare of air than cucumbers, and very little water; and that when they are watered, it ſhould always be at a diſtance from their ſtems.

If the plants raiſed in frames ſucceed well, their vines will extend over the bed, and reach to the frames, in about ſix weeks, at the end of which the alleys between the beds ſhould be dug up; or, if there is but one bed, a trench about four feet wide ſhould be dug on each ſide of it, as deep as the bottom of the bed. A ſufficient quantity of hot dung ſhould then be trodden down cloſely to it, till this dung is as high as that of the bed, and this additional breadth ſhould be covered with the ſame ſort of earth as was uſed for the bed. This earth ſhould alſo be trodden down as cloſe as poſſible, and the whole bed ſhould by theſe means be enlarged to the breadth of twelve feet; for the roots of the plants will extend themſelves to very near that diſtance: but if they ſhould reach farther than they are covered, and their extremities be conſequently dried by the ſun and air, the plants themſelves will gradually languiſh and decay, or at beſt produce but meagre, mealy, and ill flavoured fruit; whereas thoſe which have a ſufficient breadth and depth of well trodden earth for their roots to run in, will remain in vigour till the froſt deſtroy them. Mr. Miller has experienced the benefit of this practice, ſo far as to have a ſecond crop, even of Cantaleupe melons, upon the ſame vines as had borne the firſt; and that ſecond crop has ſometimes ripened very well under his judicious inſpection. The languiſhing of the plants, for want of ſufficient room to extend their roots, frequently before the fruit is full grown, and even ſometimes before it is well formed, may ſoon be diſcovered by the drooping of their leaves in the middle of the day, and a then ſpeedy total decay of many of thoſe leaves. It is owing to their not having enlarged the beds, as above directed, or even made them at all wider than they were at firſt, or increaſed the original depth of the mould upon them, which perhaps did not exceed the common allowance of about three inches, that many people have ſeen their plants of Cantaleupe melons pine away, and periſh, before they had ripened a ſingle fruit; and then have imputed to their tenderneſs, too great, ſay they, for this climade, a miſcarriage which was entirely owing to their not underſtanding the right method of cultivating them.

When the vines have extended ſo far as to fill the frames, and conſequently to want more room, the frames ſhould be raiſed up about three inches above the ſurface of the bed, and ſet upon a few bricks, at that height, in order that the ſhoots may have room to run out under them : for if the plants are vigorous, theſe branches will reach to the diſtance of ſix or ſeven feet every way from their ſtem. It therefore is evidently beſt, not to put more than one plant under each light ; and the more ſo as its fruit will ſeldom ſet well if the vines are crowded, but will drop off when about the bigneſs of an egg. The addition of the warm dung before mentioned, on each ſide of the bed, will indeed, by reviving the heat of the dung in the bed, be of great ſervice to the ſetting of the fruit, eſpecially if the ſeaſon ſhould prove cold, as it ſometimes is with us till the very end of May ; and this is ſurely no ſmall advantage accruing from that method. To ſecond it properly, the frames for melons ſhould not be made ſo ſmall as is the general cuſtom ; for the wider they are, the better the plants will thrive, and the greater quantity of fruit they will produce.

If the weather ſhould become cold after the plants have extended themſelves from under the frames, it will be right to cover the extremities of their vines every night with mats, during the continuance of the cold ; for if they are injured, the growth of the fruit will be retarded, and the plants themſelves may be hurt eſſentially. Care ſhould alſo be taken after this enlargement of the beds, that what water is given to the plants be poured only in the alleys between the beds, or towards the outſide of the ſpace added to them ; for their roots will now have extended ſo far as to reap the benefit of any ſuch watering, and their ſtems will continue the ſounder for being kept dry.

This watering ſhould be pretty plentiful when it is given ; but it ſhould not be repeated above once a week, even in the drieſt weather : and, on the other hand, the plants ſhould be aired as much as poſſible when the ſeaſon is warm.

The plants of melons intended to be reared under bell or hand-glaſſes, ſhould be raiſed in the ſame manner as the beforementioned ; and the beds, or ridges, for them ſhould be made by the latter end of April, if the ſeaſon is forward. A ſufficient quantity of hot dung ſhould therefore be provided for this purpoſe, ſo as to allow eight or nine good wheel-barrow loads of it to each glaſs. When there is but one bed, and that is to be extended in length, the trench for it ſhould be dug four feet wide, and its length ſhould be proportioned to the intended number of glaſſes, which ſhould ſtand at leaſt four feet aſunder : for if the plants are too cloſe to each other, their vines will intermix and entangle, and crowd the bed ſo as to prevent the ſetting of the fruit. This trench ſhould be ſo ſituated, that there may be room for widening the bed two or three feet on each ſide. Its depth muſt depend on the nature of the ſoil, as was before obſerved : but if the ground is ſo dry as to obviate all danger of the bed's being hurt by wet, it cannot well be dug too deep. After the dung is ſpread, trodden down, and flatted in the trench, as already directed, a hill of earth (ſuch as was before adviſed will be the beſt) ſhould be raiſed eighteen inches high, with a flat head, in the middle of each ſpot where a plant is to be ſet ; but the reſt of the bed need not yet be covered above four inches thick ; for that will be ſufficient to prevent the evaporation of the warmth of the dung. The glaſſes ſhould then be ſet down cloſe, over the hills, that theſe may be warmed ſo as to be fit to receive the plants, which they will be in two or three days, if the bed works kindly, and then the plants ſhould be ſet in the top of the hills, in the manner before directed. If they are taken out of pots, with all the earth about their roots, only one ſhould be ſet under each glaſs, becauſe there will not then be any danger of their growing ; but if they are tranſplanted directly from the ſeedling-bed, it will be right to plant two upon each hill, and afterwards to remove one of them, if they both grow. Theſe plants muſt be watered when they are firſt ſet, to bring the earth the cloſer to their roots. They muſt alſo be ſhaded every day, till they have taken new root ; and if the nights prove cold, the glaſſes ſhould be covered with mats, the better to preſerve the warmth of the bed.

When ſeveral of theſe beds are made, they ſhould ſtand eight feet aſunder at firſt, that there may be between them a proper ſpace, which is afterwards to be filled up, in order to enlarge them ſo that the roots of the vines may have room to extend themſelves every way, for the reaſons before aſſigned.

When theſe plants have taken good root, their tops muſt be pinched off as before directed for thoſe in the frames ; and the glaſſes ſhould be raiſed up in the day time, in warm weather, on the ſide oppoſite to the wind, to let in freſh air to the plants, which will otherwiſe be drawn up weak and ſickly : a ſtate which all poſſible care ſhould be taken to prevent, becauſe their runners cannot ſupply the fruit with due nouriſhment, if they themſelves have not proper ſtrength.

If the weather be favourable, the glaſſes ſhould be raiſed two or three inches high from the ſurface of the beds, and ſet upon three bricks, as ſoon as the plants are grown long enough to touch their ſides, in order to give the vines room to run out from under them ; but it is eſſential to obſerve, that, when this is done, the whole bed ſhould be covered with earth to the depth of eighteen inches ; that this earth ſhould be trodden down as cloſe as poſſible ; and that, if the nights ſhould prove froſty, a covering of mats ſhould be carefully ſpread over the beds, to guard the tender ſhoots of the plants from the cold. It is alſo to be obſerved, with regard to the Cantaleupe melon in particular, that, as the vines of this ſort cannot endure wet, the beds where it grows ſhould be arched over with hoops, to ſupport the mats, and that theſe ſhould be held in readineſs to be uſed at a moment's warning, either againſt cold or rain : for this is the only way to have theſe melons ſucceed in ſo variable a climate as ours is. Mr. Miller gives a ſtriking inſtance of the neceſſity of this precaution, when he ſays, that he had ſome beds of Cantaleupe melons in as fine order as could be deſired, under theſe glaſſes, and that they were totally deſtroyed by one day's heavy rain in June.

If the weather ſhould prove cold after the bed is covered with the proper thickneſs of earth, well trodden down, it will be adviſable to dig a trench along each ſide of it, or, if there are more beds than one, to dig out their intermediate ſpace, then to fill this, or the trenches, with hot dung, up to the height of the dung of the adjoining bed, and to cover this dung with an equal depth of well trodden down earth, as before directed. This new dung will revive the warmth of the former beds, and ſoon make the plants ſhew their fruit. The watering of them, pinching off their tops, and, in ſhort, every other part of their management, muſt be the ſame as before directed for thoſe under frames : but a farther care requiſite here is, to cover them with mats in all hard rains and cold nights. If all this is rightly performed, theſe plants will remain vigorous until the cold in autumn deſtroys them.

The oiled paper coverings are a late invention ; but they have been found to ſucceed admirably well when rightly managed. The chief thing to be attended to when they are uſed, is, not to keep them down too cloſe over the plants ; for then the melon vines will waſte themſelves by running out in length, and will be ſo weak as rarely to ſet their fruit in any plenty. The beſt way therefore is, where theſe coverings are intended to be uſed, to raiſe the plants under bell or hand glaſſes, as before directed, till they are grown large enough to be releaſed from thoſe glaſſes ; and then, inſtead of mats, to uſe this oiled paper covering, which, if it be prudently managed, will anſwer every end that can be deſired.

To make this covering, a number of ſheets of ſtrong, but not too dark coloured, paper ſhould be paſted together ſo as to over-ſpread the frame intended to be uſed ; and theſe ſhould then be faſtened to the frame, and rubbed well over with linſeed oil, which will dry ſoon ; for all the ſtench ſhould be gone off before it is put over the plants, becauſe they will otherwiſe be hurt thereby. Pan-tile laths put together in the ſhape of the ridge of a houſe, with hinges to each ſlope, whereby any of the pannels may be raiſed at pleaſure, to let air in to the plants, are the beſt materials, and the beſt form, for theſe frames ; for when they are made with broad hoops, like the tilts of waggons, they are cumberſome to move, and no air can be admitted to the plants, but by raiſing up one whole ſide of the frame ; which is very inconvenient.

When the vines begin to put forth their fruit, which they will do in plenty ſoon after the bearing runners ſhall have been produced by nipping off, in the manner before adviſed, firſt the top of the plant, as ſoon as it has one joint, and then the ends of the earlieſt lateral ſhoots when they have two or three joints, they ſhould be carefully looked over thrice a week, to obſerve the ſetting of the young melons, and ſingle out, upon each runner, that only which ſeems to be the ſtrongeſt fruit, which has the thickeſt foot-ſtalk, and which is ſituated neareſt to the ſtem. All the others ſhould then be pinched off; and the end of the runner upon which a melon has been thus choſen ſhould alſo then be nipped off at the third joint above the ſelected fruit, to ſtop the ſap and ſet the melon: but none of the ends of theſe bearing runners ſhould ever be broken off before the particular fruit has been culled out, becauſe that would only make them produce more ſhoots, which would weaken the plant, and draw away the nouriſhment neceſſary for the fruit. For this reaſon, if any new ſhoots do break out, or any young fruit appears, after the above precautions in favour of that which is intended to remain have been taken, they ſhould be nipped off immediately; for if many of them are ſuffered to grow, they will abſolutely impoveriſh the plant to ſuch a degree, that it would not be ſurprizing to ſee all the fruit drop off when it comes to be about as big as a man's thumb. One young melon is as much as ought to be left upon any one runner; for, if but half of theſe ſtand, they will be full as many as the plant can nouriſh. Six or eight of the Cantaleupe's, whoſe fleſh is thick, are full enough for the ſtrongeſt plant of that kind; and though ſome ſmaller ſorts may be ripened in greater numbers, even unto fifteen or twenty upon one plant, they will be thinner and poorer than if they were leſs numerous.

For plants which are ſo confined under frames, that the wind requiſite to convey the farina from the male flowers to the female is excluded, it is the practice of ſeveral gardeners, and perhaps it may there be even a neceſſary one, to take off ſome of the male flowers whoſe farina is juſt ripe and fit for the purpoſe, and, inverting them over the female flowers ſituated on the crown of the young fruit, to ſtrike the former gently with the tip of a finger, ſo as to ſhake its farina into the latter; for by this means the female flower will almoſt ſurely be impregnated, and if it is, its fruit will ſwell ſoon after, and ſhew manifeſt ſigns of being perfectly ſet: but, from the time that the fruit appears on the vines, the glaſſes ſhould be conſtantly taken off in good weather, or the fruit will ſeldom form in any plenty.

As the melons draw towards ripening, (long before which all the ſuperfluous fruit and weak runners will have been pinched off, if they are properly managed,) they ſhould be turned gently twice a week, that every part of them may receive equal benefit from the ſun and air; for if the ſame ſide is ſuffered to lie continually downward, in which ſituation it will be deprived of both thoſe advantages, that ſide will become pale, or whitiſh, as if it were blanched.

Beſides airing the plants as much as poſſible when the weather will permit, they will alſo require to be watered in very dry weather, and perhaps moſt particularly after they have been pruned: but this, as was before obſerved, ſhould be done with great care not to wet their ſtems, by pouring the water only in the alleys, at a diſtance from them: nor ſhould it be repeated oftener than once in a week or ten days. Then, indeed, the alleys ſhould be well ſoaked, to forward the growth of the fruit, and render it thick fleſhed: though it is eſſentially neceſſary not to over-water the plants.

The goodneſs of all melons depends greatly on their being cut at a proper degree of maturity. The Cantaleupe, in particular, is ſo very nice in this reſpect, that it will loſe much of its delicacy if it be left but a few hours too long upon the vines. The beds ſhould therefore be looked over at leaſt twice every day when the fruit is ripening; and if thoſe which are intended for the table are cut early in the morning, before the ſun has warmed them, and laid by in a cool place till they are uſed, their flavour will be much better than if they are gathered later in the day, and ſerved up directly. Such as are cut afterwards, when the heat of the day has affected them, ſhould be put into a pail of cold ſpring water, or ice, to cool them, before they are ſet upon the table.

A ſure ſign of maturity in the Cantaleupe melon is, its beginning to crack at the foot-ſtalk, and to emit a fragrant ſmell. Whenever this happens, the fruit ſhould be cut directly; for this ſort ſeldom changes its colour as the others do, and only a few hours delay will render it too ripe, as was before obſerved.

The beſt ſeeds of melons are thoſe which are taken from the firmeſt and higheſt flavoured fruit; and if they are ſcooped out with the entire pulp, ſo as not to diſplace them, and left in it for two or three days before they are waſhed out, they will be benefited thereby. None but the heavy ſeeds, which ſink in the water, are worth ſaving. *Miller's Gard. Dict.*

MESLIN-CORN, wheat and rye mixed together.

MET, a ſtrike, or four pecks.

METEYARD, or METERWARD, a ſtaff of a certain length for taking meaſures.

MIDDING, a dunghill.

MIDGE, a knat.

MILDEW, a diſtemper very deſtructive to corn.

“ This diſtemper, ſays M. Duhamel, attacks the blades and ſtems of corn, which it covers with a powder of the colour of ruſt of iron, when at the height of their vegetation. This ſubſtance does not adhere ſtrongly to the blades; for I have ſeen the hair of white ſpaniels full of this powder, after they have run through a field attacked with this diſeaſe. It is likewiſe known, that if the infected wheat is waſhed by a plentiful rain, the ruſt diſappears almoſt entirely, and the grain ſuffers little from it. The French give it the name of ruſt, from the colour of the powder; and it ſeems to be the ſame diſtemper which the Roman writers call *rubigo*.

“ The cauſe of this diſtemper is uſually imputed to dry gloomy weather, happening while the corn is at the height of its vegetation: and in effect I have many times obſerved, that when a hot ſun has ſucceeded ſuch dry hazy weather, the corn was ruſted within a few days after.

“ This diſtemper is not common in clear and dry hot years: but when the ſpring is wet, the fineſt fields of wheat run great hazard of being deſtroyed by the mildew, which generally appears upon the breaking out of the ſun in the morning, after cloſe and ſultry weather, during which there has not been any dew. The ruſty powder then gathers upon the blades in ſuch quantities as to cover the earth two feet around. M. de Chateauvieux cut off the mildewed blades, and found the trial anſwer: the ſame plants produced new blades, and throve much better than thoſe on which this operation had not been performed: but this cannot be done except when the corn is very young.

“ This diſtemper is very fatal: for the fineſt wheat is ſuddenly brought almoſt to nothing, when it is entirely attacked with it.

“ If it attacks the plants while they are young, and before their ſtems begin to riſe, the miſchief is ſometimes not very great, provided there comes on a ſeaſon favourable to their farther growth. In this caſe, they are only weakened, as if they had been fed or mowed. They ſhoot out anew, and produce ears: though their ſtraw is ſhorter, and thoſe ears are ſmaller, than they would otherwiſe have been. But if both blades and ſtalks are mildewed at the ſame time, the farther growth of the plant is ſtopt, and the grain gets ſcarce any more nouriſhment; ſo that the crop is exceedingly diminiſhed.

“ This grievous diſtemper well deſerves the ſerious attention of every inquirer into nature, who intereſts himſelf in the progreſs of agriculture; and I cannot too ſtrongly exhort all ſuch, to endeavour to inveſtigate its cauſes and remedies.

“ Several authors have, very improperly, confounded this diſtemper with others to which corn is ſubject. M. Tillet imputes it to a ſharpneſs in the air in dry cloudy weather, which breaks the veſſels interwoven with the ſubſtance of the blades and ſtem, and makes them diſcharge a thick oily juice, which, drying by degrees, is turned into that ruſty powder. In effect, if we examine with a microſcope, or only with a good magnifying-glaſs, plants of wheat, whoſe ſtems and leaves are covered with ruſt, we ſhall ſee diſtinctly ſmall crevices in the places where this powder lies, and ſhall diſcern, from ſpace to ſpace, in the membrane of the plant, openings through which it ſeems probable that the juices, afterwards converted into this ruſty powder, iſſues, and over which one may perceive ſome ſlight fragments of the membrane imperfectly covering thoſe cracks and openings.

“ In ſupport of this opinion, M. Tillet quotes a memoir of M. de Renéaume, publiſhed in the Tranſactions of the Academy of Sciences, on the extravaſation of the nutritive juice of the walnut trees in Dauphiny: of the manna of Calabria, which is not a dew, but the extravaſated juice of the leaves of a kind of aſh; and what M. Muſchenbroek relates in his Phyſical Eſſays of thick and oily juices which iſſue out at the excretory veſſels of leaves, and ſtop there in the conſiſtence of honey.

“ However this may be, the ruſt of corn is the conſequence of a diſtemper of which the firſt cauſe is not yet ſufficiently known. It is a miſtake to think, that the ruſt and mealy powder which may be ſeen on many plants are a collection of eggs laid there by inſects, and that this is a ſource of other inumerable inſects very fatal to vegetables. By admitting the extravaſation of the nutritive juices, as the cauſe of theſe diſtempers, we ſhall conceive that the ruſt of corn, the honey-dew, the mealy-dew, and all the unctuous ſubſtances which are found upon gramineous plants, depend on the quality of the juice concentrated in the plants, upon the outſide of which it manifeſts itſelf by evaporation, and is converted ſometimes into an impalpable powder, and ſometimes into that thick ſubſtance which is red on garden-beans, of a ruſty colour on all kinds of corn, greeniſh on the plum-tree, yellowiſh on the aſh, white on the larch-tree, &c.

“ Theſe obſervations and reflections ſtill leave undoubtedly much room to wiſh for farther information. They will, however, help to point out the path to a careful obſerver, and ought to excite philoſophers to exert themſelves in a matter of ſo great importance to the public. We confeſs that we have tried to produce the ſame effects as the dry hazy weather, which occaſions the ruſt, by applying to the leaves of many plants, acid and corroſive liquors, to others alkaline or ſpirituous, and frequently ſuch clammy glutinous ſubſtances as might ſtop the perſpiration without hurting the texture of the plants: but none of theſe trials have produced any thing like ruſt. However, who can tell how far experiments may lead the judicious and attentive? Some little circumſtances which may have eſcaped us, might perhaps, if duly remarked, have led us to the object of our ſearch. The public welfare calls on all attentive obſervers, to exert themſelves on this very intereſting ſubject.

“ Count Ginanni, in a memoir printed in the *Journal économique*, for October 1761, treats expreſsly of this diſtemper, and ſays, he has obſerved, with the help of a microſcope, ſmall worms lodged between the two membranes of the blades.

“ If we had any certain knowledge of the cauſes of the ruſt, we ſhould probably be enabled the more eaſily to find preſervatives againſt it: but in the mean time it will be right to collect every obſervation made by lovers of agriculture; becauſe they will certainly afford uſeful lights at one time or other.

“ M. de Chateauvieux obſerved, in the autumns of 1753 and 1754, that when the corn was ruſted, the ſecond crop of hay was ſo likewiſe. The graſs turned from a fine green, to the ugly ruſty colour of the corn: it was covered with the ſame kind of powder, and its quantity diminiſhed ſenſibly every day; and as the whole of a field of corn is not uſually affected at the ſame time, ſo this diſtemper extended only to ſome parts of the meadow.

“ The cauſe of this diſtemper is undoubtedly the ſame in corn and in graſs; but its effect is not exactly ſimilar. It may deſtroy annual plants, ſuch as corn, entirely; but in perennials, like graſs, it deſtroys only the leaves or blades. May not the preſervation of theſe laſt be owing to the taking off of thoſe leaves or blades, when they are cut for hay? But this is only conjecture; for I own that I have not yet made any obſervation on this head.

“ As the ſtraw of ſmutty, mildewed, or ruſted corn, and by the ſame rule graſs, in a ſimilar condition, may poſſibly give diſeaſes to cattle fed with it; it were to be wiſhed, for the public good, that a parcel of fodder, the moſt infected with either of theſe diſtempers, ſhould be ſet apart for the food of a certain number of beaſts. If cows or oxen, for example, remain ſound and healthy after having been fed with this growth for two or three months, we may afterwards give it them with confidence and ſafety: but if, on the contrary, they are viſibly diſordered by it, the remedy is eaſy and at hand, by feeding them with good wholeſome hay, which will carry off the diſeaſe, then known to proceed from the bad quality of the food.”

The air in England ſeldom is ſo dry as to exhale all the moiſture of the glutinous exſudations, and thereby convert them into the ruſty powder above deſcribed. The extravaſation of the ſap ſeems to account for this diſtemper of plants in a much more rational manner, than the thick clammy dews which ſome of our authors ſpeak of, as falling in cloſe weather, ſtopping the perſpiration of vegetables, and hindering their juices from aſcending to nouriſh the flowers, &c.

Mr. Miller takes the true cauſe of the mildew's appearing moſt upon plants which are expoſed to the eaſt, to proceed from a dry temperature in the air when the wind blows from that point; in which caſe it ſtops the pores of plants, and prevents their perſpiration, whereby their juices are concreted upon the ſurface of their leaves; and that concretion being of a ſweetiſh nature, inſects are incited thereto. Thoſe inſects, finding their proper nutriment, depoſit their eggs, and multiply ſo faſt as to cover the whole ſurfaces of plants, and, by corroding their veſſels, prevent the motions of the ſap. He thinks it very probable, that the excrements of theſe inſects may enter the veſſels of plants; and, by mixing with their juices, may ſpread the infection all over them; for it is obſervable, that whenever a tree has been greatly infected by this mildew, it ſeldom recovers in two or three years, and many times never is entirely clear from it after. But he by no means allows theſe inſects to be the firſt cauſe of this diſtemper, as ſome have miſtakenly imagined.

It is obſervable, that mildews and blights frequently attack only one ſort of corn, or fruit, and leave the other ſpecies unhurt.

Count Ginanni diſtingiſhes two principle kinds of mildew, one of which ſpots the blades and ſtems of corn, and dries upon them, without ever producing any powder; but penetrates through their outward covering, and entirely dries them up. This is generally of a pale colour, either reddiſh, yellowiſh, purpliſh, or blackiſh; and ſometimes a variegated mixture of many colours. The other ſpeedily covers the plant with a moiſt and thickiſh ſubſtance, which afterwards becomes dry, and turns into a powder, of one or other of the abovementioned colours, but moſt commonly reddiſh or yellowiſh. This, ſays he, always fades, corrodes, and ſeparates the outer ſkin from the plant. The former extends to every ſpecies of corn; but the latter is almoſt peculiar to wheat in the blade; though it is ſometimes ſeen upon oats and barley. Some may perhaps reckon, as a third ſpecies of mildew, a yellowiſh ſubſtance, or powder, ſometimes ſeen under the membrane of the blades of corn, where it raiſes bliſters, makes many little holes and craks, and corrodes the fibres; and perhaps they may not be wrong in accounting it ſuch.

He is confident that this diſtemper is the rubigo of the Latins.

“ For the vegetation of ſeeds,” continues count Ginanni, “ after they have been properly depoſited in the earth, for their fecundity, their ſprouting, and the increaſe and well-doing of the plants produced by them, it is neceſſary that the action of the fluid which pervades them be duly regulated: for that fluid is operated on in them by the ſame cauſes which affect the liquor in a thermometer and barometer, or influence the hygrometer; ſo that whenever its due courſe is obſtructed or weakened, or its quantity too much increaſed or diminiſhed, or its quality injured in any manner whatever, a diſtemper will enſue. This fluid is ſubject to two laws of motion; the one, ſimply as a fluid, which conſiſts in an inteſtine agitation of its minuteſt particles; and the other, as a fluid whoſe progreſs is through the various ducts of the plant. By the firſt of theſe motions it aſſimilates to itſelf all the homogeneous particles, and expels the heterogeneous; and by the ſecond, it penetrates into the various parts where thoſe functions are to be performed. When both theſe motions proceed naturally, equally, and juſtly, the ſecretions are duly made, and every part of the plant continues ſound and healthy: but when that harmony is interrupted, the fluid degenerates from its natural ſtate, and the ſecretion becomes vitiated and depraved.

"Now, if the ſeveral diſtempers to which plants are ſubject are owing to the various ways in which the regular action of this fluid may be hurt; and no one diſtemper can, in my opinion, happen to corn, which will not fall under one or other of theſe circumſtances; we ought to ſearch after, and endeavour to diſcover them, in order to be thereby enabled to prevent, or to cure them, that mankind may be the leſs expoſed to the injuries reſulting therefrom. But as the knowledge of theſe particular things depends on an adequate conception of thoſe which are univerſal; and as the univerſal cauſes of diſtempers are external or internal, and the diſtempers themſelves ſeem particularly to depend on the conſtitution of the air, or an alteration of food, or on both; ſo when we have diſcovered the genus of the cauſe, it will not be very difficult afterwards to find out the ſpecies, and the efficient cauſe. So many and various have been my reſearches, obſervations, and experiments, and ſuch the lights which they have afforded me, that, if the love of truth did not oblige me to be diffident of myſelf, and if I was not thoroughly perſuaded, with that great philoſopher and mathematician Gallileo, that we cannot in general underſtand how nature acts, becauſe ſhe makes uſe of means frequently beyond the reach of our comprehenſion, I ſhould, perhaps, flatter myſelf with thoughts of having diſcovered the origin of ſome of the diſtempers to which corn is ſubject whilſt in the blade."

He then gives his opinion of mildews, which is, that they come on very early in the morning, and cover the corn almoſt inſtantaneouſly, after a cold night, which has been preceded by a hot day; and that the ſap or moiſture which then iſſues out of the plant, is gradually exhaled, and forms the ruſty powder which characteriſes this diſtemper.

After trying in vain all the boaſted remedies of the ancients (highly commended by ſeveral modern writers) ſuch as burning of ſtraw and weeds in a ſerene night, when not a breath of air is ſtirring, or the wind, if any does blow, comes only from the weſt, ſticking up branches of laurel, &c. ſprinkling the corn with tobacco, and with pepper; and ſtrewing among it, as Dr. Hales adviſes, woollen rags ſteeped in a ſtrong ſolution of ſalt of tartar, or ſea-ſalt, or in good white-wine vinegar, and afterwards well dried, even from which laſt he cannot ſay that he has found much benefit; the method long ago directed in this caſe by Mr. Worlidge, of making two men go at a proper diſtance from each other in the furrows, holding a cord ſtretched ſtrait between them, and carried ſo as to ſhake off the dew from the tops of the corn, before the heat of the ſun has thickened it, ſucceeded beſt of all; to which he adds, as an excellent preſervative, keeping the ground perfectly free from weeds, and ſtirring the earth frequently between the plants. I ought not to omit here M. Worlidge's farther obſervation, that "the ſowing of wheat early has been eſteemed, and doubtleſs is, the beſt remedy againſt mildews; for by this means the corn will be well filled in the ear before thoſe dews fall, and the increaſe will conſequently be the greater. For curioſity ſake, wheat was ſowed in all the months of the year: that ſown in July produced ſuch an increaſe as is almoſt incredible. In France, they generally ſow before Michaelmas.

"Bearded wheat is not ſo ſubject to mildews as the other, its awns keeping the dew from the ear."

MILKNESS, a dairy. *See* DAIRY.

MILLET, the name of a plant which grows naturally in India, from whence it was firſt imported into Europe, is greatly cultivated in Italy, Spain, and the ſouthern parts of France, for the food of men, as well as for that of poultry: and we alſo raiſe it in ſeveral places in England; though we have our annual ſupply of this grain from the Eaſt-Indies, which makes ſome people erroneouſly call it Eaſt-India wheat.

It delights in a light ſandy ſoil, prepared in the ſame manner as for maize; and in ſuch land it branches out into many ſtalks, ſometimes thirty or forty, not unlike reeds either in their ſhape or leaves, of which there is one at each joint. The top of each ſtalk is terminated by a large looſe panicle, which hangs on one ſide, with a chaffy flower, which is ſucceeded by a ſmall round ſeed, about the bigneſs of turnip or cabbage-ſeed, of a yellowiſh white colour in one ſort, and of a dark red, inclining to black, in another. The ſmall millet, and the large, a diſtinction which ſome writers make, are only varieties of the ſame ſort. It is likewiſe ſaid to thrive extremely well in ſtrong land: but will not do in ſtony ground, or where the bottom is either chalk or clay.

Mr. Miller directs ſowing this grain in the beginning of April, which may be very right in this country, that it may be ripe in Auguſt: but in warmer climates, the general rule is to ſow it either between the middle and the end of May, or at Midſummer. The former is reaped at the end of September, and the latter about the end of October.

The ſeed is ſowed in furrows, very thin, and covered with the plough or rake. The largeſt ſort ſhould be ſowed thinneſt, becauſe it branches moſt. When the plants are about a month old, the ground ſhould be ſtirred round them with a hand-hoe, as well to lay freſh earth to their roots, for they require a great deal of nouriſhment, as to clear them from weeds, of which they will afterwards prevent any great increaſe, by over-topping them. At the ſame time, the millet ſhould be thinned wherever it grows too cloſe, ſo as to leave, in general, about ſix inches between each plant. The huſbandman has nothing more to do to this grain till harveſt, excepting that, when it begins to ripen, he muſt take great care to protect it from birds, which would otherwiſe ſoon devour it. If preſerved from them, the returns are very great; for it is not eaſily hurt by drought or rain, nor is it ſubject to blight. Frequent ſhowers of rain are of great ſervice to it whilſt growing.

When the millet is ripe, its panicles are cut off near the uppermoſt joint of the ſtalk, with a knife, and put into baſkets or ſacks, in which they are carried home. They are then laid up in heaps, covered over with cloths, and, after remaining in that ſituation five or ſix days, are ſpread upon the barn floor, threſhed out with a flail, and cleanſed, like other grain. Great care muſt be taken to dry it well in the ſun, before it is laid up in the granary: for it would ſoon ſpoil if the leaſt moiſture were left in it; this being of all grains the moſt difficult to keep, unleſs it be thoroughly dry: and, on the other hand, none keeps longer or better, after it has been well dried. It is not liable to the weevil: and though it ſhould be turned from time to time in the granary, yet if that happens now and then to be neglected, it ſtill keeps perfectly well.

It has been a conſtant obſervation, that the late ſown millet, I mean ſo late as Midſummer, had always had the greateſt number of abortive grains; that its panicles are ſmaller than thoſe of the ſame grain ſowed earlier; and that the crop is leſs plentiful.

The ſmall white millet, which is by far the moſt delicate, and of which excellent puddings, &c. are made, is the ſort chiefly cultivated in this country. The red, which is much larger and coarſer, is not uſed here, except, perhaps, for pigeons, poultry, and ſwine, for which laſt it ſhould be ground to meal: but the peaſants about Bourdeaux, where a great deal of it is raiſed in the poor light lands near that city, make of it a reddiſh, heavy, ill-taſted bread, difficult to digeſt. The culture of this ſort, which is Mr. Miller's *ſorgum*, is, in all reſpects, the ſame as that of the white; excepting that, as it grows much larger, the plants require more room.

Millet, either green, or after its grain is threſhed out, is very good fodder for cattle, for which uſe it may be ſowed thicker than for a crop of grain. Its many roots, large ſize, and quick growth, are ſaid to render it a great impoveriſher of the earth; for which reaſon ſome people pull up the roots, and plough the ground immediately, as ſoon as the crop is reaped: but others, more judicious, plough in the ſtubble and roots, which rot, and greatly enrich the ſoil: and indeed all other ſucculent plants, inſtead of being ſuch robbers as is commonly ſuppoſed, return to the earth, by the inſpiration of their leaves and perſpiration of their roots, even while they grow, perhaps as much as they borrow from it: for how ſhould it be poſſible for them to pierce into the very drieſt and hardeſt ground, as we frequently ſee they do, unleſs they perſpire moiſture through their roots? As this plant requires a great deal of nouriſhment, it would probably thrive beſt in the horſe-hoeing huſbandry.

The following account of the culture and amazing produce of the African millet, was ſent by the ingenious Mr. Burton, to the editors of the Muſeum Ruſticum.

“ I cannot help mentioning to you, for the ſake of your practical readers, the African millet, *ſorghum, milium nigrum*, the culture of which is ſtrongly recommended by M. Tſchiffeli, who has written a paper on the ſubject, publiſhed in the Tranſactions of the Berne Society. There is ſomething ſo very extraordinary in this paper, that I am ſure you will think a ſhort abſtract of it worthy to be inſerted in your work.

“ Monſ. Tſchiffeli obſerves, that this millet is a plant which merits the huſbandman's utmoſt attention, and that for the following reaſons: 1. It thrives in all ſorts of ſoils. 2. It neither requires much dung, nor a great deal of tillage. 3. It is not ſubject to the depredations of birds, which are very fond of panic and common millet. 4. It yields very large returns. 5. Laſtly, it does not exhauſt the land in proportion to the largeneſs of the crops.

“ He farther ſays, that the ſeed of this ſort of millet comes originally from Africa, where it ſupplies the inhabitants with food; but that they are miſtaken who thence conclude it will thrive only in hot countries: for providence has endowed it with ſuch excellent qualities, that it may, with ſucceſs, be cultivated in countries much colder than Switzerland.

The firſt ſeed of it M. Tſchiffeli received was from Mr. Engel, magiſtrate of Eſchalens, who procured it from Pomerania, it being ſent to him by the celebrated doctor Schreber, in the ſpring of the year 1760. M. Tſchiffeli had from him about a ſpoonful.

“ In the month of May of the ſame year, he ſowed it on a gravelly ſoil, hard and ſtony, very much expoſed to the north wind, and which the year before had borne ſome very indifferent bere. In the month of February preceding, ſome human ordure had been laid on this land; and in May the clods were all broken before the ſeed was ſpread: having ſo ſmall a quantity of ſeed, he took care to ſpread it very thin; and to this does he aſcribe the ſtalks running to the height of eight feet or more. The ears were above ten inches long; and if a ſhower of hail had not fallen on it, the ſpoonful would probably have produced him at leaſt a peck. This accident occaſioned the loſs of half his ſeed: he had, however, enough left to divide with his friends in Switzerland, as well as elſewhere.

“ In the month of May, 1761, he ſowed about a quart of ſeed, or near a pound, on ſome land, from which he had firſt pared off the turf, and afterwards burnt it. The ſpace on which the ſeed was ſown might be about twenty paces long, and ten broad.

“ Some time before harveſt, M. Tſchiffeli perceived he ſhould have allotted three times as much ground for that quantity of ſeed. The ſtalks, which were very cloſe, were interwoven one with the other, like the hairs of a bruſh. They were ſcarcely five feet in height, and the ears alſo were much ſhorter than the preceding year: this, however, did not prevent his reaping about ſeven pecks, or above fifty for one. In the year 1762, he ſowed about four pounds of ſeed, or about half a peck, on ſome pretty good land, being in quantity about thirty ſquare rods or perches. The year before, the ſame land bore potatoes; and as he had laid on no freſh manure for the millet, and had neglected to plough it before the winter (for it was only turned over with a ſpade before ſowing) he imagined he had not ſown the ſeed too thick: but in this he was greatly miſtaken; the millet came up almoſt as thick as the year before, and as he had not the courage to thin it, which would have been right, the ſtalks and ears were ſhorter than the firſt year.

“ Notwithſtanding this, he was enabled to reap twenty buſhels, being ſix hundred and forty pounds; of courſe, a return of an hundred and ſixty for one.

“ There can then be no reaſon to doubt, but that land of a moderate quality, ſown thin, and properly prepared, will produce, one year with another, one hundred buſhels of millet per acre; for our huſbandman got as much in proportion, though his land was but ſlightly tilled, and he manifeſtly ſowed his ſeed too thick. This is certainly a moſt wonderful increaſe, in what light ſoever we behold it.

“ What grain is there which in the open field will yield a return of one hundred and fifty for one, and which, at the ſame time, will ſell ſo well, for in price it is on a footing with wheat? It is true, it yields a heavy, crumbly, and indifferent bread; but if it is made into pottage, it is excellent, very nouriſhing, and of exquiſite flavour. Not only M. Tſchiffeli's ſervants and workmen were very fond of millet thus prepared; but he himſelf prefers it to the beſt rice, which will not grow in Switzerland, and comes at a much higher price.

“ The millers in Switzerland, whoſe reputation is not of the beſt, return a good third of a buſhel of millet-meal for every buſhel ſent to them, after deducting toll, bran, waſte, &c. Now this ingenious writer knows by experience, that ſuch a quantity, when made into pottage with milk, will ſerve at leaſt fifty men for a meal. Surely they cannot be fed at a cheaper rate. In times of ſcarcity millet muſt be of great uſe, as with potatoes the poor might live comfortably.

“ An acre of land requires, at moſt, but ten pounds of ſeed; and M. Tſchiffeli ſays he can, from his own experience, venture to aſſert, that millet does not impoveriſh land in proportion to its produce. The land he ſowed in 1760 and 1761, yielded, the following year, fine plants of Dutch clover, and rye-graſs in as great plenty, with reſpect to the crops, as the neighbouring land.”

MILL-HOLMS, watery places about mill-dams.

MISLIN, the ſame with maſlin, or maſlin-corn. *See* MASLIN-CORN.

MINT, the name of a well-known herb, propagated in the kitchen-garden.

There are ſeveral ſpecies of mint; but all of them are very eaſily propagated by parting the roots in the ſpring, or by ſetting cuttings of it during any of the ſummer months, in a moiſt ſoil. If the ſeaſon ſhould prove dry, theſe cuttings muſt be watered often till they have taken root, and after that they will not require any farther trouble, except good weeding. If any quantity of theſe plants is raiſed (for example, for diſtilling) they ſhould be ſet in beds about four feet wide, with a path a foot and a half or two feet broad, to go between the beds, in order to water, weed, and cut the mint; and the diſtance between the plants ſhould be at leaſt five inches every way, that their roots may have room to ſpread; for this they do to ſo great a degree, that they will mat together, and rot each other, if they are ſuffered to ſtand above three years in the ſame bed.

When mint is cut for diſtilling, or for any medicinal uſe, this ſhould be done in very dry weather, when the plants are juſt coming into full bloom; for they are fulleſt of ſap, and higheſt in flavour, at that point of time. What is then cut ſhould be hung up to dry in a ſhady place, till it is wanted for uſe: but care muſt be taken not to hang it againſt a wall, becauſe this will make it turn black and mouldy. The ſame will alſo happen to mint that is cut in wet weather.

If the ſoil be fit for this plant, it will afford three general cuttings every year: but thoſe ſhoots which come out after July, are ſeldom good for much. Theſe ſhould therefore be let ſtand till Michaelmas, when it will be right to cut the whole down cloſe to the ground, and, after carefully clearing away all the weeds, to ſift a little fine rich earth all over the beds, to the thickneſs of about an inch. This will give vigour to the roots left in the ground, and will make them ſhoot out finely the next ſpring.

MIST, a meteor conſiſting of groſs vapours floating near the ſurface of the earth.

The bluiſh miſt, which we ſometimes ſee on our fields and paſtures in a morning though often innocent, yet has been in ſome places found to be the actual cauſe of murrain, and other fatal diſeaſes among the horned cattle.

Dr. Winklar gives, in the Philoſophical Tranſactions, an account of a murrain affecting the cattle in Italy and other places, which was evidently ſeen to ſpread itſelf over the countries in the form of a blue miſt. Wherever this was perceived, the cattle were ſure to come home ſick; they appeared dull and heavy, and refuſed their food; and many of them would die in four and twenty hours. Upon diſſection there were found large and corrupted ſpleens, ſphacelous and corroded tongues; and in ſome places thoſe people who were not careful of themſelves, in their management of the cattle, were infected and died as faſt as themſelves. The principal cauſe of this diſeaſe ſeemed to be the exhalation of ſome unwholeſome ſteams from the earth; and it was obſervable that there had been three earthquakes in Italy the year before it happened. The method of cure which ſucceeded beſt, was this: as ſoon as any beaſt appeared to be ſick, they examined the tongue, and, if apthæ, or little bliſters, were found on it, they ſcraped it with a ſilver inſtrument made with ſharp teeth at the ſides, till it bled in all thoſe parts where the apthæ were; the blood was then wiped away with a cloth, and the whole tongue waſhed ſeveral times with vinegar and ſalt. After this, the following medicine was given internally: take of ſoot, brimſtone, gun-powder, and ſalt, of each equal parts; mix theſe in as much water as will make them thin enough to be ſwallowed, and let a ſpoonful be given for a doſe three or four times a day. The cattle which were in health had this medicine given them, as well as the ſick; and the conſequence was, that very few died in Switzerland, while almoſt all died in other places.

It was very remarkable that the contagion, on this occaſion, ſeemed to travel ſlowly and regularly on: it came at the rate of about two German miles in twenty-four hours: this it kept regularly to, during the whole time of its raging, and never appeared in very diſtant places at the ſame time.

The whole ſurface of the earth emitting theſe effluvia, no cattle eſcaped them in the courſe of their way; but thoſe which were kept within doors at rack and manger fell ill at the ſame time, and in the ſame manner with theſe in open fields. Dr. Slare was of opinion, that it was owing to certain inſects which could not fly faſter than at the rate of two German miles a day; and that they travelled regularly, and ſpread the miſchief where they paſſed; but there wanted ſome judicious perſons, verſed in theſe obſervations, to have examined both the ſtate of the air, and the beaſts, on this occaſion. *Philoſ. Tranſactions*, Numb. 145.

MIXEN, a dung-hill.

MIZZY, a bog, a quagmire.

MOAR-LOVRE, a term uſed to expreſs a peculiar diſtemperature of corn, generally comprehended under the common term of a blight. In this caſe the earth ſinks away from the roots of the corn, and leaves the plant ſtanding in great part above ground with naked roots; theſe being too weak to ſupport the ſtalks, the plants fall, and the ears become light. This a diſtemperature peculiar to corn growing on light and looſe lands. *Tull's Horſehoing Huſbandry.*

The remedy is this: turn a ſhallow furrow againſt the rows, when they are ſtrong enough to bear it, and the mould is fine and dry; the motion of the ſtalks with the wind will draw in this looſe powder, and it will ſpread itſelf equally among all the rows, ſettle about the roots, and cover them.

MOLE, a ſmall animal too well known to the huſbandman, from the miſchief it does in the fields, by looſening of the earth, and deſtroying the roots of corn, graſs, and other vegetables.

The common method of deſtroying them is by traps, made in the following manner:

Take a ſmall board, about three inches and a half broad, and five inches long: on one ſide thereof raiſe two ſmall round hoops or arches, one at each end, like the two hoops or bails of a carrier's waggon, capacious enough for a mole to creep through eaſily: in the middle of the board make a hole about the bigneſs of a gooſe-quill, and have in readineſs to put into it a ſtick about two inches and a half long, fitted at one end to the hole, and a little forked at the other. Cut alſo a hazel or other ſtick, about a yard, or a yard and a half long, which will riſe with pretty ſtrong elaſticity, when it is ſtuck into the ground; and to the end of this ſtick faſten a very ſtrong nooſe of horſe-hair, made ſo as to ſlip eaſily. Have likewiſe in readineſs four ſmall hooked ſticks: then go to the furrow or paſſage of the mole, and after you have opened it, fit in the little board with the bended hoops downward, ſo that when the mole paſſes that way, it may go directly through the two ſemi-circular hoops. But before you fix the board in this manner, put the hair ſtring through the hole in the middle of it; place the nooſe in a circular form, ſo as to make it anſwer to the two hoops; put the ſmall ſtick before mentioned gently into the hole in the middle of the board, ſo as juſt to ſtop the knot of the hair ſpring, without entering ſo far as abſolutely to tighten it. Then faſten the board down with four hooked ſticks, and cover it with earth. When the mole, paſſing in its furrow, comes into this trap, it will diſplace the ſmall ſtick that hangs perpendicularly downward, the knot will then be drawn through the hole, and the nooſe, inſtantly ſtreightened by the riſing of the end of the hazel ſtick to which it is faſtened, which will catch the mole round the neck.

Others, watching their motions in the morning and evening, which are their uſual times of ſtirring, dig them out in a moment with a ſpaddle: and about March, which is their time of breeding, numbers of their young ones may be deſtroyed by turning up their neſts, which are generally in the greateſt hills; and the old ones who come to ſeek their young will preſently be taken.

Some commend the pot-trap, which is a deep earthen veſſel ſet in the ground with the brim even with the bottom of the mole tracks. The ſeaſon for uſing this is when the moles couple, which is about the beginning of March, or perhaps ſomewhat earlier.

Mr. Worlidge ſays, they may be driven from the gardens, meadows, and other places where one would not chooſe to dig, by fuming their holes with brimſtone, garlick, or other unſavoury things; and that the putting a dead mole into a common haunt, will make them abſolutely forſake it: to which Mr. Mortimer adds, but only upon report, that white hellebore and the roots of palmachriſti, dried, powdered, and ſifted through a fine ſieve, then mixed with barley-meal and eggs, and worked into a paſte with wine and milk, will kill them, if laid in little pellets under their hills.

The writers of the Memoirs of the Society of Agriculture at Angers, recommend hazle-nuts boiled in an infuſion of hellebore, as a ſure method of deſtroying moles. Two or three of theſe nuts are to be laid under each mole's hill, and the creatures, by being fond of that fruit, will be poiſoned by eating them.

The way to remove mole-hills and ant-hills, which are not only diſagreeable to the ſight, but detrimental to the paſture, and a great hindrance to the mowing of the graſs, eſpecially where they are numerous, is particularly in regard to the latter, either to divide the turf which grows over them, into three parts, with a ſpade, or other inſtrument, then to pare it off each way, to dig out the middle or core of the hills, to ſpread this mould over the other ground, to leave the holes open all the winter, that the ants may be killed, to lay the turf down again in the ſpring, and to roll thoſe ſpots after the re-inſtated turfs are ſettled, and their graſs has taken freſh root; or, which is a more expeditious method, to ſcoop them out at once, with what Mr. Bradley calls a ſcolloped mole-hill plough, made in the following manner.

From *a* to *a* (Fig. 1. Plate XX.) is an iron plate, about five inches over, and above an inch thick at the back. *b b* is the ſcolloped ſpade, or tongue, of the plough, and about a foot over at the wideſt part. This, from the ſharp point, grows thicker by degrees, till it comes to the back, which ſhould be a full inch thick. The iron muſt be well hardened, and very ſharp at the edges. *c c* is the paring plate, which ſhould be very ſharp on the fore edge, and, with the ſcolloped ſpade, ſhould be four feet long from *a* to *a*. *d d* are iron ſockets, in which are fixed the plough handles, or ſtilts, *e e*. At *a a* are foot-links to ſet the harneſs on, for one horſe, or two horſes lengthwiſe, to draw by.

When this plough is uſed, the point of the ſcolloped ſpade muſt be ſet to the bottom of the hill, by raiſing the plough ſtilts, ſo that it may go into the ground; and when the hill is near cut through, the point ſhould be raiſed up again, by weighing a little on the ſtilts.

The hollow left by this plough will receive the rain as it falls, and this will drown the remaining ants.

After the mole and ant-hills, and other inequalities have been thus taken off, the beſt way is to carry them to a corner of the field, there to break them well to pieces, and mix them with a conſiderable portion of lime, or other manure ſuited to the ſoil, which will effectually deſtroy every remains of the ants, and convert the whole to good manure, which may then be profitably ſpread all over the ſurface of the ground. The ſpots on which the mole, or ant hills ſtood, ſhould be looſened with a ſpade, then mixed with lime or other manure, and afterwards be laid down with clean graſs ſeeds.

This method is the moſt adviſable of any, becauſe a fine graſs will be raiſed in thoſe places, inſtead of the coarſe benty growth which occupied them before.

MOLTEN-GREASE, a fat or oily diſcharge with the dung, and ariſes from a colliquation, or melting down of the fat of the horſe's body, by violent exerciſe in very hot weather.

It is always attended with a fever, heat, reſtleſſneſs, ſtarting and tremblings, great inward ſickneſs, ſhortneſs of breath, and ſometimes with the ſymptoms of a pleuriſy. His dung will be extremely greaſy, and he will fall into a ſcouring; his blood will have a thick ſkin of fat over it when cold, of a white or yellow hue, but chiefly the latter; the congealed part, or ſediment, is commonly a mixture of ſize and greaſe, which makes it ſo extremely ſlippery, that it will not adhere to the fingers, and the ſmall portion of ſerum feels alſo ſlippery and clammy. The horſe ſoon loſes his fleſh and fat, which probably is diſſolved and abſorbed into the blood; and thoſe that ſurvive this ſhock commonly grow hide-bound for a time, their legs ſwelling both before and behind, and continue in this ſtate till the blood and juices are rectified; and if this is not done effectually, the farcy, or ſome obſtinate ſurfeit, generally follows, very difficult to remove.

In the firſt place bleed plentifully, and repeat it two or three days ſucceſſively in ſmaller quantities; two or three rowels ſhould alſo be immediately put in, and cooling emollient glyſters, daily thrown up to abate the fever, and drain off the greaſy matter from the inteſtines. By the mouth give plenty of warm water, or gruel, with cream of tartar, or nitre, to dilute and attenuate the blood; which in this caſe is greatly diſpoſed to run into grumes, and endanger a total ſtagnation.

When the fever is quite gone off, and the horſe has recovered his appetite, gentle aloetic purges ſhould be given once a week, for a month or ſix weeks, in order to bring down the ſwelled legs; but if the purgative ingredient does not exceed half an ounce, or ſix drams of fine aloes, it only opens the belly gently; and, with the other medicines joined with it, paſſes into the blood, acts as an alterative, and operates both by urine and perſpiration; as will appear by the horſe's ſtaling plentifully; and the kindly feel of his ſkin. To this end give the following, which, repeated for ſome time, will intirely remove this diſorder.

> Take of ſuccotrine aloes ſix drams, of gum-guaiacum powdered half an ounce, of diaphoretic antimony, and powder of myrrh, of each two drams: make into a ball with ſyrup of buckthorn.

Or it may be prepared with an ounce of aloes, ſix drams of diapente, and a ſpoonful of oil of amber.

Theſe will ſeldom take a horſe from his buſineſs above two or three days in a week; neither will he loſe his fleſh or appetite with them, which cannot be obtained by any other method of purging, and gives this greatly the preference in many caſes.

Two ounces of nitre mixed up into a ball with honey, and a dram of camphire, will alſo be found an excellent medicine for this purpoſe, as it will powerfully attenuate the blood, and promote the due ſecretions; to which end it ſhould be given every day for a fortnight, or three weeks. *Barlet's Farriery*, p. 168.

MOLTER, the toll of a mill.

MOOR, a very fine black mould, ſometimes found under a pretty thick ſward of graſs, but more frequently under moſs, or ſtraggling plants of heath.

It differs from peat, in that it does not ſtick together, nor has the fibrous roots, or bituminous viſcous quality of this laſt. Peat, when dry, becomes hard and firm: this falls into powder. It cannot be better deſcribed, than by comparing it to that ſubſtance which is found in hollow rotten willows, and other trees of that kind; which gives room to think that it ariſes from rotten plants. It is of a ſpungy nature, and ready to imbibe moiſture, which adds conſiderably to its weight. There is generally underneath it, as under moſt earths of this kind, a bed of clay, or ſome ſubſtance impervious to water: ſo that the particles of bodies decayed on their ſurface, not being admitted into the ſoil, remain upon that ſurface, dry there, and increaſe its thickneſs, according to the continuance of the cauſe.

If this kind of ſoil is collected in a place where running water, in rainy ſeaſons, brings with it clay, or other fat ſoils, from the neighbouring grounds, it then acquires a greater degree of coheſion, hardens when dry, and reſembles the cleanſing of ponds, more than the former.

The moſt conſiderable ſoil of this kind is the ſort called peat. This is uſually full of roots of weeds, and even of trunks and branches of trees and other plants. It always contains a bituminous oil, which renders it very inflammable when dry; at which time it alſo becomes very hard, though it is quite ſoft when in the mine, if we may be allowed to give that name to the bed in which it lies; for there it is eaſily cut in the form of bricks, as we ſee it when uſed for fuel.

" The whole maſs and body of this ſoil, ſays Mr. Maxwell, is a dung-hill, made up of rotten timber, graſs, weeds, and often mud waſhed from the higher grounds about it, by the land-floods; than which there are few richer compoſts: only by age, and its cold ſituation in water, pent in about it by the neighbouring riſing grounds, its ſalts are weakened, and its ſpirits become languid. The ſame will happen to the richeſt dunghill that can be made of any compoſition whatever, if too long kept. It will even become ſuch as not to be diſtinguiſhed, by the eye, from ordinary moſs; nor will it be more uſeful, as dung, except either in proportion to the ſhorter time it has been kept, or the better ſituation of the place where it has ſtood. I believe the qualities of moſſy grounds differ very little from one another in any other reſpect, than with regard to the better or worſe quality of the mud which makes a part of their compoſition. They are more or leſs ſpungy, in proportion as this rich mud fills up the cavities of the component vegetables, which are preſerved from putrefaction by the acid in the water. The leſs ſpungy, and the more rotten the moſs is, the fitter it is for the vegetation of any thing planted in, or ſown on it."

The firſt thing to be done, in order to the improvement of moors, is to divide them into proper incloſures; not only to ſecure their future produce, but alſo to be a means of procuring rich earth to cover the otherwiſe inſipid uſeleſs mould on their ſurface, and give root to the plants which may afterwards be cultivated in them. Then, as the natural produce of this earth is of no value, its ſurface ſhould be pared off, in order to be burnt. But as this ſubject, of burning earth, has been before fully treated of, we ſhall only obſerve here, that the huſbandman ſhould be very careful not to make the clods too dry, or light his fires in too dry a ſeaſon, leſt they ſhould extend farther and deeper than was intended.

If the depth of the mooriſh earth be not very conſiderable, the ſurrounding ditches, which make the incloſure, will afford a rich ſtrong ſoil, which ſhould be ſpread about three or four inches thick all over the ſurface. When the clods are burnt, their aſhes ſhould be mixed with this new ſoil. If no proper earth can be got from the ditches, ſand or gravel may be uſed with ſucceſs, as was practiſed by the ancients. Gravel is ſingularly beneficial to ſuch lands, as has been ſhewn under the article BOG.

The Berne ſociety, who recommend this method of improvement as founded on repeated experience, very properly obſerve, that the good effects of the ſand and gravel will be conſiderably increaſed by a moderate mixture of dung, and that, eſpecially if the ground be intended for plowing, this covering ſhould be at leaſt a hand's breadth in thickneſs. Dung alone would undoubtedly be extremely efficacious on all ſuch ſoils, in which it is remarked to be of longer ſervice than in any other; but the farmer can ſeldom ſpare a ſufficient quantity of it to go far enough unmixed, nor indeed for mixing. In this caſe, other ingredients muſt be recurred to; though the ſand, or gravel, will generally do great things without any mixture. Well preſerved aſhes will be of excellent ſervice, and ſo will the rubbiſh of old buildings, or any other ſimiliar ſubſtance, when mixed with the ſand or gravel, even of the coarſer kind, and incorporated with this naturally rich earth, which, were its real value known, and the proper method of treating it rightly underſtood, might claim a preference before any other

other ſoil. Loam is ſtill better than either ſand or gravel. This ſhould be brought on before the fires are lighted to burn the ſurface of the moſs, and ſhould remain in heaps till it can be equally mixed with the aſhes. Lime, where it can be had, will alſo contribute to the meliorating of moſſy grounds. The mooriſh earth, thus covered, is fitted for various kinds of crops.

Mr. King, who obſerved that the places in bogs in Ireland, where a little earth had chanced to fall as the peaſants were carrying it to mend the ways acroſs them, became a green ſod, covered with a fine ſcutch graſs, does not doubt but that the ſame expence as ſands or gravels land, would bring a dried bog even to be arable; and as to the common opinion that gravelling is bad for graſs, the contrary, he ſays, is apparent; eſpecially in bogs. Another method of reducing barren boggy land, in Ireland, is by laying upon it a little dung or ſtraw, and covering this with ſhells.

A ſtrong proof of the propriety of covering moſs with earth, reſults from a fact which happened to Mr. Græme, near Stirling. Two years after this gentleman had earthed his moſs, which he had not yet ſowed, it was as full of natural white clover, and other graſs, as any field generally is in twice that time.

In the province of Groninguen, they pare off the upper ſurface of the ſoil, which is a light looſe earth, and lay it by till they have dug out the peat underneath, when they mix it with the ſand which lies under the peat, and ſow it with rye and hay-ſeed the firſt year; after which they let it run to graſs, and have amazingly fine crops. In Sweden, a drained bog was remarkably improved by a peaſant who burnt upon it a parcel of uſeleſs wood and limeſtones; and another converted his drained bog into a fine meadow, by covering it with lime and tanner's bark.

Mr. Eliot, after draining a very remarkable ſwamp, ſowed it with graſs-ſeed, ſuch as red clover, ſpear-graſs, fowl-meadow graſs, and herd-graſs; none of which came up ſo well as the red clover, which he found to be the boldeſt and moſt hardy. Though this came up well, yet, where the ſward was ſtrong, what with the toughneſs of the ground and the over-topping growth of the wild natural graſs, it made but ſlow progreſs till the fall of the year, and then it mended conſiderably. The other ſorts of graſs came up but poorly, the land being, as Mr. Eliot judges, too new and tough for them. In September, he ploughed up a piece of this ground, where he had not ſowed any graſs. It ploughed very tough, and the cattle mired in ſome places; but he kept them as much as poſſible upon the graſs; notwithſtanding which there was a neceſſity of leaving many baulks. About a month after, he ordered theſe baulks, to be hoed up, and was agreeably ſurpriſed to find how eaſily this was done. He found the meadow rotted and mellowed more in one month in the fall, than it had been in the whole ſummer; but thinks the ploughing would have been performed with much greater eaſe, if it had been deferred till a month later. In July, he ſowed a little piece with turnips, which came up, but did not grow well till the ground began to rot in the fall of the year, when they throve perfectly, and were good and ſweet, inſtead of being rank, as he expected.

This gentleman found by experience, that ſuch drained land muſt have one ſummer to ferment and rot, ſo as to become proper ſoil, before it will be fit for grain or every ſort of graſs. " If, ſays he, I had ſowed red clover inſtead of the other ſorts of graſs, I had ſaved five pounds in ſeed. Clover out-did my expectation, and the other ſorts fell ſhort of it. If others ſave where I loſt, and mend wherein I was miſtaken, it anſwers my deſign in writing.

" By a little experience which we have had of theſe drained lands, we find they will produce Indian corn, ſixty or ſeventy buſhels to an acre, and flax. If life and health be continued, I deſign to try liquorice-roots, barley, Cape-Breton wheat, cotton, indigo-ſeeed, wood for dying, and the water melon. But what I have principally in view is hemp. New-England doth not, I ſuppoſe, expend leſs than ſeveral hundred thouſand pounds worth of foreign hemp yearly. If we can raiſe more than to ſupply our own occaſions, we may ſend it home. It is not a mere conjecture, that the drained lands will produce hemp. I am informed by my worthy friend Benjamin Franklin, Eſq; of Philadelphia, that they raiſe hemp there upon their drained lands.

" Hemp requires ſuch very ſtrong land to produce it, that it would conſume all our dung to raiſe it in any great quantities; ſo that we ſhould not be able to raiſe bread-corn: therefore, how inviting ſoever the trade is, and how great ſoever the encouragements have been, both from home and by our own government, we have not as yet engaged in that affair. We have now a promiſing proſpect of ſucceſs in theſe drained lands: what may be the iſſue, time and experience muſt determine. A meadow of drained land, which could be laid under water, and this drawn off at pleaſure, would probably be of great value. I have heard that a man in the Jerſies hath ſuch a meadow, which thotugh only half an acre in exent, yields him as much hemp yearly, as ſells for fifty pounds, York money: but this ſeems incredible."

Whatever advantages are reaped from hemp, may alſo be received from flax, if rightly managed, upon moſſy grounds. Some improvers in Scotland have already tried it with ſucceſs, and though, a new attempt, doubt not its anſwering well in that kind of ſoil. The moſt approved method of cultivating and dreſſing each of theſe ſingularly beneficial plants, are given under the articles HEMP and FLAX.

" It is common in ſwamps, continues Mr. Eliot, to find the moſs two or three feet deep. At firſt, I was perplexed how to get rid of it, and ſomewhat doubtful whether the land would be worth any thing, if this ſurface was removed. When the water was drawn off by ditches, the moſs grew ſo dry, that in a hot ſummer ſeaſon, it would burn quite down to the ground. To burn this, or any other traſh you would conſume upon land, ſet fire to it when the weather is clear, the ſun hot, and a ſtrong ſoutherly wind blows, which makes fire rage more fiercely, and do much more execution, than a northerly or weſterly wind. In a northerly wind the air is thin and light, ſo that the fire is not ſtrongly compreſſed: the moiſt heavy ſouth wind prevents the diſſipation of the fire, and renders it more compact. Thus we ſee a ſmith ſwab and wet his coals, by which means the heat is greatly increaſed. Whether this reaſoning be juſt or not, the fact is certain, and that is the chief concern of the farmer.

" Deep ſwamps are preferable to thoſe which are ſhallow: for experience ſhews, that a deep ſoil bears extreme drought better than any other land, in the hot ſeaſon. The cold drought in the ſpring will hurt ſuch land, ſo that the firſt crop of graſs will not be very great; but the ſecond crop will be extraordinary good.

" The red clover in my drained land above-mentioned, looked in the cold drought at the latter end of the ſpring, as if it would not come to any thing: but it recovered a good colour, and grew up well, when hot weather came on, though the drought continued. This is ſuch an advantage as will always recommend a ſoil eight or ten feet deep.

" Our ditching and draining dry only the top of the ground, not more than three feet deep in the hot and dry ſeaſon; I ſuppoſe that the moiſture from the mud and water underneath is drawn up by the force of the ſun, ſo that the roots of the graſs are furniſhed with ſufficient moiſture to bring forward the vaſt burthen they frequently bear. But this is not to be expected till the land be concocted, changed, and altered by the ſun and air: for at firſt, ſoon after it is drained, it is pinched with the drought more than any other land.

" Thoſe ſwamps which are thick overgrown with moſs, prove as good as any other drained land, when they are ſo far dried by draining, that the moſs will rot, or burn off. I mention this, becauſe it is beſt that the farmer work as free from diſcouragement as poſſible.

" Our drained land, though in all other reſpects well adapted for producing Indian corn, is of ſo looſe a texture that the plants become an eaſy prey to crows and other birds, which, if not prevented, will pull up a great part of them, and deſtroy the crop. To guard againſt this great diſcouragement in all ſuch land, "Take the roots of ſwamp hellebore (known in different places hy the ſeveral names of ſkunk-cabbage, tickle-weed, bear-root) and boil them in ſo much water as to keep them covered an inch deep: by two hours boiling, the liquor will be of ſufficient ſtrength: ſtrain it off; put your corn into it while the liquor is warm, and let it ſteep twenty hours. It will then be fit for planting.

"This is found to be an effectual ſecurity. The Rev. Mr. Todd obſerves, that after meeting with much trouble and loſs, by having his corn repeatedly pulled up, he planted his ground with corn ſteeped in this liquor; but not having enough of that, he ordered the planting to be finiſhed with unſteeped corn. The event was, that the birds pulled up but two or three hills of the ſoaked corn, but left not one in ten of thoſe which were planted with unſoaked corn. He planted anew, with ſteeped corn, the hills where the plants had been thus pulled up, except a few of them in the middle of the field, which were planted a ſecond time with unſteeped corn, upon a ſuppoſition that the birds would not find them out: but the reſult was as before: all the unſoaked was pulled up, and the hills planted with the ſteeped corn were ſpared.

"Upon the whole," ſays Mr. Todd, "I think this experiment a full proof that corn ſo prepared when planted, is ſecure from the birds; the knowledge of which may be of great ſervice to huſbandmen, as the preparation is cheap and eaſy, and our ſwamps ſeem to be the beſt land we have for Indian corn. My little ſwamp this year yielded after the rate of above ninety buſhels to the acre, and was eaſier and cheaper tilled than the ſame quantity of upland." *See the article* BOG.

MORES, or *Mours*, hills.

MORGAN, the ſame with May-weed. *See the article* MAY-WEED.

MOSS, a name given to moory or boggy grounds, in many parts of England. Theſe ſorts of land conſiſt of a turfy ſurface, below which is a black, moiſt, ſpongy earth, which being dug up with ſpades, almoſt in the form of bricks, and dried, is what they call peat, and uſed as fuel in ſeveral parts.

The ſhorteſt method of all for the improvement of moſs, if the ground be deſigned only for graſs, and its ſituation be ſuch as admits of it, is this: firſt drain the moſs, and if there be heath upon it, burn that off, and make the ſurface even. Then make a dam at the loweſt part, and a ſluice, and work the water upon it through the winter. The mud which comes with the land flood will bring a fine ſward upon it in two or three years, and be afterwards a yearly manure; ſo that it will hear annual cutting, and, beſides, be good paſture for cattle, after the ſward is become ſtrong enough to bear them.

Mr. Græme found that the improvement of moſs may be endangered by draining it too much; for his crops were beſt where the ſurface of the water in the ſurrounding ditches was not above three feet lower than the level of the moſs. It will, undoubtedly, be a vaſt advantage to an improved moſs, if the farmer is able to flood it at proper times, by means of a ſluice in the loweſt part of the ſurrounding ditch, as mentioned before. This will greatly promote the growth of plants; but ſhould be uſed with the caution of not letting the water remain too long at a time upon the ground, becauſe, though there will be no danger of its re-converting the ſoil into a bog ſo long as there are channels to carry it off, it will be apt to chill, and thereby hurt the plants. *See the article* BOG, *and* MOOR.

MOSS *on Trees*, is a diſtemper of very bad conſequence to their increaſe, and much damages the fruit of the trees of our orchards.

The preſent remedy is the ſcraping it off from the body and large branches, by means of a kind of wooden-knife, that will not hurt the bark; or with a piece of rough hair-cloth, which does very well after a ſoaking rain. But the moſt effectual cure is, the taking away the cauſe. This is to be done by draining off all the ſuperfluous moiſture from about the roots of the trees, and may be greatly guarded againſt in the firſt planting of the trees, by not ſetting them too deep.

If trees ſtand too thick in a cold ground, they will always be covered with moſs; and the beſt way to remedy the fault, is to thin them. When the young branches of trees are covered with a long and ſhaggy moſs, it will utterly ruin them; and there is no way to prevent it, but to cut off the branches near the trunk, and even to take off the head of the tree, if neceſſary, for it will ſprout again; and if the cauſe be in the mean time removed by thinning the plantation, or draining the land, the young ſhoots will continue clear after this.

If the trees are covered with moſs, in conſequence of the ground's being too dry, as this will happen from either extreme in the ſoil, then the proper remedy is, the laying mud from the bottom of a pond or river, pretty thick about the root, opening the ground to ſome diſtance and depth to let it in; this will not only cool it, and prevent its giving growth to any great quantity of moſs, but it will alſo prevent the other great miſchief which fruit-trees are liable to in dry grounds, which is, the falling off of the fruit too early. *Mortimer's Huſbandry.*

Falſe MOTH, an inſect which proceeds from a ſmall caterpillar, the body of which is ſmooth and whitiſh. It has ſixteen legs, does not lodge in the grains of corn, but contrives to faſten ſeveral of them together with a web which it ſpins, and with which it makes itſelf a dwelling place like that of common caterpillars. This dwelling place, or ſheath, in which the caterpillar of the falſe moth uſually abides, is generally in the middle of the little heap of grains which it has collected for its food: but, which diſtinguiſhes it from the caterpillar of the true moth, it can quit this ſheath at any time, to eat the grains around it, one after another. It generally attacks ſeveral grains at once, and always without order, eating ſometimes of one, and ſometimes of another; ſo that ſeveral are gnawn, when not one is wholly conſumed. When theſe inſects are very numerous in a granary, all the grains upon the ſurface of the corn are linked together by a web, ſo as to form a cruſt, which is ſometimes three inches thick. This caterpillar turns into a chryſalis, or aurelia, in a grain which it has hollowed, or in the ſheath of its web, and iſſues from thence, in the month of June, in the form of a butterfly. When a heap of corn is ſtirred in which there are many caterpillars of the ſpecies of this falſe moth, thoſe inſects crawl up the walls; but they ſoon return to the heap, and, by the very next day, cover it all over with a new web.

In its ſtate of moth, it is grey, has ſix legs, and is frequently ſeen in vaſt numbers fluttering about the eaves of the windows of granaries, in the ſpring and ſummer, when the weather is very hot. The females lay their eggs upon the heaps of wheat, and theſe eggs produce the caterpillars, or corn worms, as ſome call them, which feed on the grain, and envelop it with their ſilky web, ſo as to form over the whole ſurface a cruſt that is ſometimes three or four inches thick. This entirely ſpoils the corn within that depth, beſides communicating a bad ſmell to all the reſt. Theſe worms, or rather caterpillars, for they have ſixteen legs, are ſmooth, whitiſh, and ſeldom exceed a quarter, or at moſt the third part of an inch when at their full growth. Breaking of their webs avails but little, for they are woven again by the next day: for which reaſon ſome have been of opinion, that it is beſt to let them enjoy undiſturbed the ſurface of the corn of which they have taken poſſeſſion. But it ſhould be conſidered, that three inches are a ſixth part, and four inches upwards of a fifth, of any quantity of corn ſpread eighteen inches deep, which is the medium thickneſs at which it is laid; and that, independant of the bad ſmell with which the reſt is tainted, this is a very conſiderable object, though it extend no farther. When this cruſt is broken, moſt of the grains which compoſe it are found to be either gnawn in their inſide, or full of live worms, or of aureliæ, according to the ſeaſon; or one ſees only the empty ſheaths of the catterpillars, if the aureliæ have been transformed into moths.

It is ſaid, that ſtrewing the corn with powdered lime, ſo as to form a cruſt over it, will preſerve it from the ravages of theſe inſects: but as the ſurface would ſtill be ſpoiled, and as that ſurface may be a conſiderable part of the ſmall proviſion of wheat allotted for a family only, M. Duhamel did not try this expedient. Covering it with hay, which he did try, anſwered no end whatever.

Theſe obſervations, and the reflections conſequent thereon, made him ſuſpect that this inſect, as it delights in none but very warm places, would not be able to live in the cold air of his ventilating granaries.

Accordingly, in the winter of the year 1746, he collected all the wormy cruſts which theſe caterpillars had formed in his common granaries, where they were very thick, the moths having been extremely numerous the preceding ſummer. Theſe cruſts were broken and ſcreened; and what grain could be got from them, which undoubtedly was impregnated with the eggs of the moths, was put into one of his granaries of preſervation, which contained ſeventy-five cubic feet, and was ventilated from time to time during all the winter.

Towards the end of May, when the vent-holes at the top of this granary were opened, a prodigious number of moths flew out, which ſhewed that they did not like their ſituation.

When the wheat was thought to have been ventilated ſufficiently, the holes were ſhut cloſe, and nothing more was done to it for a month: for as this corn (which had not been ſtove-dried) was old and dry enough, it was but ſeldom ventilated.

In June 1747, this granary was emptied: all the moths and worms were dead, and there remained only a thin cruſt, not above a twelfth part of an inch thick, on the top of the corn, which had ſo far loſt the bad ſmell it had when put into the granary, that it ſold for the current market price.

Not ſatisfied with this ſingle method, M. Duhamel tried the effect of the ſtove upon another parcel of wheat known to be full of theſe worms. A heat from 45 to 50 degrees of Réaumur's thermometer (from 115 to 124 of Farenheit's) killed them all. This corn was then laid up in a common granary, where it remained two years without being attacked by any of theſe moths; and even in the third, but very few of them appeared.

Theſe experiments remove all doubt of the poſſibility of deſtroying the corn moth, or worm, without hurting the grain, which would otherwiſe be ſpoiled by it; and as that grain, generally is wheat, which the inſect prefers to any other, this diſcovery is of great importance to the huſbandman, as well as to the public.

MOULD, a looſe kind of earth, every where obvious on the ſurface of the ground, called by ſome mother earth, and by others loam.

The goodneſs of a mould for the purpoſes of agriculture and gardening, &c. may be known, according to Mr. Miller, by the ſight, ſmell, and touch. 1. Thoſe moulds that are of a bright cheſnut or hazely colour, are counted the beſt: of this colour are the beſt loams, and alſo the beſt natural earth; and this will be the better yet, if it cut like butter, and does not ſtick obſtinately, but is ſhort, tolerably light, breaking into ſmall clods, is ſweet, will be tempered without cruſting or chopping in dry weather, or turning to mortar in wet. Next to that the dark grey and ruſſet moulds are accounted the beſt: but the light and dark aſh coloured the worſt, ſuch as is uſually found on common heathy ground: the clear tawney is by no means to be approved; but that of a yellowiſh red colour is the worſt of all: this is commonly found in wild and waſte parts of the country, and for the moſt part produces nothing but goſs, furze, and fern, according as their bottoms are more or leſs of a light and ſandy, or of a ſpewey gravel, or clayey nature. 2. All lands that are good and wholeſome, will, after rain, or breaking up by the ſpade, emit a good ſmell. 3. By the touch we may diſcover whether it conſiſts of ſubſtances entirely erenaceous, or clammy; or, as it is expreſſed by Mr. Evelyn, whether it be tender, fatty, deterſive, or ſlippery; or more harſh, gritty, porous, or friable.

MOULDINESS, a term applied to bodies which corrupt in the air, from ſome hidden principle of humidity therein; and whoſe corruption ſhews itſelf by a certain white down, or lanugo, on their ſurface, which, viewed through a microſcope, appears like a kind of meadow, out of which ariſes herbs and flowers, ſome only in the bud, others full blown, and others decayed, each having its root, ſtalk, and other parts.

MOUND, a bank or fence of earth. *See the article* BANK.

MOW, the pile or collection of corn in the ſtraw, placed in a bay of a barn. *See the article* BARN.

MOW-BURNT, over-heated in the mow for want of being dry.

MOWING, the art of cutting down corn, graſs, &c. with a ſcythe.

M. de L'Iſle lately introduced the mowing of wheat. The method is this: the ſcythe he uſes is at leaſt ſix inches ſhorter in the blade than the common ſcythe, and inſtead of a cradle has two twigs of ozier put ſemicircular-wiſe into holes made in the handle of the ſcythe, near the blade, in ſuch a manner, that one ſemicircle interſects the other: this method is frequently practiſed by the men who mow our meadows, as they think a cradle unneceſſary and cumberſome, unleſs the ſcythe is to carry over a large and very heavy ſwarth.

In mowing barley, or oats, the corn is always on the right-hand of the workman: but by M. de L'Iſle's method of mowing wheat the corn is at his left-hand: he mows it inward, bearing the corn he cuts on his ſcythe, till it comes to that which is ſtanding, againſt which it gently leans. After every mower follows a gatherer, which may be a lad of twelve or fourteen years of age, or a woman. The gatherer keeps within five or ſix feet of the mower, and being provided either with a hook or ſtick about two feet long, gathers up the corn, makes it into a gavel, and lays it gently on the ground: this muſt be done with ſpirit, as another mower immediately follows; for to every mower there is a particular gatherer.

To do this work properly, the mower ſhould form but one track with his feet, advancing in a poſture nearly as if he was going to fence, one foot chaſing the other. In this manner the ſtanding corn is mowed; but the workman muſt take care to have the wind at his left, as it bears the corn towards the ſcythe, and cauſes it to be cut nearer the ground. If the wind is behind the mower, it is no great inconvenience: it only occaſions the ſcattering of a few ears; and the cut corn, which ſhould lean againſt the ſtanding corn, is ſometimes thrown down; which makes the work go on ſlower, and encreaſes the gleanings. The wind in front is very bad; the corn cannot be cut cloſe, and there is a great loſs: but the wind on the right-hand is worſt of all; the ſtubble is left long, and ſuch a quan- of gleanings, that one would imagine no crop had been taken off. When wheat is bent, the workman takes the corn as it preſents itſelf to him, which has the ſame effect as if the wind was at his left-ſide. When wheat is laid, it is more troubleſome to the gatherer, becauſe the cut corn is apt to be mixed with that which is ſtanding; but a good mower takes the advantage of the wind, and cuts it againſt the way it is laid. No particular directions can be given for corn that is lodged and tangled, unleſs it is to take it as it is inclined, as if the wind was in the back of the mower.

This method of mowing wheat was tried in Northamptonſhire, and the following account of it ſent to the editors of the Muſeum Ruſticum.

" A gentleman, a foreigner, ſays this writer, came down here to a neighbour's of mine, in order to put us into a method of going about this work.

" Many trials were made in the preſence of myſelf, and a great number of others: the ſcythes did their work well; they cut the corn within two inches of the ground: and though our workmen were of courſe a little aukward, ſcarcely any ears were ſcattered: but the greateſt advantage is, that a man with one of theſe ſcythes can cut down at leaſt double the quantity of wheat in the day he can with a ſickle or hook.

" The chief objections made to the introducton of this method were, that the ſtubble is left too ſhort, and on that account is not fit for thatching; that the weeds are cut with the corn, and will be apt to mould or heat, and the ſeeds to mix with the corn in threſhing; and that the poor are deprived of their gleanings, as none of the corn is ſcattered.

" But theſe objections muſt ſoon fall to the ground, when we reflect that, by mowing, the ſtraw is much longer, and certainly ſtraw is much better for thatching than ſtubble.

" As

PLATE XX. *Facing* Mowing.

n Mole

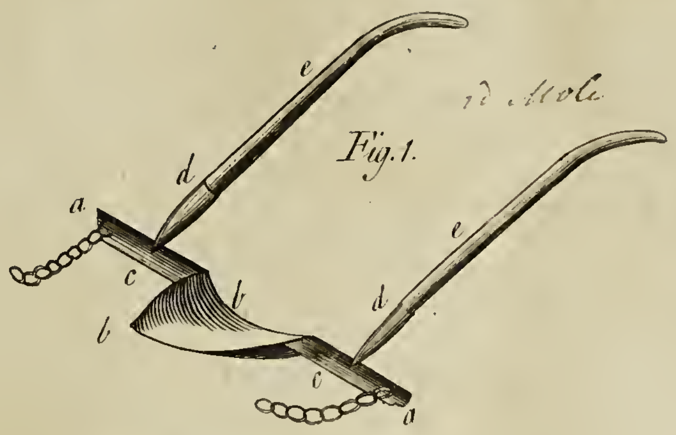
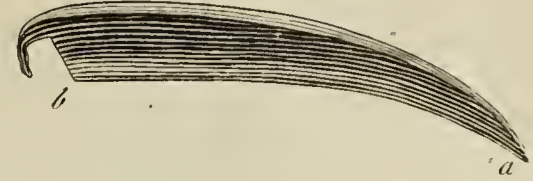


Fig. 1.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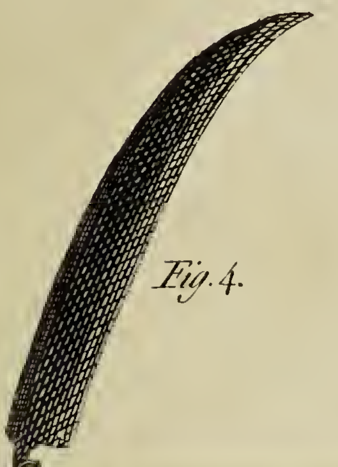
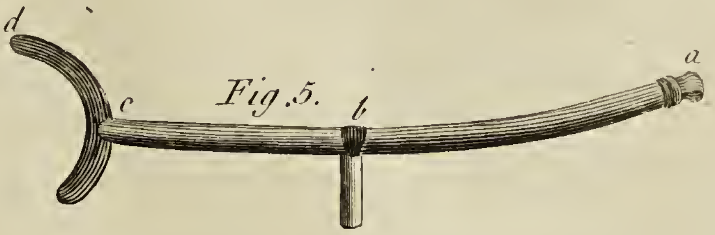


Fig. 4.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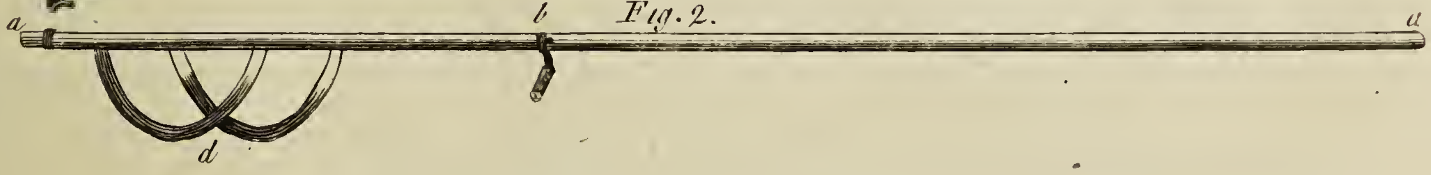
Fig. 2.

Fig. 6.

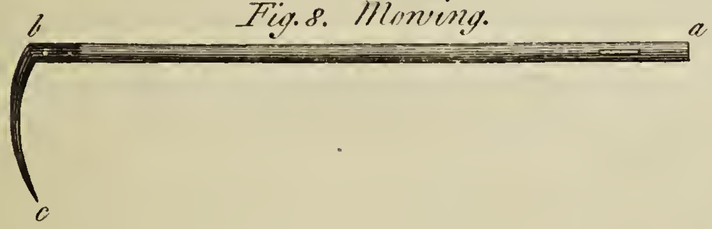
Fig. 8. Mowing.

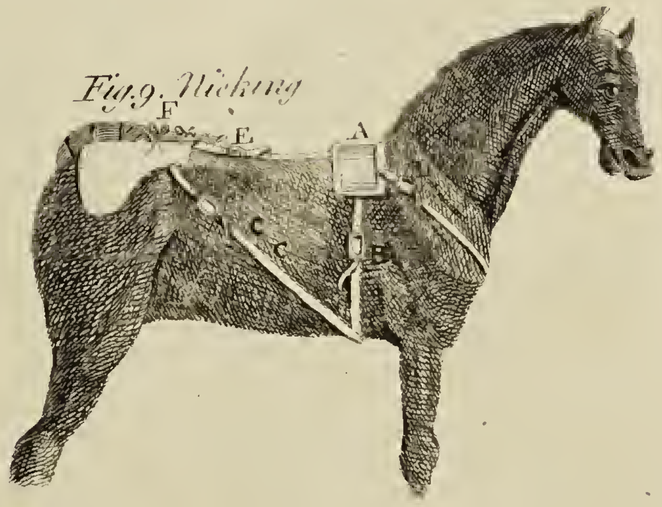
Fig. 9. Nicking

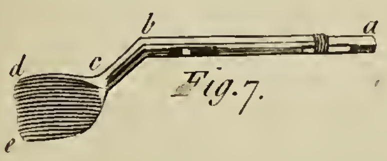
Fig. 7.

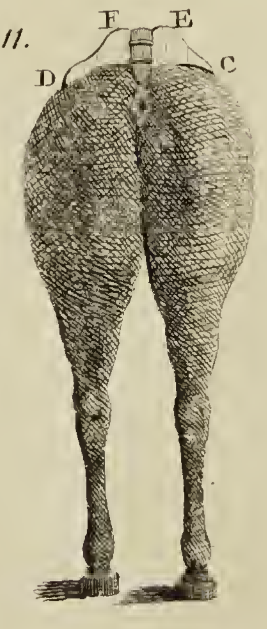
Fig. 11.

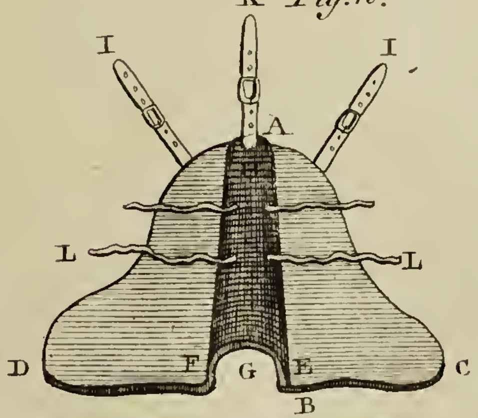
Fig. 10.

“ As to the weeds being cut with the corn, it is of no conſequence; for they are eaſily ſhaken out of the bottoms of the ſheaves, after drying a day or two; and the ſheaves may be ſafely left to dry, if they are laid in the following manner.

“ Suppoſe three tobacco pipes to repreſent three ſheaves, the bowls to be the feet of the ſheaves, and the ſmall part the ears: lay one of theſe on the ground; then take another, and lay the bowl of it under the ſmall end of the firſt; take afterwards a third, and diſpoſing them in form of a triangle, lay the bowl of the third under the ſmall end of the ſecond, and the bowl of the firſt under the ſmall end of the third: by diſpoſing them in this form, the ears are always kept from the ground, and will endure a great deal of wet without damage.

“ As to the ſeeds of the weeds being threſhed, and mixing with the corn, that may eaſily be avoided; for the wheat, by this method of mowing it, is ſo regularly diſpoſed in the ſheaf, that the ſheaves need only to be threſhed on the ear, without being unbound.

“ The objection, that the poor would be deprived of their gleanings, is a mere farce: their time might be much better employed; and by the ſame parity of reaſon, the more corn the farmer left for them in the field, the more juſtice he would do them; and this few would venture to aſſert, as cuſtom might in time extend it to half the crop: beſides, as by this new method, a great deal more corn will be inned, it will of courſe be cheaper the year round, and eaſier purchaſed by the poor.

“ The foreign gentleman was of great uſe to us: he is intelligent and communicative, and we all of us acknowledge ourſelves much obliged to him.

“ Many in this county propoſe making more extenſive trials of it next harveſt, and there is no doubt but that in the ſpace of a few years it will be brought into conſtant uſe.

“ A ſhort certificate of the advantages reſulting from the practice of this method, was ſome time ago drawn up: it was preſently ſigned by a number of gentlemen, farmers, gardeners, labourers, &c. and tranſmitted to Dr. Templeman, ſecretary to the Society of Arts in London, to be, if neceſſary, publiſhed for the benefit of the kingdom. This new method will doubleſs be introduced to the knowledge of the Engliſh world with a better grace, coming under the ſanction and recommendation of ſo reſpectable and uſeful a ſociety.”

The authors are happy, that, as members of the ſociety, they have an opportunity of conveying to the readers of this Dictionary, a perfect idea of the form of the ſcythes lately tried in Northamptonſhire: for this purpoſe they have annexed a plate engraved from a drawing taken from the three ſcythes now depoſited in the Society's machine-room, for the inſpection of the curious. The parts are repreſented ſeparate, that they might be more diſtinct: the dimenſions and proportions follow. Plate XX. Fig. 7. is the handle, or mounting of the largeſt ſcythe: the length of it from *a* to *c* is eight feet, from *a* to *b* five feet, from *b* to *c* three feet: at *c* is the part whereon the blade is fixed, *d* ſhews the two bends which ſerve inſtead of a cradle. Fig. 3. is the blade to this ſcythe: from the heel *a*, to the point *b*, meaſures three feet, and it is two inches and a half broad: when the ſcythe is mounted, from the point of the blade *b*, to the end of the long handle *a*, meaſures an angle of ſeven feet. Fig. 4. is the blade of another ſcythe, the length and breadth the ſame as the laſt blade. Fig 5. is the handle to this ſecond ſcythe: from *a* to *d*, it meaſures three feet ten inches, from *a* to *b*, two feet, and from *b* to *c*, one foot ſeven inches: the blade is fixed at *a*, and when the ſcythe is mounted, the angle from the point of the ſcythe-blade to the end of the handle, meaſures three feet nine inches. Fig. 6. is the blade of the ſmalleſt ſcythe: from *a* to *b*, it meaſures one foot nine inches, and is two inches and a half broad. Fig. 7. is the handle or mounting to this laſt ſcythe: at *a* the blade is fixed: from *a* to *b* is one foot five inches and a half; the angle from *b* to *c*, four inches and a half; from *c* to *d*, five inches; from *d* to *e*, three inches and three quarters. Fig. 8. is the gathering-hook: the length of its handle, from *a* to *b*, is three feet nine inches; the hook from *b* to *c*, is ten inches long.

MUCK, dung, or ſtraw that lies rotting.

MUD, the ſediment at the bottom of rivers, ponds, ditches, &c. *See the article* DUNG.

MUGWORT, a very troubleſome weed; for its roots creep far under the ſurface of the ground, ſo as ſoon to overſpread a large ſpace, if they are not ſtopped; and its ſeeds, being light, and eaſily carried to a diſtance by the wind, will produce numbers of new plants the next ſpring. It has plain cut leaves, ending in many parts, woolly underneath, and ſingle ſpikes of pale yellow oval flowers, which blow in June.

MULBERRY, the name of a tree, of which there are ſeveral ſpecies, but two only are generally cultivated, called the black and white mulberry.

The black mulberry grows naturally in Perſia, from whence it was firſt brought to the ſouthern parts of Europe; but is now become common in every part of Europe, where the winters are not very ſevere: for in the northern parts of Sweden, theſe trees will not live in the open air; and in ſeveral parts of Germany they are planted againſt walls, and treated in the ſame way as peach and other tender fruits are here.

Theſe trees are generally of both ſexes, having male flowers or katkins, on the ſame tree with the fruit; but it often happens, that ſome of the trees which are raiſed from ſeeds, have only male flowers, and produce no fruit; ſo that thoſe who plant theſe trees for their fruit, ſhould never make choice of ſuch as have been propagated by ſeeds, unleſs they have ſeen them produce fruit in the nurſery. It is alſo the ſureſt way to mark ſuch trees as are fruitful in the nurſery, at the time when their fruit is upon them, becauſe thoſe trees which are propagated by layers, are ſometimes of the male ſort.

The old mulberry trees are not only more fruitful than the young, but their fruit are much larger and better flavoured; ſo that where there are any of theſe old trees, it is the beſt way to propagate from them, and to make choice of thoſe branches which are moſt fruitful. The uſual method of propagating theſe trees, is by laying down their branches, which will take root in one year, and are then ſeparated from the old trees; but as the moſt fruitful branches are often ſo far from the ground as not to be layed, unleſs by raiſing of boxes or baſkets of earth upon ſupports for this purpoſe; ſo the better way is to propagate them by cuttings, which, if rightly choſen and ſkilfully managed, will take root very well; and in this method there will be no difficulty in having them from trees at a diſtance, and from the moſt fruitful branches. Theſe cuttings ſhould be the ſhoots of the former year, with one joint of two years wood to their bottom; the cuttings ſhould not be ſhortened, but planted their full length, leaving two or three buds above ground. The beſt ſeaſon for planting them is in March, after the danger of hard froſt is over; they ſhould be planted in light rich earth, preſſing the ground pretty cloſe about them; and if they are covered with glaſſes, it will forward their putting out roots; but where there is no ſuch conveniency, the ground about them ſhould be covered with moſs, to prevent its drying; and where this is carefully done, the cutting will require but little water, and will ſucceed much better than with having much wet. If the cuttings ſucceed well, and make good ſhoots, they may be tranſplanted the following ſpring into a nurſery, where they ſhould be regularly trained to ſtems, by fixing down ſtakes to each, to which the principal ſhoots ſhould be faſtened; and moſt of the lateral branches ſhould be cloſely pruned off, leaving only two or three of the weakeſt to detain the ſap, for the augmentation of the ſtem; for when they were quite diveſted of the ſide ſhoots, the ſap is mounted to the top, ſo that the heads of the trees grow too faſt for the ſtems, and become too weighty for their ſupport. In about four years growth in the nurſery, they will be fit to tranſplant where they are to remain; for theſe trees are tranſplanted with greater ſafety while young, than when they are of a large ſize.

The white mulberry is commonly cultivated for its leaves to feed ſilk-worms, in France, Italy, &c. though the Perſians always make uſe of the common black mulberry for that purpoſe; and it is ſaid that the worms fed with thoſe of the black produce much better ſilk than thoſe fed with the white; but it is to be obſerved, that the leaves of the black ſort ſhould never be given to the worms, after they have eaten for ſome time of the white, leſt the worms ſhould burſt, which is often the caſe when they are thus treated.

The trees which are deſigned to feed ſilk-worms ſhould never be ſuffered to grow tall, but rather kept in a ſort of hedge; and inſtead of pulling off the leaves ſingly, they ſhould be ſheared off, together with their young branches, which is much ſooner done, and not ſo injurious to the tree.

This white ſort may be propagated either from the ſeeds or layers, as the black mulberry, and is equally hardy; but the moſt expeditious method of raiſing theſe trees in quantity, is from the ſeeds, which may be procured in plenty from the ſouth of France and Italy. The beſt way to ſow theſe ſeeds, in England, is to make a moderate hot bed, which ſhould be arched over with hoops, and covered with mats; upon this bed the ſeeds ſhould be ſown in the middle of March, and covered over with light earth about a quarter of an inch deep: in very dry weather, the bed muſt be frequently watered, and in the heat of the day ſhaded with mats, and alſo covered in the nights when they are cold. With this management the plants will come up in five or ſix weeks, and as they are tender when they firſt appear, ſo they muſt be guarded againſt froſty mornings, which often happens in May. During the ſummer they muſt be kept clean from weeds, which is all the culture they require: but there muſt be care taken of them the firſt winter, eſpecially to cover them in autumn, when the firſt froſts come, which will kill the tender plants to the ground, if they are not protected; the following March, theſe plants ſhould be tranſplanted into the nurſery, to get ſtrength, where they may remain two or three years, and then ſhould be removed where they are to continue.

MULE, a mongrel kind of quadruped, uſually generated between an aſs and a mare, and ſometimes between a horſe and a ſhe-aſs.

The mule is a ſort of a monſter, of a middle nature between its parents, and therefore incapable of propagating its ſpecies; ſo careful is nature to avoid filling the world with monſters. Mules are chiefly uſed in countries where there are rocky and ſtony roads, as about the Alps, Pyrenees, &c. Great numbers of them are kept in theſe places; they are uſually black, ſtrong, well-limbed, and large, being moſtly bred out of the fine Spaniſh mares.

In Spain there is great encouragement for breeding and training mules to every kind of buſineſs: in Portugal they are eſtimated at a high price, and are not a little valued in the ſouthern parts of France.

I own, ſays a writer in the Muſeum Ruſticum, I have often been aſtoniſhed (the uſeful nature of this creature conſidered) that we do not more encourage the breed in England. This inattention may perhaps proceed from mules being thought naturally more vicious than horſes: I doubt the fact; yet be it as it will, they are, to my knowledge, equally capable of being made uſeful, docile, and gentle.

I aſſert not this merely from opinion, having had many years experience of what may be done in this way.

During the courſe of the war, in which his royal highneſs the duke of Cumberland commanded the army of the allies in Flanders, the empreſs queen made him a preſent of above fifty fine mules to carry his baggage: theſe mules, at the end of that war, were brought to England, at which time I had an opportunity of ſeeing and admiring them. They were, I think, the fineſt and largeſt I ever before beheld; and one, nearly white, particularly attracted my attention, being almoſt ſixteen hands high.

This circumſtance of ſeeing his highneſs's ſtring of mules, it was firſt induced me to think of breeding them, in which I have ſince had uncommon ſucceſs.

I had many encouragements to make the attempt: my fortune was ſuch as could not be hurt by the experiment; my park was extenſive, and very proper for the purpoſe; and I had many ſervants, who had ſo little to do, as to have leiſure time enough to obey my orders in this matter.

My great difficulty at firſt ſetting out was to procure a he aſs or two to cover my mares; for I found none were to be got of any ſize bred in England.

It is true, I met with ſome Spaniſh aſſes; but they were ſluggiſh, and not likely to get mettled colts: beſides, I could not buy two of them, of any ſize and ſhape, under ſeven hundred pounds, which I thought too much money to throw away, if I could by any other means get my end eaſily anſwered.

Senſible that perſeverance does much in all things, I bought a ſtrong-boned, fine-ſhaped he aſs, and two ſhe aſſes of a large ſize, conſidering they were bred in England, determined to try if I could not by a little care and attention mend the bred, before I attempted to get any mules.

Theſe coſt me only four pounds, and my two ſhe aſſes ſoon afterwards dropped a foal each.

I continued to breed from them for ſeveral years; but it is the manner in which I managed the aſs colts, that the great ſucceſs I have lately had in breeding mules muſt be aſcribed.

I took care that the ſhe aſſes ſhould be well fed, and be kept in order, both before they dropped their foals, and afterwards whilſt they ſuckled.

As ſoon as the colts were weaned, I had them as carefully attended and fed as if they had been got by Childers or Babram: every winter they ſtood under cover, defended from the injuries of the weather, and were regularly fed, cleaned, and littered, the door of the ſtable being always left open two or three hours in the middle of the day, for them to exerciſe themſelves as they thought proper, which they ſeldom failed to do, if the weather was fine, to ſome purpoſe, returning, without compulſion, when the hour of feeding approached.

In this manner I always managed them till they were three years old, when I permitted my ſtone colts to cover, and my females to breed.

You would indeed be ſurpriſed to ſee how much, by this plain and ſimple management, my breed of aſſes is improved; for I have now in my ſtables ſeveral he aſſes, which I keep as ſtallions, that are, I believe, as large, and as well ſhaped, as any that were ever heretofore bred in theſe iſlands.

I ſhall now proceed to deſcribe to you the manner in which I breed my mules. For this purpoſe I chuſe mares that are of a very large breed, ſuch as are ſometimes uſed to draw the brewers drays in London.

My next care is that they are young, full of life, large barrelled, but ſmall limbed, with a moderate ſized head, and a good forehand. At the proper ſeaſon my mares are covered by my aſs ſtallions, and they ſeldom miſs. During the time the mares are in foal, I take care to have them fed with nouriſhing fodder, ſuch as I imagine will moſt contribute to the ſize of the foal.

My expectations, after this management, are generally anſwered, for in due ſeaſon my mares drop foals, which I could often ſell for ten, and ſometimes for twenty guineas a piece at three months old; and their future value is more than in proportion encreaſed afterwards.

I always houſe my mule colts the firſt winter; otherwiſe the hard froſts, and ſharp, cold, long nights, would ſtint them in their growth, beſides making them unſhapely and rough.

From the time of their being dropped, I cauſe them often to be handled, to make them gentle: this prevents their hurting themſelves by ſkittiſhneſs, and ſudden frights: they are beſides much eaſier broke at the proper age, and become docile and wonderfully harmleſs, having nothing of that viciouſneſs which is ſo commonly complained of in theſe animals.

I have them for the moſt part broke at three years old, but never permit them to do much work till four: they are thus ſecure from being hurt by hard labour, till they have acquired ſtrength enough to bear it without injury.

I have now ſeveral mules which I conſtantly employ in various kinds of labour; two, which are indeed very fine, I ride myſelf after my harriers; two more I keep for my huntſman, and one for my whipper-in: theſe are black, ſorrel, and grey.

I have alſo four fine mules, but ſtronger and heavier than thoſe above mentioned, which I drive occaſionally in a four-wheel chaiſe, beſides ſeveral others leſs valuable, uſed for ploughing and carting.

Some of my neighbours ſmile at my taſte; yet they cannot at the ſame time help acknowledging, that they are cheaper animals, when bred at home, as has been my practice, than horſes.

Perhaps ſome of your readers, from the hints above thrown out, may be inclined to try the experiment: if ſo, I would caution them againſt ſome errors I at firſt ſetting out fell into.

I thought at firſt I could not keep my colts too well during the winter months: accordingly I ordered that they ſhould have the ſweeteſt hay, which I had before ordered to be reſerved for my cows, and as many oats as they could eat.

This way of feeding them, it is true, made them very fat; but it was far from being an advantage to them; for I afterwards found by experience, that it was not only incurring a much larger expence than was any ways neceſſary, but alſo made them wonderfully nice and delicate in their appetites ever after, and alſo by encreaſing their weight of fleſh, made them more ſubject to ſtrains and hurts in their morning gambols.

Finding this to be the caſe, I altered my method entirely, and contented myſelf with giving them food enough to prevent their loſing fleſh, and keep up their growth, without palling their appetites with delicacies, or making them over fat: as to the reſt, I took the ſame care of defending them from the injuries of the weather as ever, by allowing them ſtable room, and good litter to ſleep on, beſides cauſing them every day to be well rubbed down with a hard wiſp of ſtraw by an active groom, whoſe peculiar province it was to attend them; and this was ſcarcely ever omitted, particularly in cold, raw, wet weather, when they were leaſt inclined to exerciſe themſelves in the park. *Muſeum Ruſticum, vol.* II. *page* 162.

MULCH, ſtraw half rotten.

MULLOCK, dirt, or rubbiſh.

MULLEIN, the name of a biennial plant, which periſhes ſoon after it has perfected its ſeeds. The leaves ſpread on the ground, are nine or ten inches long, and ſix broad, very woolly, of a yellowiſh white colour, and very little footſtalk. The ſtem riſes four or five feet high, and the upper part of it is garniſhed with yellow flowers, which ſit very cloſe, and form a thick ſpike. Theſe flowers have an agreeable odour, appear in July, and the ſeeds ripen in autumn.

This plant commonly grows by the ſides of highways, and on [illegible] if it once gets into the fields in a warm expoſure, and is ſuffered to ſeed there, it will ſoon overrun the whole ground. It may be eaſily deſtroyed by cutting off the ſtem, when it is in flower.

MURE, the cake of apples, grapes, &c. left in the preſs, after extracting the juice.

MURRAIN, or *Gargle*, a contagious diſeaſe among cattle.

The moſt remarkable murrain is that mentioned in the Philoſophical Tranſactions, which ſpread through Swiſſerland, Germany, into Poland, &c.

The contagion ſeemed to propagate itſelf in form of a blue miſt, which fell on the graſs where the cattle grazed, when whole herds, forbearing their food, almoſt died away in twenty-four hours. Upon diſſection were found large corrupted ſpleens, ſphacelous and corroded tongues, &c. And even the perſons who managed them were infected, and died like the beaſts.

Some imagined it had its riſe from noxious vapours thrown out of the earth, in three earthquakes perceived in the neighbourhood of the place where it began; though Dr. Slare thinks it rather owing to ſwarms of volatile inſects.

The antidote for the ſound, and medicine for the ſick, was equal parts of ſoot, gunpowder, brimſtone, and ſalt, with as much water as would waſh it down: a ſpoonful was the doſe.

The common ſigns of this diſeaſe are a hanging down of the head, gum at the eyes, as big as your finger, growing weakly, ſtaggering, the head ſwelling very much, the breath ſhort, the heart beating with rattling in the throat; and if you put your hand into the creature's mouth, and find his breath very hot, and his tongue ſhining, the diſtemper is very ſtrong.

As ſoon as you find any of your cattle infected, take a pretty large quantity of blood from them immediately, and give them a drench. Madder root is highly commended for this diſtemper.

MUSHROOM, a genus of imperfect plants, compoſed of a pedicle crowned with a broad head, convex and ſmooth at the top; and hollow, foliated, lamellated, or piſtulous underneath.

It is of the utmoſt importance to diſtinguiſh the right eatable ſort, from ſeveral noxious kinds that have been productive of even fatal accidents: the true ſort appear at firſt with a roundiſh head, not unlike to a button. The outſide of this head is then very white, as is likewiſe the ſtalk on which it grows; but its under part, when it is taken off that ſtalk, from which it ſeparates pretty eaſily, is of a livid fleſh colour. Its fleſh is alſo very white within. If this ſort remains undiſturbed, its head will ſpread to a conſiderable ſize, and open at the bottom, ſo as to form an almoſt flat ſurface, the under part of which will then be changed to a dark colour.

Moſt of the writers upon gardening have ſpoken ſo confuſedly, not to ſay, of moſt of them, ſo unintelligibly, of the means of propagating this plant, that excepting the authors of the *Maiſon Ruſtique*, and Mr. P. Miller, one is ſometimes puzzled to gueſs at their meaning. The account which this laſt has given in his Dictionary, is the moſt practical, being the method of the gardeners near London, who raiſe annually great quantities of muſhrooms for ſale. The ſubſtance of it is to the following effect.

The ſpawn of muſhrooms, from which only they are propagated, looks like a white mouldineſs ſhooting out in long ſtrings. It is frequently found among the dung of old hot-beds, or in old dunghills, eſpecially when much litter has been mixed with theſe laſt, or the wet has not penetrated ſo as to rot it; or it may be procured by mixing ſome long ſtable dung, which has not been thrown up in a heap to ferment, with ſtrong earth, and then laying this mixture under cover, where it cannot be wet, and where the air may be excluded from it as much as poſſible; for, the more effectually it is kept from air, the ſooner the ſpawn will be produced. It will generally appear in about two months, if the heap has not been laid ſo cloſe together as to heat (for that will deſtroy the ſpawn) and eſpecially if it has been well covered with old thatch, or litter which has lain ſo long abroad as to have loſt the power of fermenting. Theſe are expedients by which the ſpawn of muſhrooms may be procured at almoſt any time, by thoſe who have not already had muſhroom-beds in their gardens, and therefore cannot collect it from their remains: for there are but two months of the year in which it can be gathered from downs or paſtures. Theſe are Auguſt and September; when plenty of muſhrooms ſpring up naturally in many of thoſe places. To propagate them from thence, the ground ſhould be opened about their roots, and ſuch earth as is there found full of ſmall white knobs, which are the offſets, or young muſhrooms, ſhould be attentively gathered up, with as much care as can be not to break the lumps, or the earth about them. This ſeed, or rather this ſpawn (for if muſhrooms have ſeeds, they are imperceptible to the eye) ſhould be kept very dry till it is uſed; for the drier it is, the better it will take to the bed, as has been remarkably experienced by Mr. Miller, who declares, that he never ſaw theſe plants produced ſo ſoon, or in ſo great quantity, as from a parcel of their ſpawn which had lain near the oven of a ſtove for upwards of four months, and was become ſo dry, that he deſpaired of its ſucceſs.

The beds for muſhrooms ſhould be made of dung plentifully intermixed with litter, but not thrown in a heap to ferment. The beſt dung for this purpoſe is that which has lain ſpread abroad for a month, or longer. Their breadth ſhould be about two feet and an half at bottom, their length proportioned to the deſired quantity of muſhrooms, and they ſhould be made on dry ground, by ſpreading upon it, firſt a layer of dung about a foot thick, and upon this about four inches deep of ſtrong earth; then a couch of dung about ten inches thick, and upon that another layer of earth, contracting the ſurface of the bed all the way up, till it terminates like the ridge of a houſe. This may be done with three layers of dung, and as many of earth. When it is finiſhed, it ſhould be covered with litter, or old thatch, as well to prevent its drying, as to keep out wet, and after it has remained eight or ten days in this ſituation, it will be of a proper temperature to receive the ſpawn, for which its warmth ſhould be but moderate.

rate. The thatch, or litter, ſhould then be taken off, the ſides of the bed ſhould be ſmoothed, and a covering of light rich earth, by no means wet, ſhould be laid all over it, about an inch thick. Upon this the ſpawn ſhould be placed, by laying its lumps about two or three inches aſunder, in ſuch manner as to prevent their ſlipping down, and then the whole ſhould be covered gently with about half an inch thick of the ſame light earth as was uſed before. The covering of litter ſhould then be replaced over the bed, ſo thick as to ſecure it from wet, and to prevent its drying. If theſe beds are made in the ſpring or autumn, when the weather is temperate, the muſhrooms will frequently come up in a month's time: but thoſe which are made in ſummer, when the ſeaſon is hot, or in winter, when it is cold, will not produce them near ſo ſoon. Sometimes too it happens that neither of theſe beds, but moſt particularly thoſe made in the ſummer or winter, yield any muſhrooms before the end of five or ſix months; and that they then produce uncommon quantities, and continue in perfection for a long time.

The great art in managing of theſe beds is, to keep them conſtantly in a due degree of moiſture, and, above all, not to ſuffer them ever to receive too much wet; for that would inevitably deſtroy the ſpawn of the muſhrooms. During the ſummer, they may be uncovered, to admit gentle ſhowers of rain to them at proper times; and if the weather continues dry for a long while together, it will be right to water them gently now and then, but by no means to overdo it. During the winter, they muſt be kept as dry as poſſible, and cloſely covered, leſt the cold air of the ſeaſon ſhould injure them. It will even be right in froſty or very cold weather, to lay over them a covering of dry litter, for it muſt not incline to ferment, and upon that ſome warm litter ſhaken from out of a heap of dung. This covering ſhould alſo be renewed as often as it is found to decay, and, if the cold grows more ſevere, its thickneſs ſhould be increaſed.

The muſhrooms thus produced have a finer flavour than any that are gathered in the fields; and if the above directions are obſerved, they may be had in plenty during the whole year: for each ſingle bed will continue good for ſeveral months, and yield great quantities if the ſpawn takes kindly.

When theſe beds are deſtroyed, the ſpawn for a freſh ſupply ſhould be taken from them, and laid up in a dry place till the proper ſeaſon for uſing it, which ſhould not be ſooner than five or ſix weeks, in order that it may have time to dry well, before it is put into the new bed; for otherwiſe there will be ſome danger of its ſucceeding.

MUST, new wine, or wort, before it is fermented.

MUSTARD is an annual plant raiſed from its ſeed only. The white muſtard, as it is commonly called, is the ſort chiefly cultivated in gardens, for a ſallad herb in the winter and ſpring. The ſeeds of this are ſown very thick in drills, either upon a border warmly ſituated, or if the weather be very cold, upon a gentle hot-bed, in the ſame manner as creſſes and other ſmall ſallading, and in about ten days or a fortnight after the time of ſowing, the plants will be fit for uſe; for when they are large and have rough leaves, they are too ſtrong to be mixed with ſallads.

The beſt way to ſave the ſeeds of this plant, is to ſow a ſpot of ground with it in the ſpring, to thin the plants when they have about four leaves, and at the ſame time to hoe down the weeds, as is practiſed for turnips. This hoeing is to be repeated in about a month after, and the plants are then to be left about eight or nine inches aſunder, which will be a ſufficient ſpace for the growth of this ſpecies. If theſe hoeings are well performed, in dry weather, they will keep the ground clean till the muſtard ſeeds are ripe. The ſtalks of this plant, which are branched and hairy, will then be about two feet high, and the ripening of its ſeed is indicated by the pods changing to a brown colour; immediately after which they ſhould be cut down, dried upon cloths, for two or three days, and then threſhed out for uſe.

The larger ſorts of muſtard, the ſeeds of which are uſed chiefly for ſauce, are to be treated in the ſame manner; excepting that, as they grow much larger, a proportionably greater ſpace muſt be left between their plants; and as their ſeeds will not ripen ſo ſoon as thoſe of the ſmaller kind, three hoeings, or rather good deep ſtirrings, of the ground may be requiſite for them. One of theſe large ſorts, which is the common muſtard, grows naturally in many parts of England; but is cultivated in the fields for its ſeeds, of which the ſauce called muſtard is made; and another ſort, which naturally grows in our arable lands, and is alſo cultivated for uſe, produces the ſeeds which are commonly ſold under the appellation of Durham muſtard-ſeed. The ſtalks of the laſt ſort ſeldom riſe above two feet high; but thoſe of the former generally run up to the height of four or five feet.

N.

NAIL, or *Naile*, the weight of eight pounds.

NAPE, or *Neap*, a piece of wood with two or three feet; with which they ſupport the fore-part of a loaded wain.

NASTURTIUM. *See the article* CRESS.

NAVE *of a Wheel*, is that ſhort thick piece in the center of the wheel, which receives the end of the axletree, and in which the ends of the ſpokes are fixed; it is bound at each end with hoops of iron, called the nave-bands; it has likewiſe, in each end of the hole, through which the end of the axletree goes, a ring of iron, called the wiſher, which ſaves the hole of the nave from wearing too big.

NEAT, black cattle, oxen.

NEAT-HERD, a herd or company of black cattle: alſo a perſon who looks after horned cattle.

NECTARINE, a fruit greatly eſteemed for its delicious flavour, and ſuppoſed to have its name from the nectar of the gods, in heathen ſtories.

It differs in nothing from the peach, but in having a ſmoother ſkin, and a firmer pulp. *See* PEACH.

We have ten kinds of nectarines cultivated by the curious in gardening.

1. Fairchild's early nectarine; this is a ſmall fruit of a red colour, and very well taſted, and ripens in July, the earlieſt of all this kind.

2. The Elruge nectarine; this is a larger fruit of a purple colour, on that ſide which was towards the ſun, and of a greeniſh yellow on the other parts. This is a very well flavoured nectarine, of a ſoft, melting juice, and parts from the ſtone: it ripens towards the end of July.

3. The Newington nectarine; this is a fair large fruit, of a fine red toward the ſun, and of a yellowiſh green towards the wall. It has a very rich juice, but the pulp adheres to the ſtone: this ripens in Auguſt.

4. The ſcarlet nectarine; this is of a fine glowing red towards the ſun, and of a pale red towards the wall; it ripens in the end of July.

5. The Brugnon, or Italian nectarine; this is a fair, large fruit, of a deep red next the ſun, but of a ſoft yellow next the wall. The pulp is firm, and of a rich flavour, but cloſely adheres to the ſtone, and is red in that part: this ripens in the middle of Auguſt.

6. The Roman red nectarine; this is a fair large fruit, of a deep purple towards the ſun, and of a greeniſh yellow next the wall. The pulp is very firm and well taſted, but it is red about the ſtone, and adheres firmly to it: this is ripe in the middle of Auguſt.

7. The murry nectarine; this is a middle-ſized fruit, of a dirty red next the ſun, and of a greeniſh yellow next the wall. The pulp is tolerably well flavoured, and ripens in the middle of Auguſt.

8. The golden nectarine; this is a fair handſome fruit, of a ſoft red next the ſun, but of a gold yellow next the wall; and its pulp is very yellow, but of a faint red about the ſtone, to which it adheres: it is a very well flavoured kind, and ripens at the end of September.

9. Temple's nectarine; this is a very fine kind; it is of a ſoft red towards the ſun, and of a yellowiſh green next the wall. It parts from the ſtone, and is of a very rich flavour; the pulp is white in other parts, but yellowiſh about the ſtone: this ripens in the middle of September.

10. The Peterborough nectarine, called by ſome the late green nectarine; this is a middle-ſized fruit, of a pale green colour towards the ſun, and of a whitiſh green toward the wall; the pulp is firm, and well flavoured: it ripens towards the end of September.

Nectarine trees generally produce their fruit either upon the young wood of the preceding year, or, at moſt, upon ſhoots of two years old, and theſe ceaſe to bear after that age. The branches of theſe trees muſt therefore be ſhortened, according to their ſtrength, in order to make them put out annually new ſhoots for the ſucceeding year. When the knife is uſed for pruning them, care ſhould always be taken to cut them a little ſloping behind a wood bud, which may be eaſily diſtinguiſhed from the bloſſom buds; theſe laſt being ſhorter, rounder, and more turgid than the former; for if the ſhoot have not a leading bud where it is cut, it is very apt to die down to the next leading bud. This leading bud, or wood-bud, is always neceſſary, to preſerve a circulation of the juices in the branch. The length at which the pruned ſhoots are left, ſhould be proportioned to the ſtrength of the tree: thus, in a healthy ſtrong tree it may be ten inches, or more; but in a weak one, it ſhould not exceed ſix inches: however, this muſt alſo be determined, in ſome meaſure, by the poſition of a fine wood bud; for it is better to leave a ſhoot three or four inches longer, or to cut it two or three inches ſhorter, than one might otherwiſe chooſe to do, for the ſake of ſuch a bud; it being abſolutely neceſſary for the future welfare of the tree. It is alſo neceſſary to cut out entirely all weak ſhoots, though there may be many bloſſoms upon them; for theſe have not ſtrength enough to nouriſh the fruit, but will weaken the other parts of the tree. It is to the neglecting of this, and to the not diſplacing of all luxuriant ſhoots as ſoon as they are produced, that half the blights we hear complained of are (though wrongly termed, and miſtaken as to the cauſe) in Mr. Miller's opinion, owing.

In nailing the ſhoots to the wall, care muſt be taken to place them, as nearly as poſſible, at equal diſtances, in order that their leaves, when come out, may have room to grow, without ſhading the branches too much. So far as the nature of the tree will permit, they ſhould never be nailed upright, becauſe they are very apt to ſhoot from the uppermoſt eyes, and the lower parts of the ſhoots become thereby naked, when they are trained in that manner.

When the fruit is ſet, and grown to the bigneſs of a ſmall nut, it ſhould be looked over, and thinned ſo as to be left at leaſt five or ſix inches aſunder; for no tree can afford ſufficient nouriſhment to perfect ſo great a crop as it ſometimes produces; and it is evidently better to pull off early ſuch fruits as over-burden it, and therefore are not to remain on the tree, than to let them impoveriſh the reſt by ſtanding longer; eſpecially as, in this laſt caſe, the tree itſelf is frequently ſo weakened thereby, as to be diſabled from bearing well for three or four years after.

If the ſeaſon ſhould prove hot and dry, it will be proper to draw the earth round the ſtem of each tree, ſo as to form a baſon of about ſix feet diameter, to cover the ſurface of the ground in the baſon with mulch, and once in a week or fortnight, according to the heat and drought of the ſeaſon, to pour down eight or ten gallons of water to the root of the tree: or where there is an engine, which will diſperſe the water in eaſy gentle drops like rain, if the ſame, or a larger, quantity of water is ſprinkled all over the branches of the trees, this ſoaking down to the roots, will keep the fruit conſtantly growing, and prevent its falling off the trees, as it is very apt to do where this method is not practiſed. The fruit thus conſtantly nouriſhed will alſo be much improved in its taſte, and the trees thus treated will be maintained in vigour. But this watering ſhould not be continued longer than while the fruit is growing; becauſe it will afterwards be hurtful to the trees and fruit; for a dry autumn ripens both wood and fruit better than a moiſt latter ſeaſon.

Mr. Miller, who recommends this practice from his own long and extenſive experience, blames, upon the authority of the ſame unerring guide, the too frequent cuſtom of pulling off the leaves of the trees, in order to admit the ſun to the fruit; becauſe, as the leaves are abſolutely neceſſary to cheriſh the bloſſom buds, which are always formed at their footſtalks, theſe buds muſt be greatly injured by pulling off the leaves before they have performed the office aſſigned them by nature.

After diſproving the common opinion, that theſe trees are not long lived, and that they ſhould therefore be renewed every twenty years, by declaring that he has eaten ſome of the fineſt peaches of various kinds, which grew on trees upwards of fifty years old, and then aſcribing this miſtaken notion to the wrong practice of the French, who generally bud their peaches upon almond ſtocks, which are of ſhort duration; he recommends dunging the borders where fruit trees grow, every other year, with well rotted dung dug into the ground in November, that the rain may waſh down its fertilizing particles before the ſpring comes on: and to confirm this opinion, he inſtances the practice of the gardeners at Montreuil, near Paris, who have for ſome generations been famous for this practice, and are as careful to dung the borders where their peach trees grow, every other year, as the kitchen-gardeners are for their legumes. He thinks neats or hogs dung, mixed with loam, ſix or eight months before it is uſed, and mellowed by frequent turning during that time, the beſt for a looſe or ſandy ſoil, becauſe this dreſſing is cooler than any that is made with horſe-dung; and he thinks this laſt, mixed with light ſandy earth, or ſea-coal aſhes, the moſt proper for ſtrong land.

NETTLE, the name of a weed well-known, and which may be eaſily deſtroyed by cutting the roots, before the plant has perfected its ſeed.

NEWING, yeaſt, or barm.

NICKING, the name of an operation often performed on the tails of ſaddle-horſes, and by which means they carry them in a more beautiful manner.

Before we deſcribe the operation of nicking, it may be neceſſary to enquire how the effect of it (the elevation of the tail) is brought about; and in order to know this, and judge with propriety of the operation, we muſt conſider the tail as elevated, or lifted up, by one ſet of muſcles, and depreſſed or pulled down by another.

It is ſomewhat remarkable, that Snape, Saunier, and Gibſon, who are in general pretty exact in their anatomical deſcriptions, ſhould omit, in their account of the muſcles of a horſe, to deſcribe thoſe of the tail: for which reaſon, as a proper opportunity has not offered, to ſupply this omiſſion, by making a complete diſſection, with that accuracy we could have wiſhed, it is hoped the ſubſequent imperfect deſcription will be excuſed, as it was taken only from a tail that was diſſected after docking.

Here we obſerved, that the muſcles which elevate the tail, are more numerous, large, and ſtrong, than thoſe that depreſs it; that they are cloſely connected to the bones of the tail by fleſhy fibres, and terminate in ſtrong tendons at the extremity: but the muſcles of the latter ſoon form into tendinous expanſions, and three large tendons, which are inſerted into the latter bones of the tail: there are ſeveral other ſmall tendons, which run laterally, whoſe uſe moſt probably is to move the tail ſideways. The arteries are four in number, and run ſometimes above the bones of the tail, conſequently eaſily avoided by a dextrous hand, as they cannot readily be wounded by the knife, in dividing the tendons neceſſary to be cut in this operation.

The art of nicking horſes then chiefly conſiſts in a tranſverſe diviſion of theſe depreſſing tendons of the tail, and ſuch a poſition afterwards as will keep their extremities from coming again into contact; ſo that an intervening callus fills up the vacuity: by theſe means an additional power is given to the antagoniſt muſcles, viz. the elevators; the counteraction of the depreſſors being manifeſtly abated by the diviſion of the tendons, and the intervention of the callus.

The uſual method of ſupporting the tail by a pulley and weight, is liable to many exceptions, the extremities of the divided tendons not being by that method kept ſufficiently aſunder; the ſituation of the tail being rather inclined to a perpendicular than a curved direction: this poſition too is liable to many variations, from the different movements of the horſe, and is the reaſon that the tail frequently inclines to one ſide, as the nick may heal up faſter on one ſide than the other; the diſagreeable ſituation the horſe muſt ſtand in, with a weight conſtantly hanging to his tail, is another material objection, beſides the neceſſity of removing it when the horſe is exerciſed, or taken out to water.

To remedy theſe inconveniencies, and perfect this operation, a very ingenious gentleman, who had thoroughly conſidered it, has been ſo kind as to favour us with a draught and deſcription of a machine he contrived for that purpoſe, which has frequently been practiſed with the expected ſucceſs, and indeed at firſt view appears in every reſpect calculated to correct all the defects in the old one: as we doubted not its reception being perfectly agreeable to the public, we have ordered a plate to be engraved, which, with the annexed deſcription, will, we hope, make it very familiar and intelligible to every capacity.

In regard to the operation, it is worth notice, that the extremities of the tendons, which jut out in the operation, need not here be cut off, as is cuſtomarily done; the number of the inciſions muſt be in proportion to the length of the tail, but three in general are ſufficient. The moſt approved method of dreſſing at firſt, is with powdered roſin, and ſpirit of wine, applying a ſoft doſſil of lint or tow, dipped in the ſame, between each nick, and lapping the tail up with a linnen cloth and broad fillet; which the next morning ſhould be cut open down the back part of the tail, and the morning after be gently taken off: when it will be proper to plat the hairs, in order to keep them clean, and to ſet the tail, as will be directed in the plate and references.

Every two or three days, the tail ſhould be let down, and the upper part next the rump bathed with hot vinegar; and if it begins to crack, and the hair comes off, a little tincture of myrrh will ſoon put a ſtop to it. To obviate any threatening ſymptoms that may ariſe in regard to the wounds, have recourſe to the remedies uſed on docking.

After ſix or eight days, it will be proper to let the horſe ſtand without the machine for a few hours, and then be rode about, in order to obſerve how he carries his tail; by which means you will the better judge how to faſten it down, whether to confine it cloſer, or give it more ſcope: after the wounds are healed up, it may be neceſſary to keep the tail ſuſpended, till the callus is confirmed, at leaſt for ſome hours in the day; though a greater liberty may now be allowed it.

Thus this machine anſwers every intention, is far preferable to the pulley, as it keeps the tendons properly ſeparated, and the tail in a certain poſition; ſo that the wounds heal up uniformly, without any riſk of its being caſt to one ſide; the horſe alſo is more at eaſe, having no weight conſtantly pulling and teazing him, and may be taken out to water or exerciſe without any inconveniency, or diſturbance.

Directions for the Application of the Nicking Machine; and Explanation of the Plates.

When the hair of the tail is properly platted, and tied with a knot or two at the end, the pad, &c. as deſcribed in Plate XX. Fig. 9. muſt be put on, and the machine, as in Fig. 10. buckled to them, letting the part G. in the machine lie over the part of the tail that joins to the horſe's rump; then let an aſſiſtant, ſtanding on the ſide rail of the brake, or any other conveniency that may place him above the horſe, raiſe the horſe's tail very gently, till the knot of the tail gets ſo far beyond the ſtrings L L in Fig. 10. that it may be tied down; which being done, the tail may be let down lower, or taken up higher at pleaſure. It is to be obſerved, that the ligature is not made on the tail itſelf, but on the plated hair, at the extremity of the ſtump.

The machine, Fig. 10. muſt be made of a piece of tough wood, about a foot long, viz. from A to B, and about nineteen inches broad from C to D, and ſeven or eight inches thick. The under part muſt be hollowed, ſo as to let in the horſe's rump, and that the wings C D may reſt on his buttocks. To receive the tail, a groove muſt be cut from G to H, about three inches wide, and three deep at G, leſſening gradually both in height and breadth to H. Holes muſt be made at certain diſtances in the groove, as at H for the ſtring, and a nick cut to receive the billet from the ſtrap K. Two buckles fixed to the machine as at I I.

The pad, &c. are ſufficiently deſcribed in Fig. 9. and its references; the wood muſt be ſloped off from E to C and A, and ſo on the other ſide, to lighten the machine, and hollowed at B, G, and F.

Fig. 9. repreſents a horſe, with his tail in the frame or machine. A is a pad, to which is faſtened a circingle B. C C two ſide ſtraps, one on each ſide the horſe, faſtened to the circingle, to keep the machine from going to either ſide; D, a breaſt-plate, to prevent the pad, &c. ſlipping back. E, a ſtrap fixed to the pad, and buckling to the machine, to keep the tail on the ſtretch at pleaſure. F, the ſtring tied on the hair, to confine the tail down to the machine.

Fig. 10. from A to B is twelve inches; from C to D, meaſured with a ſtring drawn over E F, is nineteen inches. From the top of the groove at E to the bottom G, is three inches. From E to F, the wideſt part of the groove, is three inches, gradually narrowing, as a tail leſſens to its extremity. The dots about H are holes in the groove, through which a piece of tape or pack-thread muſt be put, according to the length of the dock, and the diſtance of the knot, to tie the tail down behind the knot. I I, the buckles to receive a ſtrap from the circingle on each ſide, as deſcribed in Fig. 9. which keeps the machine from turning to either ſide. K, the ſtrap with a billet and buckle, which comes along the back from the pad, and is faſtened to the machine, through a nick cut juſt above H. L L, the ſtrings to tie down the tail. B, G, F, the hollow to let in the rump.

Fig. 2. repreſents the horſe with the machine on, ſtanding directly before you, where the depth of it is ſhewn, being three inches.

C D, the extremities of the wings. E F, the upper part. *Bartlet's Farriery, page* 325.

NIGHT-FALL, the beginning of night.

NOPE, a bull finch, or red-tail, a ſmall ſinging bird, well known.

NURSERY, or Nursery Garden, a piece of land ſet apart for the raiſing and propagating of all ſorts of trees and plants, to ſupply the garden and other plantations.

Of this ſort there are great numbers in the different parts of this kingdom, but particularly in the neighbourhood of London, which are occupied by the gardeners, whoſe buſineſs it is to raiſe trees, plants, and flowers for ſale; and in many of theſe there is at preſent a much greater variety of trees and plants cultivated than can be found in any other part of Europe. In France, their nurſeries (which are but few, when compared with thoſe in England) are chiefly confined to the propagation of fruit-trees, from whence they have the appellation of pepinier: for there is ſcarce any of thoſe gardens, where a perſon can be ſupplied either with ever-greens, flowering ſhrubs, or foreſt-trees. And in Holland, their nurſeries are principally for flowers; ſome few of them indeed propagate tender exotic plants. But thoſe nurſeries in the neighbourhood of London do, ſeveral of them, include all theſe; and from hence moſt of the curious perſons abroad are ſupplied with furniture for their gardens. But we do not propoſe, in this place, to treat of theſe extenſive nurſeries, or to give a deſcription of them; therefore ſhall confine ourſelves to treat of ſuch nurſeries only as are abſolutely neceſſary for all lovers of planting to have upon the ſpot, where they deſign to make their plantation: for if theſe are large, the expence of carrying a great number of trees, if the diſtance is greet, will be no ſmall article, beſides the hazard of their growing; which, when plants have been trained up in good land, and removed to an indifferent one, is very great. Therefore it is of the utmoſt conſequence to every planter, to begin by making of a nurſery. But in this article we muſt beg leave to obſerve, that a nurſery ſhould not be fixed to any one particular ſpot: we mean by this, that it would be wrong to continue the raiſing of trees any number of years upon the ſame ſpot of ground: becauſe hereby the ground will be ſo much exhauſted by the trees, as to render it unfit for the ſame purpoſe. Therefore all good nurſery-gardeners ſhift and change their land, from time to time; for when they have drawn off the trees from a ſpot of ground, they either plant kitchen herbs, or other things, upon the ground for a year or two, by which time, as alſo by dunging and trenching of the land, it is recovered, and made fit to receive other trees. But this they are obliged to from neceſſity, being confined to the ſame land; which is not the caſe with thoſe gentlemen, who have a large extent of ground in the country. Therefore all ſuch perſons we would adviſe to make nurſeries upon the ground which is intended for planting, where a ſufficient number of the trees may be left ſtanding, after the others have been drawn out, to plant in other places; which, for all large growing trees, but particularly ſuch as are cultivated for timber, will be found by much the moſt advantageous method: for all thoſe trees which come up from the ſeed, or which are tranſplanted very young into the places where they are deſigned to remain, will make a much greater progreſs, and become larger trees than any of thoſe which are tranſplanted at a greater age. Therefore the nurſeries ſhould be thinned early, by removing all thoſe trees which are intended for other plantations, while they are young; becauſe hereby the expence and trouble of ſtaking, watering, &c. will be ſaved, and the tree will ſucceed much better. But in expoſed ſituations, where there are nurſeries made, it will be neceſſary to permit the trees to ſtand much longer, that, by growing cloſe together, they may ſhelter each other, and draw themſelves up: and theſe ſhould be thinned gradually, as the trees advance; for by taking away too many at firſt, the cold will check the growth of the remaining trees. But then thoſe trees which are taken out from theſe nurſeries, after a certain age, ſhould not be depended on for planting; and it will be prudence rather to conſign them for fuel, than by attempting to remove them large, whereby, in endeavouring to get them up with good roots, the roots of the ſtanding trees will be often much injured.

What has been here propoſed, muſt be underſtood for all large plantations in parks, woods, &c. but thoſe nurſeries which are only intended for the raiſing of ever-greens, flowering ſhrubs, or plants which are deſigned to embelliſh gardens, may be confined to one ſpot, becauſe a ſmall compaſs of ground will be ſufficient for this purpoſe. Two or three acres of land, employed this way, will be ſufficient for the moſt extenſive deſigns; and one acre will be full enough for thoſe of moderate extent. And ſuch a ſpot of ground may be always employed for ſowing the ſeeds of foreign trees and plants; as alſo, for raiſing many ſorts of biennial and perennial flowers, to tranſplant into the borders of the pleaſure garden; and for raiſing many kinds of bulbous-rooted flowers from ſeeds, whereby a variety of new ſorts may be obtained annually, which will recompenſe for the trouble and expence, and will moreover be an agreeable diverſion to all thoſe perſons who delight in the amuſements of gardening.

Such a nurſery as this ſhould be conveniently ſituated for water; for where that is wanting, there muſt be an expence attending the carriage of water in dry weather. It ſhould alſo be as near the houſe as it can with conveniency be admitted, in order to render it eaſy to viſit at all times of the year; becauſe it is abſolutely neceſſary, that it ſhould be under the inſpection of the maſter; for unleſs he delights in it, there will be little hopes of ſucceſs. The ſoil of this nurſery ſhould alſo be good, and not too heavy and ſtiff; for ſuch land will be very improper for ſowing moſt ſorts of ſeeds; becauſe, as this will detain the moiſture in the ſpring and winter, ſo the ſeeds of moſt tender things, eſpecially of flowers, will rot in the ground, if ſown early. Therefore, where perſons are confined to ſuch land, there ſhould be a good quantity of ſand, aſhes, and other light manures buried, in order to ſeparate the parts, and pulveriſe the ground; and if it is thrown up in ridges, to receive the froſt in winter, it will be of great uſe to it; as will alſo the frequent forking or ſtirring of the ground, both before and after it is planted.

The many advantages which attend the having ſuch a nurſery, are ſo obvious to every perſon who has turned his thoughts in the leaſt to this ſubject, that it is needleſs for us to mention them here; and therefore we ſhall only beg leave to repeat here what we have frequently recommended, which is, the carefully keeping the ground always clear from weeds; for if theſe are permitted to grow, they will rob the young trees of their nouriſhment. Another principal buſineſs is, to dig the ground between the young plants at leaſt once a year, to looſen it for the roots to ſtrike out; but if the ground is ſtiff, it will be the better to be repeated twice a year, viz. in October and March; which will greatly promote the growth of the plants, and prepare the roots for tranſplanting.

The ground you intend for the flower nurſery ſhould be well ſituated to the ſun, but defended from ſtrong winds by plantation of trees, or buildings; and the ſoil ſhould be light and dry, which muſt always be obſerved, eſpecially for bulbous-rooted flowers, which are deſigned to be planted therein.

In this nurſery ſhould be planted the off-ſets of all your bulbous-rooted flowers, where they are to remain, until they become blowing roots; when they ſhould be removed into the pleaſure garden, and planted either in beds or borders, according to the goodneſs of the flowers, or the management they require.

You may alſo, in this ground, raiſe the ſeveral ſorts of bulbous-rooted flowers from ſeeds, by which means new varieties may be obtained; but moſt people are diſcouraged from ſetting about this work, from the length of time before the ſeedlings will come to flower: however, after a perſon hath once begun, and conſtantly continued ſowing every year, after the parcel firſt ſown has flowered, the regular ſucceſſion of them, coming annually to flower, will not render this method ſo tedious as it at firſt appeared.

The ſeedling auriculas, polianthus's, anemonies, carnations, &c. ſhould be raiſed in this nurſery, where they ſhould be preſerved until they have flowered; when you ſhould mark all ſuch as are worthy of being tranſplanted into the flower garden; which ſhould be done in their proper ſeaſons: for it is not ſo well to have all theſe ſeedling flowers expoſed to public view in the flower garden; becauſe it always happens, that there are great numbers of ordinary flowers produced among them, which will make but an indifferent appearance in the pleaſure garden. *Miller's Gard. Dict.*

NUSHED, ſtarved in bringing up.

O.

OAK, a tree well known, and one of the principal materials in building ſhips, &c. being ſtrong in all poſitions.

All the ſorts of oaks are propagated from acorns, which ſhould be ſown as ſoon as poſſible after they are ripe; for if they are kept too long out of the ground, they ſeldom grow.

The manner of ſowing theſe acorns, if deſigned for a ſmall plantation, or to be removed, is, to prepare ſome beds of freſh earth, neither too ſtrong and heavy, nor too light and dry; in theſe beds you ſhould place the acorns in rows one foot aſunder, and about two inches diſtance in the rows, covering them about two inches thick with the ſame freſh earth; obſerving to leave none of them uncovered, to entice the vermin, which may, in a ſhort time, deſtroy all the ſeeds.

In the ſpring, when the plants begin to appear, you muſt carefully clear them from weeds; and if the ſeaſon proves dry, you ſhould refreſh them now and then with a little water, which will greatly promote their growth. In theſe beds the plants ſhould remain until the following autumn, obſerving conſtantly to keep them clear from weeds; at which time you ſhould prepare a ſpot of good freſh earth, in ſize proportionable to the quantity of plants, which ſhould be trenched and levelled: then towards the middle or latter end of October, you ſhould carefully take up the plants, ſo as not to injure their roots, and plant them out in rows three feet aſunder, and eighteen inches diſtance plant from plant; obſerving never to ſuffer the plants to abide long out of the ground, becauſe their roots would dry, and endanger the growth of the plants.

When they are planted, you ſhould lay a little mulch upon the ſurface of the ground, near their roots, to prevent the earth from drying too faſt; and if the ſeaſon ſhould prove very dry, you ſhould give them a little water to ſettle the earth to their roots.

When the plants have taken root in this nurſery, they will require little more care than to keep them clear from weeds, and dig the ground between the rows every ſpring; in doing of which, you ſhould cut off ſuch roots as extend very far from the trunk of the trees, which will render them better for tranſplanting again: you ſhould alſo prune off ſuch ſide-branches as extend themſelves very far, and would retard the upright ſhoot; but you ſhould by no means cut off all the ſmall lateral branches, ſome of which are abſolutely neceſſary to be left on, to detain the ſap for the augmentation of the trunk; for I have often obſerved, where trees have been thus cloſely pruned, that their heads have over-grown their bodies, ſo that they have bent downward and become crooked.

When theſe trees have remained in the nurſery three or four years, they will then be large enough to tranſplant to the places where they are to remain; for it is not proper to let them grow very large before they are planted out; becauſe theſe are very hazardous trees to remove when old, or after they have taken deep root.

The ſeaſon for this work is, as I ſaid before, in the autumn; at which time, if they are carefully taken up, there will be little danger of their ſucceeding. When they are planted, the ſurface of the ground ſhould be mulched about their roots, to prevent its drying too faſt; and if the ſeaſon is very dry, they ſhould be watered, to ſettle the earth to their roots, which may be repeated two or three times in very dry weather; but you muſt carefully avoid giving them too much water, which is very injurious to theſe trees, when newly removed.

You ſhould alſo ſtake them to prevent their being ſhaken and diſturbed by the winds, which would retard their rooting. In tranſplanting of theſe trees, you ſhould by no means cut their heads, which is too much practiſed: all that ſhould be done, muſt be only to cut off any bruiſed or ill-placed branches, which ſhould be taken off cloſe to the place where they are produced: but there can be no greater injury done to theſe trees than to ſhorten their roots; for when the leading bud, which is abſolutely neceſſary to draw and attract the nouriſhment, is taken off, the branch often decays entirely, or, at leaſt, down to the next vigorous bud.

The trees, thus raiſed and managed, will, if planted in a proper ſoil, grow to a conſiderable magnitude, and are very proper for a wilderneſs in large gardens, or to plant in clumps in parks, &c. but if they are deſigned for timber, it is much the better method to ſow the acorns in the places where they are to remain; in order to which, you ſhould provide yourſelf in autumn with a ſufficient quantity of acorns, which ſhould be always taken from ſtraight, upright, vigorous-growing trees; theſe ſhould be gathered from under the trees as ſoon as may be after they are fallen, and, if poſſible, in a dry time, laying them thin in ſome open room to dry; after which they may be put in dry ſand, and preſerved in a dry place until the end of November, when you ſhould prepare the ground for planting them.

The directions here given are deſigned only for ſmall plantations in a garden or park, which are only for pleaſure: but where theſe trees are cultivated with a view to profit, the acorns ſhould be ſown where the trees are deſigned to grow; for thoſe which are tranſplanted will never grow to the ſize of thoſe which ſtand where they are ſown, nor will they laſt near ſo long ſound: for in ſome places, where theſe trees have been tranſplanted with the greateſt care, and they have grown very faſt for ſeveral years after, yet they are now decaying, when thoſe which remain in the place where they came up from the acorns, are ſtill very thriving, and have not the leaſt ſign of decay: therefore, whoever deſigns to cultivate theſe trees for timber, ſhould never think of tranſplanting them, but ſow the acorns on the ſame ground where they are to grow; for the timber of all thoſe trees which are tranſplanted, is not near ſo valuable as that of the trees from acorns. I ſhall therefore add ſome plain directions for the ſowing of acorns, and managing of the young trees, during their minority, until they are out of danger, and require no farther care.

The firſt thing to be done is that of fencing the ground very well, to keep out cattle, hares, and rabbits; for if either of theſe can get into the ground, they will ſoon deſtroy all the young trees. Indeed, they will in a few years grow to be out of danger from the hares and rabbits; but it will be many years before they will be paſt injury from cattle, if they are permitted to get into the plantation; therefore, durable fences ſhould be put round the ground. If, in the beginning, a pale fence is made about the land, which may be cloſe at the bottom, and open above; and within the pale a quick-hedge planted; this will become a good fence, by the time the pale decays, againſt all ſorts of cattle; and then the trees will have got above the reach of hares and rabbits, ſo that they cannot injure them; for the bark of the trees will be too hard for them to gnaw.

After the ground is well fenced, it ſhould be prepared, by ploughing of it three or four times, and, after each ploughing, to harrow it well, to break the clods, and cleanſe the ground from couch, and the roots of all bad weeds. Indeed, if the ground is green ſward, it will be better to have one crop of beans, peaſe, or turnips, off the ground, before the acorns are ſown, provided theſe crops are well hoed to ſtir the ſurface, and deſtroy the weeds: for if this is obſerved, the crop will mend and improve the land for ſowing; but in this caſe the ground ſhould be ploughed as ſoon as poſſible, when the crop is taken off, to prepare it for acorns; which ſhould be ſown as ſoon as may be after the acorns are ripe: for although theſe may be preſerved in ſand for ſome time, yet they will be apt to ſprout; and, if ſo, the ſhoots are in danger of being broken and ſpoiled; therefore we would adviſe the ſowing early, which is certainly the beſt method.

In making choice of the acorns, all thoſe ſhould be preferred which are taken from the largeſt and moſt thriving trees: and thoſe of pollard-trees ſhould always be rejected, though the latter are generally the moſt productive of acorns; but thoſe of the large trees commonly produce the ſtrongeſt and moſt thriving plants.

The ſeaſon for the ſowing of the acorns being come, and the ground having been ploughed, and levelled ſmooth, the next work is to ſow the acorns; which muſt be done by drawing of drills acroſs the ground, at about four feet aſunder, and two inches deep; into which the acorns ſhould be ſcattered, at two inches diſtance. Theſe drills may be drawn either with a drill-plough, or by hand, with an hoe; but the former is the moſt expeditious method, therefore in large plantations ſhould be preferred. In the drawing of the drills, if the land has any ſlope to one ſide, theſe ſhould be made the ſame way as the ground ſlopes, that there may be no ſtoppage of the wet by the rows of plants croſſing the hanging of the land. This ſhould be particularly obſerved in all wet ground, or where the wet is ſubject to lie in the winter. When the acorns are ſown, the drills ſhould be carefully filled in, ſo as to cover the acorns ſecurely; for, if any of them are expoſed, they will entice the birds and mice; and if either of theſe once attack them, they will make great havock with them.

The reaſon of my directing the drills to be made at this diſtance, is for the more convenient ſtirring of the ground between the rows, to keep the young plants clean from weeds; for if this is not carefully done, it cannot be expected, that the young plants ſhould make much progreſs; and yet this is generally neglected by many who pretend to be great planters, who are often at a large expence to plant, but ſeldom regard them after: ſo that the young plants have the difficulty to encounter the weeds, which frequently are four or five times the height of the plants, and not only ſhade and draw them, but alſo exhauſt all the goodneſs of the ground, and conſequently ſtarve the plants: therefore, whoever hopes to have ſucceſs in their plantations, ſhould determine to be at the expence of keeping them clean for eight or ten years after ſowing, by which time the plants will have obtained ſtrength enough to keep down the weeds: the neglecting of this has occaſioned ſo many young plantations to miſcarry, as are frequently met with in divers parts of England.

About the end of March, or beginning of April, the young plants will appear above ground; but before this, if the ground ſhould produce many young weeds, it will be good huſbandry to ſcuffle the ſurface over with Dutch hoes, in a dry time, either the latter end of March, or the beginning of April, to deſtroy the weeds, whereby the ground will be kept clean, until all the plants are come up ſo as to be plainly diſcerned; by which time it may be proper to hoe the ground over again; for by doing it early, while the weeds are ſmall, a man will perform more of this work in one day than he can in three or four, when the weeds are grown large: beſides, there will be great hazard of cutting off or injuring the young plants, when they are hid by the weeds; and ſmall weeds, being cut, are ſoon dried up by the ſun; but large weeds often take freſh root, and grow again, eſpecially if rain ſhould fall ſoon after, and then the weeds will grow the faſter for being ſtirred; therefore, it is not only the beſt method, but alſo the cheapeſt huſbandry, to begin cleaning early in the ſpring, and to repeat it as often as the weeds are produced.

The firſt ſummer, while the plants are young, it will be the beſt way to perform theſe hoeings by hand; but afterwards it may be done with the hoe-plough; for as the rows are four feet aſunder, there will be room enough for this plough to work; and as this will ſtir and looſen the ground, it will be of great ſervice to the plants; but there will require a little hand labour where the plough is uſed, in order to deſtroy the weeds, which will come up in the rows between the plants; for theſe will be out of the reach of the plough, and, if they are not deſtroyed, they will ſoon over-grow and tear down the young plants.

After the plants have grown two years, it will be proper to draw out ſome of them, where they grow too cloſe; but in the doing of this, great care ſhould be had not to injure the roots of thoſe left; for as the plants which are drawn out are only fit for plantations deſigned for pleaſure, ſo theſe ſhould not be ſo much regarded in their being removed, as to ſacrifice any of thoſe which are deſigned to remain. In the thinning of theſe plantations, the plants may, at the firſt time, be left about one foot aſunder, which will give them room enough to grow two or three years longer; by which time it may be eaſy to judge which are likely to make the beſt trees. Therefore theſe may be then fixed on, as ſtandards, to remain; though it will be proper to have a greater number at this time marked than can be permitted to grow, becauſe ſome of them may not anſwer the expectation: and, as it will be improper to thin theſe trees too much at one time, ſo the leaving double the number intended at the ſecond thinning will not be amiſs. Therefore, if they are then left at about four feet diſtance in the rows, they will have room enough to grow three or four years longer; by which time, if the plants have made good progreſs, their roots will have ſpread over the ground; therefore it will be proper to take up every other tree in the rows. But, by this, I do not mean to be exact in the removing, but to make choice of the beſt plants to ſtand, which ever rows they may be in, or if they ſhould not be exactly at the diſtance here aſſigned: all that is deſigned here, is, to lay down general rules, which ſhould be as nearly complied with as the plants will permit: therefore every perſon ſhould be guided by the growth of the trees in the performance of this work.

When the plants have been reduced to the diſtance of about eight feet, they will not require any more thinning. But in two or three years time, thoſe which are not to remain will be fit to cut down, to make ſtools for underwood; and thoſe which are to remain, will have made ſuch progreſs as to become a ſhelter to each other; for this is what ſhould be principally attended to, whenever the trees are thinned; therefore, in all ſuch places which are much expoſed to the wind, the trees ſhould be thinned with great caution, and by ſlow degrees; for if the air is let too much at once into the plantation, it will give a ſudden check to the trees, and greatly retard their growth, but, in ſheltered ſituations, there need not be ſo great caution uſed as in thoſe places; the plants will not be in ſo much danger of ſuffering.

The diſtance which I ſhould chuſe to allow to thoſe trees which are deſigned to remain for timber, is, from twenty-five to above thirty feet, which will not be too near, where the trees thrive well; in which caſe their heads will ſpread, ſo as to meet in about thirty, or thirty-five years: nor will this diſtance be too great, ſo as to impede the upright growth of the trees. This diſtance is intended that the trees ſhould enjoy the whole benefit of the ſoil. Therefore, after one crop of the underwood, or, at the moſt, two crops are cut, I would adviſe the ſtubbing up the ſtools, that the ground may be intirely clear, for the advantage of the growing timber, which is what ſhould be principally regarded: but, in general, moſt people have more regard for the immediate profit of the underwood than the future good of the timber, and, frequently, by ſo doing, ſpoil both: for, if the underwood is left after the trees have ſpread ſo far as that their heads meet, the underwood will not be of much worth; and yet by their ſtools being left, they will draw away a great ſhare of nouriſhment from the timber-trees, and retard them in their progreſs.

The ſoil in which oak makes the greateſt progreſs, is a deep rich loam, in which the trees grow to the largeſt ſize; and the timber of thoſe trees which grow upon this land, is generally more pliable than that which grows on a ſhallower or drier ground; but the wood of the latter is much more compact and hard. Indeed there are few ſoils in England in which the oak will not grow, provided there is proper care taken in their cultivation; though this tree will not thrive equally in all ſoils: but yet it might be cultivated to a national advantage upon many large waſtes in many parts of England, as alſo to the great profit of the eſtates where theſe tracts of lands now lie uncultivated, and produce nothing to the owner. And, ſhould the preſent temper of deſtroying the timber of England continue in practice ſome years longer, in the ſame degree which it has for ſome years paſt, and as little care be taken to raiſe a ſupply, this country, which has been ſo long eſteemed for its naval ſtrength, may be obliged to ſeek for timber abroad, or be content with ſuch a naval ſtrength as the poor remains of ſome frugal eſtates may have left growing: for, as to the large foreſts, from whence the navy has been ſo long ſupplied, a few years will put an end to the timber there: and how can it be otherwiſe, when the perſons to whoſe care theſe are committed, reap an advantage from the deſtruction of the timber? *Miller's Gard. Dict.*

OAK-BARK. *See the article* BARK *and* TAN.

OATS, the name of a well known ſpecies of grain, and of which Mr. Miller reckons four ſorts, cultivated in England, viz. the white, the black, the brown or red, and the naked oat, in which, though ſuppoſed to be only accidental varieties, he has never obſerved any alteration where they have been cultivated ſeparately for many years. Their principal difference is in the colour of their grain.

The white ſort, which is moſt common about London, makes the whiteſt meal, and is chiefly cultivated where the inhabitants live much upon oat-cakes. The black oat is more cultivated in the northern parts of England, and is eſteemed a very hearty food for horſes. Red oats are much cultivated in Derbyſhire, Staffordſhire, and Cheſhire, but are ſeldom ſeen in any of the counties near London; though, as they are a very hardy ſort, and yield a good increaſe, they will be well worth propagating, eſpecially in all ſtrong lands. The ſtraw of theſe oats is of a browniſh red colour, as is alſo the grain, which is very full and heavy, and eſteemed better food for horſes than either of the other ſorts. The naked oat is leaſt common in the ſouthern parts of England; but in the northern counties, in Scotland, and in Wales, it is pretty much cultivated, and is particularly eſteemed, becauſe its grain threſhes clean out of the huſk, and need not be carried to the mill, to be made into oat-meal or griſt.

As oats are very hardy, and will thrive in almoſt any ſoil, they have been a great improvement to many eſtates in the northern parts of this kingdom, where, though ſown even ſo late as April, and in ſtiff ground, they have ripened early, and yielded a good crop. However, February, or March, according as the ſeaſon proves early or late, is a more common and better time for ſowing this corn, of which it will always be right to ſow the largeſt grain ſort earlieſt.

Oats are often ſown after a crop of wheat, rye, or barley; in which practice the common method is to turn in the ſtubble, with one ploughing, about the beginning of February, and ſow the ſeed with a broad-caſt at twice, harrowing it in, once after the firſt ſowing, and five or ſix times after the ſecond, obſerving to draw the harrow once or twice acroſs the furrows, to break the clods and cover the ſeeds; but at the other times to harrow in the ſame direction as the furrows, leſt the ſtubble ſhould be raiſed on the ſurface. But it would be much better huſbandry to plough in the ſtubble in autumn, that it may rot in winter, and to give the land another ploughing, and a good harrowing, juſt before the oats are ſown. This will render the ground finer, and fitter to receive the grain, the increaſed produce of which will amply repay the extraordinary expence of tillage. M. Duhamel, after obſerving that every farmer knows, though but few practice it, that all crops of ſpring-corn are greatly bettered by this method, inſtances the example of M. d'Elu, one of his correſpondents, who having given three ploughings to ſome of his oat-lands, had, in 1759, a year remarkably dry, and unfavourable to ſpring-corn, a plentiful crop of oats, which held up well till they were perfectly ripe, and yielded excellent grain.

Another thing, which I muſt alſo inſiſt on, is, that if farmers were to follow the directions before given, in regard to the changing of crops, by which means oats, which impoveriſh the ground, would always ſucceed ſome one of the meliorating crops, the return would be much more plentiful than in the common way, becauſe the earth would be in a much looſer ſtate.

When oats, as it frequently happens, are ſown upon a lay, or on ground newly broken up, after only one ploughing, which is given in January, when the earth is moiſt, to turn down the ſward; the harrowing muſt be in the ſame direction as the furrows, or but very little acroſs, for fear of raiſing the turf. But this again is bad huſbandry: for the ground would be brought to a much better tilth for other grain, as a preparation for which this ſowing is chiefly intended, by giving the ſward time to rot before the oats are ſown; becauſe the roots of the graſs will prevent thoſe of the corn from ſtriking downward.

Black oats delight in a moiſter ſoil than the white ſort, and, being a hardier plant, may be ſown a month earlier. The white, which prefer a dry land, and will do well on gravel and ſand, are the beſt of all corn for ground ſubject to quick-graſs or weeds, becauſe it may be ploughed later for them, and they riſe ſooner, and top the weeds better than black oats. The weather cannot be too dry when white oats are ſown; though the ground may then be moiſter for them than barley will endure; becauſe this laſt, having a thinner coat, is ſooner chilled by imbibing the wet, which may perhaps burſt many of its veſſels; whereas white oats, being protected by a double huſk, better reſiſt the entering of the moiſture. Mr. Liſle, who makes theſe remarks, adds, that, according to the beſt of his obſervations, white-oats require a rich feeding ſoil; becauſe their haulm, or ſtraw, running to a great largeneſs, cannot be ſupported without good juices and moiſture; that white chalky ground, though in never ſo good heart, will be unfruitful with white oats; and that a mixed mould, between white earth and red clay, of which there is a great deal in the hilly parts of Hampſhire, is not feeding enough for them. The red and the white clays, when in good heart, carry moiſture enough, and are very fit for this grain.

The common allowance of ſeed oats is four buſhels to an acre; but Mr. Miller rightly thinks three buſhels more than enough: and the uſual produce is about twenty-five buſhels from an acre; though he obſerves, that he has ſometimes known more than thirty buſhels reaped from that extent of ground; and we can ſay with truth, from an accurate account now in our poſſeſſion, that a gentleman, who is indeed an excellent huſbandman, has had, for a continuance, forty-eight buſhels of oats from off each acre of his land ſown with that grain. I do not mean forty-eight buſhels of naked oats; for the produce of that ſort is the leaſt of any in bulk, becauſe its grains are ſmall, and lie very cloſe together: but they make up in value, for what is wanting in meaſure. White oats always produce a greater increaſe than black oats. Mr. Liſle threſhed a ſtack of twenty-eight loads of the former, and found it yield more grain than a ſtack of thirty-eight loads of the latter; and farmers in general account an ordinary crop of white oats as good as a middling crop of black oats. This laſt ſort is alſo moſt liable to blight, eſpecially if a hot ſummer follow a dry cold ſpring, and the grain has been ſown on lay ground. Their culture is alike; and the manner of mowing and ordering them at harveſt exactly the ſame. Only it is to be obſerved, that white oats are apt to ſhed moſt as they lie, and black oats as they ſtand.

In the year 1709, M. Liſle ſowed, in the beginning of May, in ſome of his wheaten ground, where the corn had been killed by the preceding hard winter, rath-ripe barley in one part, and ſhort grained white oats, which he diſtinguiſhes by the name of white Poland oats in another. Both grains were ſown on the ſame day, in an equally fertile, moiſt and well tilled ground. He made no doubt but that the Poland oat would be firſt ripe, and was therefore ſurpriſed to ſee the rath-ripe barley ſpring up ſooneſt, by four or five days: but reflecting on the nature of each grain, he ſoon concluded the reaſon to be, that the oat, having a double hull, and being conſequently better guarded from moiſture, could not imbibe the vegetable water ſo ſoon as the barley; but that, the texture of the flour of the oat, and the infolded fibres of the incloſed plant being ſofter, it would conſequently grow faſter. From hence he infers, that, to ſecure the growing of Poland oats without rain, they muſt be committed to the earth before it becomes ſo dry as is proper for the ſowing of barley, not only becauſe the oats require more moiſture to make them grow, but alſo becauſe they lie ſo many days longer in the ground, before they come up, than the barley does.

When oats are about four inches high, intelligent huſbandmen run a wooden roller over them, after a ſhower of rain has ſoftened the clods, by the breaking of which in this manner, freſh earth is laid to the roots of the plants, their tillering is conſiderably increaſed, if they have not been ſown too thick, and the ſurface of the field is ſmoothed; ſo that the mowers, at harveſt, are able to cut cloſe to the ground, as it is very fit they ſhould, becauſe oats ſeldom grow high. Both oats and barley ſhould be carefully weeded.

Oats are ripe when the ſtraw turns yellow, the grain becomes hard, and the chaff begins to open and ſhew the ſeed. When mowed, they are generally let lie ſome time for the due and rain to plump them, and make them threſh well, and, if weedy, to kill the weeds: but if rain wet them much, they ſhould be carried off as ſoon as they can be got tolerably dry again, or they will ſhed; for oats may be inned the wetteſt of any corn, if the weeds among them be but dead. Even in very rainy harveſts, when other grain is ſpoiled, this will receive little or no damage, the ſurface of its ſtraw and ears being ſo ſmooth and compact as to turn off water, and of ſo dry a nature, that, though houſed wet, they will not heat in the mow, or become mouldy, as other grains uſually do. This is a vaſt advantage in northern climates, where the harveſt is generally late, and the autumn wet.

M. Duhamel is ſtrongly of opinion, that farmers, eſpecially thoſe who keep many cattle, would find their account in houſing their oats directly, without letting them lie out after they are cut, as is the common way, that rain and dews may moiſten, and conſequently ſwell their grain. He earneſtly adviſes huſbandmen to try the experiment upon a part of their crop; "becauſe," ſays he, "the fodder will, by this means, certainly be much better for cattle, and much leſs grain will be loſt in the field. It may be objected, that theſe oats will be difficult to threſh; to which I anſwer, that if this be the only inconvenience, the ſuperior quality of the fodder, and the ſaving of a quantity of grain, which would otherwiſe be ſhed, will probably more than pay the extraordinary wages of the threſher.

"But allowing that the oats thus houſed cannot be threſhed quite clean, and that ſome grain will neceſſarily remain in the ears, I ſay, that this will not be loſt to the farmer; for he is obliged to give his cattle unthreſhed oats, and they will eaſily find the grains remaining in the ſtraw, which will not perhaps exceed the quantity that would have been dropped in the field: and even granting, though it will not happen, that the greateſt part of the grain be left in the ear, ſtill it will not be loſt in the hands of an intelligent farmer; for what ſhould hinder him from giving it to his horſes? ſuppoſing that four ſheaves yield a buſhel of oats, he need only give his horſes thoſe ſheaves inſtead of a buſhel of corn. They will certainly be longer in feeding upon four ſheaves, than upon a buſhel of cleared oats; and at the ſame time they will eat ſome ſtraw with the corn, which will ſupply the place of other fodder, and probably prove a more healthy food." This method may be particularly beneficial to ſuch as live in very hot countries, or in very dry ſeaſons.

Mr. Liſle, refuting the opinion of thoſe who think that oats cut green will ripen while they lie in ſwarth, ſays, "If, by ripening be meant ſhrinking, drying, or withering, I muſt allow the poſition; but if the countryman will have it, that the greeniſh oat, cut a fortnight or ten days, or be it but a week, before it is ripe, will proceed in its vegetable increaſe, and ſwell as well as harden by lying in ſwarth, I muſt deny it. This year (1707) I made a full experiment of this matter; for when the ſpring corn was ſown, the ground being generally dry, half the oats and barley came not up till the latter end of May, when rain came, whereby in moſt places half the crop was edge-grown. The forward oats being then in danger of ſhedding, we were forced to cut down the greeniſh corn with the ripe, when otherwiſe we ſhould have waited ten days longer. I let them lie in ſwarth above a week, and, when I carted them, I found the hull of the greeniſh oat had got a riper colour, and the pith was well hardened, but pitifully lean and ſhrunk; ſo that though this is to be done on neceſſity, yet it ought not to be practiſed with ſuch indifference as is uſual among farmers. Note, the pith of theſe green oats was well paſt the milk, and came to a floury ſubſtance."

The ſame gentleman adds, that oats are the worſt of all grain to keep, becauſe of the great moiſture in them, and their conſequent aptneſs to heat when laid in a heap; and that when the heat has been ſuch as to ſpoil them for growing, their hulls look as red as a fox.

The meal of oats makes tolerably good bread, and is the common food of the country people in the north. In ſome places beer is made with this grain: in Ruſſia in particular the poorer ſort make with it a drink, which they call *quas*; but its principal uſe is for the food of horſes, for which purpoſe it is reckoned very wholſome, being ſweet, and of an opening nature: but it muſt not be given them before it has ſweated in the mow, or been otherwiſe dried, leſt it ſhould prove too laxative.

The very long drought of the ſummer 1762, ſhewed another very profitable uſe of oats on ſuch occaſions; and probably it will anſwer equally well in the winter. Some milk-men near London boiled oat-meal in the water which they gave their cows to drink, and found that the expence was abundantly repaid, by the additional quantity of milk which theſe cows yielded more than thoſe which had not this maſh.

The following Letter from Mr. Lamb, *on the beſt Method of cultivating Black Oats, and recommending more frequent Ploughings than are uſually afforded them, will, we are perſuaded, be acceptable to our Readers.*

Gentlemen,

"Having been for many years a practical farmer in the eaſtern part of the county of Eſſex, you will not, I hope, think me impertinent in troubling you on the culture of black oats, which I have very often to great advantage ſown.

“ Moſt of my neighbours prefer the white Poland oat, which may, I own, in ſome circumſtances of ſoil and ſituation, be beſt. I prefer the black oats becauſe they are hardieſt, for which reaſon they ſuit beſt with my convenience; for, as a conſiderable tract of the farm I occupy is light land, I am under a ſort of neceſſity of ſowing this ſoil early, or, if a dry ſummer followed, I ſhould have no return at harveſt.

“ Few people allow more than one ploughing for a crop of oats; but ſuch as follow this practice are very wrong-headed; for they may aſſure themſelves, that no crop pays better for ploughing than oats; and it is on this account that I generally give my land deſigned for oats three tilths; whence I am morally certain ariſes the largeneſs of my crops, for I have ſeldom under five, oftener ſix, and very frequently ſeven quarters from an acre, throughout a field

“ Your readers will not be ſurpriſed at my having ſuch good crops, when I obſerve, that I almoſt every year ſow ſome oats on a fallow that has been well dunged; and this I aver to be good huſbandry, as it abates the rankneſs of the ſoil, kills many of the weeds, and prepares the land in an excellent manner for a ſucceeding crop of ſweet wheat; but I muſt obſerve, that I always clear my land of the ſtiff oat-ſtubble before I attempt to plough for the wheat.

“ I have already ſaid that I ſow black oats early on my light land: by early, I mean as early as the firſt week in February, by which time I have generally an opportunity of getting the land in proper order, for a light ſoil is ſoon wet, ſoon dry.

“ Let me mention once more to your readers, that it is on a light ſoil, which is apt to burn a crop, that I ſow my black oats ſo early as the beginning of February; for ſhould any of them attempt to ſow them ſo early in a moiſt, cold, ſtiff ſoil, and a hard froſt ſhould follow, the young blade would, in all probability, be killed.

“ I muſt alſo remark, that when I ſow oats thus early, it is generally under furrow; yet I ſometimes ſow them broad-caſt, and plough them in.

“ The quantity of ſeed I, for the moſt part, uſe, is about three buſhels, which I find to be enough; nay, I have ſometimes from only two buſhels had a good crop; but then I have been particularly careful and attentive to the goodneſs of the ſeed, without which precaution I ſhould not, unleſs the ſeaſon had been very favourable indeed, have ſucceeded.

“ I have found it a very good way to ſow firſt half my quantity of ſeed under furrow, and afterwards, ſowing the remainder broad-caſt, harrow it in; and this is often my practice when I ſow the latter end of February, or the beginning of March.

“ When I ſow oats after wheat, which however is not very frequently, I turn up the ſtubble as ſoon as I conveniently can after harveſt, and leave it rough through the winter. The firſt fine weather after Chriſtmas, I lay it down ſmooth with the harrows, and immediately give it a croſs ploughing.

“ As ſoon as February comes in, if it is not a hard froſt, I make the land as fine as I poſſibly can by the harrows, raiſing a fine looſe mould to the ſurface, which is to be the bed for the oats to lie in; for I ſow my oats directly under furrow; after which I paſs a moderate-ſized roller over the field, and then give it a ſlight ſcratch with a pair of light harrows.

“ This huſbandry generally produces me a crop I have no reaſon to complain of.

“ My chief reaſon for troubling you with this letter is, to endeavour to perſuade my brother farmers that they do not, in general, allow their oats a ſufficient number of ploughings, one being the ſtated quantity.

“ If they would plough twice for this crop, they would receive more than twenty ſhillings an acre for their trouble; but if they would conſult their own intereſts, and allow three ploughings, it would often make fifty pounds difference to them in a field of twenty acres: this they will, perhaps, think wonderful; but it is no leſs true.

“ The black oats require particularly to be ſown early, eſpecially if the farmer wiſhes to have them of a fine gloſſy ebon colour, and that the crop ſhould corn well; for if they are ſown late, and wet weather follows ſoon after ſowing, they will be apt to run all to ſtraw; and if dry weather, and the ſoil is gravelly, it is a chance but they are burnt up.

“ I have found by experience, that black oats will yield a very large crop after turnips; and this I believe is ſimply owing to their being ſown in a fine tilth; for the mould cannot but be reduced to very ſmall particles if a crop of turnips has been well huſbanded, eſpecially if it is in a light ſoil.

I am, &c.

Eaſt of Chelmsford, J. Lambe.”
Eſſex.

Wild Oats, a ſpecies of oats difficult to be extirpated where they have once taken poſſeſſion; for ripening before harveſt, and ſcattering their ſeed round them, they will remain in the ground till it is ploughed up again, though it be for a whole year, ſome ſay four or five years, and will then come up with the corn. The ſureſt way to deſtroy them, is to lay the ground down to clover, and to mow the oats and clover together before the oats are ripe.

OILS, the beards, or prickles of barley, &c.

OLITORY, a kitchen-garden.

OLIVE-TREE, the name of a tree much cultivated for its fruit in the warmer climates, and which will grow in almoſt any ſoil, provided the ſituation be very warm, and the expoſure to the ſouth or eaſt, eſpecially on the ſide of a hill, or other riſing ground; for it never bears well in a flat, or valley. It grows to the largeſt ſize when planted in rich moiſt ground: but its fruit is beſt, either for eating, or for making oil, when produced on a poorer ſoil. That which grows on chalky land mixed with coarſe ſand, and lying upon a bed of gravel, is thought to yield the fineſt and beſt keeping oil: but a watery, oozy, or quite chalky ſoil, is not fit for the olive.

This tree ſeldom riſes higher than from twenty to thirty feet; nor is it often ſeen with a ſingle ſtem, but generally with two or three, which riſe from the ſame root, and put out from their ſides, for almoſt their whole length, branches which are covered with gray bark, and garniſhed with ſtiff leaves about two inches and an half long, and an inch broad in the middle, gradually diminiſhing to both ends. They ſtand in oppoſite pairs, and are of a lively green on their upper ſide, and hoary on the under. The flowers, which are produced in ſmall bunches from the wings of the leaves, are ſmall, white, and have ſhort tubes, ſpreading open at the top; and theſe are ſucceeded by oval fruit, which ripens in the autumn.

It would be at leaſt very tedious to raiſe olive-trees from the ſtones of their fruit: but they may be eaſily enough propagated by layers, cuttings, or offsets from their roots.

The layers, which are formed by laying down the tender branches, in the ſame manner as is practiſed for other trees, muſt be allowed two years to take root, before they are cut off from the mother-tree, in order to their being planted in the nurſery; for a nurſery is as neceſſary for the raiſing of theſe, as it is for any other ſort of fruit-trees. This nurſery ſhould be in a free air, in land that is moderately ſtrong, but rather light than heavy, and ſomewhat moiſt, though by no means wet or watery. It ſhould be ploughed well, and repeatedly, or rather thoroughly dug, to the depth of at leaſt three feet, ſo long before the time of planting, as that it may be well mellowed by the influences of the air, &c.

The cuttings, or rather truncheons, for they ſhould be full two inches in diameter, and not above a foot and an half long, ſhould be taken from the ſtraiteſt, roundeſt, and moſt fruitful branches of young trees, the bark of which is ſmooth, and perfectly ſound. They ſhould be ſawed off with care not to hurt the bark or any other part of them, and with eyes towards each end, to produce ſhoots at the one, and roots at the other. Both the cut extremities ſhould then be ſmoothed with a ſharp knife; and after that the wounds have been covered with the grafting clay or cement, or ſays Columella, with dung mixed with aſhes, theſe truncheons ſhould be ſet in the nurſery, ſo deep as that the upper end may be covered with four fingers depth of earth. Care muſt be here taken to place that end uppermoſt, which was uppermoſt on the tree; and in order to be ſure of this, they ſhould be marked with chalk, or ſome other ſoft ſubſtance, as ſoon as they are cut: for if they were put under ground inverted, it would be long before they would ſtrike out roots, and even though they ſhould afterwards produce ſtrong trees, they would be for ever barren. A mark ſhould alſo be ſtuck upon each ſide of the cutting thus planted, in order that the digger of the nurſery may not injure it with his ſpade or hoe. The beſt way therefore is to ſet them in ſtrait rows, and at regular diſtances from each other.

When the offsets from the roots, which are generally moſt numerous when the head of the tree has been hurt by froſts in the winter, are grown pretty ſtrong, they are ſeparated from the tree with a ſharp axe, ſo as to preſerve a few roots to them, and they are planted about two feet deep in the ground. This is the moſt uſual method of propagating the olive-tree in Languedoc and Provence.

November is the moſt proper ſeaſon for either of the above ways of planting in very warm countries; but Febuary and March are preferable for milder climates.

The holes for planting theſe layers, cuttings, or offsets, but eſpecially for the cuttings, or truncheons, ſhould be four feet large every way, and ſhould remain open for at leaſt two months before the plants are ſet in them, in order that the earth may be the better mellowed. The mould which is to be returned into them ſhould alſo be mixed with well rotted dung and wood-aſhes; and when the plants are ſet, it ſhould be trodden down gently about them.

The young trees muſt remain in this nurſery five years, during the firſt of which the ground ſhould be well hoed with a hand-hoe, and in the courſe of the others it ſhould be dug with a ſpade, or carefully horſe-hoed, at leaſt every ſpring and autumn, and it ſhould be kept conſtantly clear from weeds. The ſoil ſhould alſo be well manured every autumn with thoroughly rotted dung, and the plants ſhould be watered now and then in very dry ſeaſons. They ſhould not be pruned at all during the two firſt years: in the third, two branches only ſhould be left upon each of them; and in the fourth, the weakeſt of thoſe two branches ſhould be cut off. When the trees thus reared are five years old, they will be fit to tranſplant into the places where they are to remain. This is beſt done in November, if the ground intended for their future growth is dry, and the climate hot: but the ſpring, a little before their time of budding, is beſt for ſuch lands as are rich and moiſt. The trenches, or holes, for this new planting ſhould be laid open for a year before they are uſed; or if ſo much time cannot be allowed, let ſtraw be burnt in them, that the heat of the fire may bring the mould to that looſe and crumbling ſtate, which it would otherwiſe have derived, ſtill more effectually, from the ſun, air, and froſts. Care ſhould alſo be taken, that there be no wet at the bottom of them when they are planted; and the earth with which they are filled up after the trees are ſet (being that which was before dug out of them, and ſpread abroad to mellow) ſhould be mixed with well rotted dung, and trod down gently about the ſtems, as above directed for the nurſery. The rows of theſe trees ſhould be from about thirty to thirty-five feet aſunder in land which is rich enough to bear corn; but about twenty or twenty-five feet will be enough for ground of an inferior quality, where their growth will, of courſe, be leſs luxuriant. The diſtances between the trees in the rows ſhould be in proportion; and, both here and in the nurſery, they ſhould be carefully fenced from cattle, eſpecially whilſt they are young. The trees ſhould be taken up with as much earth as can be about their roots: the rows ſhould be directed towards the weſt, that the ſummer breezes may have the freer paſſage through them; and Columella is again of opinion here, that the trees thus tranſplanted ſhould be ſet to the ſame aſpect as they had in the nurſery.

The olive grounds in the ſouth of France are carefully dug, or ſtirred pretty deep with a hoe, twice a year, viz. at Midſummer and at Michaelmas. Channels are likewiſe cut to convey the rain, and the fine mould which is waſhed down with it, from the higher parts of the ground to the ſtems of the trees on the lower; and in the autumn, about ſix pounds of goats-dung are laid around the foot of each olive-tree, with ſometimes a ſmall quantity of the lees of oil of olives, to fatten the land, and kill the worms which breed in it. The roots of the olive-tree are laid bare every year from October till February; all young ſhoots which have ſprung out of the lower part of the ſtock are extirpated every year, unleſs it be an old tree which is to be renewed thereby, in which caſe one or two of the fineſt ſhoots are left; and all the dead wood is pared off very cloſe.

The olive-tree is not pruned till it is eight years old, nor, after that, oftener than once in eight years. This is moſt uſually performed at the end of the winter, a little before the buds begin to ſwell. It ſhould be done in fine weather; and the people of Provence and Languedoc, who may poſſibly have experience on their ſide, and therefore we ſhall not pretend to contradict them, hold, that the moon ſhould always be in the decreaſe when theſe trees are pruned. They heal the wounds made in pruning, by rubbing them with lees of oil drawn without ſalt, or covering them over with the ſubſtance which remains of the olives after their oil has been preſſed out.

Skilful huſbandmen manure their olive grounds every third year, generally with well rotted dung, whether they be, or be not, ſown with corn in the intervals between the trees; which laſt practice Columella recommends, becauſe, as the olive-tree does not produce an equal plenty of fruit in any two ſucceſſive years, the other crop will help to make amends for the deficiency, and the ſtirring of the ground, by ploughing it, will always be of ſervice to the trees.

An olive-tree which thrives well, and does not produce fruit, may be made to bear by cutting off one of its principal roots; or by laying to its roots lees of unſalted oil, mixed with ſtale urine of men or ſwine: but the ſureſt way is to engraft it with a good cion of its own kind, taken from a fruitful branch of a well bearing tree. This is generally done in May, and the method is that of ſcutcheon-grafting; but no part of the ſtock is cut off till a year after. Then, indeed, its head is cut off cloſe to the graft.

In Provence, when an olive-tree is decayed, and therefore condemned to be grubbed up, the following method is uſed in order to force it to yield a good final crop. The breadth of an inch of bark is peeled off all around its youngeſt branches, and the place thus bared is covered with an equal ſlip of other bark taken from the branch of a young tree of the ſame ſpecies. The wound is then dreſſed in the ſame manner as is practiſed for grafſing, and the branches of the old tree thus ſpliced in the rind yield an uncommon quantity of fruit. Nearly the ſame thing is done in Languedoc, by grafting old olive-trees in the month of May, and then cutting the bark off circularly to the breadth of about three fingers, juſt above the graft, ſo as to lay bare the wood of the ſtem or branch which has been engrafted; the conſequence of which is found to be, that the tree produces a double quantity of bloſſoms and of fruit. The trees thus forced die indeed the ſame year: but as this operation is not performed till they are no longer worth cultivating, it is thought beſt to kill them in this manner, becauſe an extraordinary crop of fruit is obtained thereby.

In Spain, the olive-trees are not ſuffered to grow ſo high as they do in France: on the contrary, they are kept low, like ſhrubs, and are found then to yield the moſt fruit, which is alſo leaſt apt to be blown off or injured by high winds, and likewiſe the eaſieſt to be gathered. Theſe trees are therefore cut low when they are pruned: for their nature is to produce either a great deal of wood, or a great deal of fruit. The Spaniards give the preference to their large olives, becauſe they are moſt fleſhy, and yield the greateſt quantity of oil: but neither the fruit nor the oil of that country is at all comparable to the product of France or Italy.

The olive-tree is long lived, and its wood, which has an agreeable ſmell, and is prettily veined, is eſteemed by the turners.

The antients looked upon the olive as a maritime-tree, and ſuppoſed that it would not thrive far from the ſea: but, though it does bear the ſpray of the ſea better than moſt other ſorts of trees, experience has ſhewn that it will ſucceed perfectly well in any country where the air has a proper degree of heat.

The fruit of this tree is gathered by hand, either in June or July, while the olives are green, if they are intended for pickling; or in November and December, or even January, when they are thoroughly ripe, which is known by their beginning to turn to a blackiſh red, if they are deſigned for oil.

OLLET, fuel of any kind.

OMY, mellow; ſpoken of land.

ONION, the name of a well-known plant propagated in kitchen-gardens.

Onions intended for the general winter crop ſhould be ſown in the latter end of February, or beginning of March, on rich light ground, well dug and levelled, and cleared from the roots of all weeds. The weather ſhould be dry, and the ſurface of the ground not moiſt, at the time of ſowing. The common allowance of ſeed is after the rate of ſix pounds to an acre of land: but the generality of gardeners ſow more, in order to allow for drawing out a crop, which they call cullings. However, they ought not to be ſown too thick.

The way of ſowing theſe ſeeds alone in the garden is, to ſtrew them as equally as poſſible over the ground intended for them, then to tread or beat it down flat, in order to fix them in their places, and as ſoon as they begin to ſhoot, to ſift a little fine earth over them, to the thickneſs of ſomewhat leſs than a finger's breadth: for they muſt not be buried deep.

In about ſix weeks from the time of ſowing, the onions will be forward enough to be hoed. This ſhould be done in dry weather, with a hoe about two inches and an half wide; carefully cutting up all weeds, and thinning the plants themſelves, till they ſtand at leaſt two or three inches aſunder. In about a month after, they muſt be hoed again, and thinned till they are four or five inches from each other; and in about a month or ſix weeks more, they muſt be hoed for the third and laſt time, and thinned to the diſtance of at leaſt ſix inches. If this hoeing (which may be performed with a wider hoe, for the ſake of greater riddance) be well executed, and the weather proves dry, the ground will remain clean till the onions are fit to pull up, which will generally be towards the middle of Auguſt. But if the ſeaſon be wet, a careful perſon ſhould go over the ground, about a fortnight or three weeks after this laſt hoeing, and pluck up by hand all weeds that may chance to have taken freſh root, or to have ſprung up ſince the former clearing: for the onions ſhould not be diſturbed with a hoe after they have begun to bulb.

Onions have attained their full growth when their blades fall to the ground, and ſhrink: but before their necks are withered off, the bulbs ſhould be taken up, and, after cutting off the extremity of their leaves, be ſpread upon a dry ſpot of ground, and there turned every other day at leaſt, to accelerate their drying, and prevent their taking freſh root; which laſt they will otherwiſe quickly do, eſpecially in moiſt weather. With this management, they will be fit to houſe in about a fortnight. But at the time of hoeing them, which ſhould be done in perfectly dry weather, particular care ſhould be taken to rub off all remaining earth, to ſeparate the faulty roots, which would ſoon decay and ſpoil the reſt, and not to lay them up in too thick heaps, leaſt this ſhould make them ſweat, and conſequently rot. A loft, or garret, is therefore preferable to a lower room, or ground-floor, for keeping them in; and the leſs they are expoſed to the air, the better they will be preſerved. It will be right here to look them over at leaſt once a month, and to pick out all ſuch as are found to be decaying: though, with all the care that can poſſibly be taken, many of them will ſprout in the loft, eſpecially in mild winters, which are generally moiſt, unleſs their roots have been ſlightly ſinged with a hot iron. This, indeed, will effectually prevent their growing: but great caution muſt be uſed not to ſcorch the pulp of the onions; for that would ſoon deſtroy them.

To ſave the ſeeds of onions, ſome of the firmeſt, largeſt, and beſt ſhaped bulbs ſhould be replanted, in the beginning of March, in well dug beds of fine good mould, about three feet wide, and two feet aſunder. Each of theſe beds will conſequently be wide enough to contain four rows of plants, at the diſtance of near a foot from each other. To make theſe rows, a channel, for each, ſhould be opened all along the bed, to the depth of about ſix inches, and the onions intended for ſeed ſhould be placed therein, with their roots downward, at about nine inches aſunder. They ſhould then be covered, by raking the ground ſmooth, and in about a month's time their leaves will appear. Many of theſe roots will produce three or four ſtalks. Care muſt be taken to keep them clear from weeds; and towards the beginning of June, when the heads of the flowers begin to ſhew themſelves upon the tops of the ſtalks, ſtakes, about four feet long, ſhould be fixed in the ground, at ſuch diſtances, that ſtrings may be faſtened from one to the other, ſo as to ſupport thoſe heads, which would otherwiſe ſoon be broken down by wind and rain, or even by their own weight. Theſe ſtrings ſhould therefore run cloſe under the heads that are to be ſupported by them.

About the end of Auguſt, the heads of the onions will turn brown, and the cells which contain the ſeeds will begin to open. This is a ſure ſign of their being ripe, and no time ſhould then be loſt to cut them, leaſt they ſhould fall to the ground. The heads thus cut ſhould be immediately ſpread upon coarſe cloths, and expoſed to the ſun: but they ſhould be ſheltered at night, and alſo in wet weather. When they are quite dry, the ſeeds muſt be beaten out, which is very eaſily done, and after clearing them from their huſks, &c. and expoſing them again to the ſun, for one day, to complete their drying, they may be put up in bags, and kept for uſe.

The Spaniſh onion is moſt eſteemed for its mildneſs as well as ſize; but it ſoon degenerates in this country. The next place is given to the Straſburgh, and the third to the white, ſometimes called the Egyptian, which is the ſpecies that furniſhes the general winter crop, of which only we have hither to ſpoken. But the gardeners about London generally raiſe two other crops from this ſame ſort. One of theſe crops, known by the name of Michaelmas onions, is ſown in Auguſt, and ſupplies the markets after the winter onions are over: the other is ſown in the ſpring, and is drawn up for ſallads, after the Michaelmas onions are grown too large for that purpoſe.

Welch ONIONS, a ſort of onions propagated by gardeners for the uſe of the table in ſpring; they never make any bulb, and are therefore only to be eaten green with ſallads.

They are propagated by ſowing their ſeeds towards the end of July, in beds of a dry but rich ſoil; and in three weeks after ſowing, they will appear above ground; when they muſt be kept very free from weeds. About October all their leaves die away, which has occaſioned ſome to think all the plantation loſt, and to dig up the ground for ſome other uſe; but if they are ſuffered to ſtand, they will ſhoot up again very ſtrong in January, and from that time will grow very vigorouſly, reſiſt all weathers, and be fit to draw in March, when they will be extremely green and fine. They are much ſtronger than any other ſort of onions, and have much of the taſte of garlic.

OPE-LAND, ground that is looſe or open, from its being ploughed up every year.

ORANGE, the name of a delicious fruit of the apple kind, too well known to need deſcription.

This fine tree not being natural to our climate, we muſt quicken the nature of our ſoil with a compoſition that may cauſe it to correſpond as much as poſſible with the temperament of warmer countries. It delights greatly in a ſoil that is compoſed of an equal quantity of ſheep's dung that has reſted two years; old compoſt, or the ſoil of a ſewer; and fat land taken either from a marſh or hemp-cloſe.

When the proper ſeaſon is arrived for lodging your young ſtems in boxes, theſe latter ſhould always be proportioned to the heads of the plants. The ſtems, even when they are become vigorous, will accommodate themſelves to a box of about fifteen inches diameter; but they muſt be placed more at large in others, when the tree ceaſes to augment its foliage, and informs you, by its languid air, that its ſoil and ſuſtenance are inſufficient. At the end of ſeven or eight years, they may be tranſplanted, with all the earth, into their laſt boxes, whoſe diameters may be about twenty-four inches. All theſe boxes ſhould be made of entire heart of oak, and caſed over with a double coat of green paint liquified with oil, as alſo on the inſide, in order to preſerve the wood from rotting by frequent waterings, as it is on the outſide, to ſecure it from rain and ſun.

The large boxes ſhould have a door with double hinges, and two iron-bars to admit the proper renovations of ſoil, and to enable you to clear the box of that liquid ſediment that is collected and thickened at the bottom; and likewiſe to pare off the extreme parts of the mould, that it may afterwards be taken out with eaſe, when it is neceſſary to transfer it into a new box.

In order to place ſome ſhrubs, and more eſpecially orange trees, in boxes, after a proper manner, the firſt proceeding is to cover the bottom of the boxes with large pieces of brick and potſherds, which afford the water an eaſy flow through the cavities that are opened at the bottom. Were it not from this precaution, the humidity collected by the ſediment would rot the box, and deſtroy the tree by an immoderate chilneſs. When this proviſion has been made for the ſecurity of the tender plant, the bottom and ſides of the box muſt be lined with good ſoil, prepared in the manner already mentioned: in this ſoil the tree ſhould be inverted in an upright poſition, and the ball of earth at its roots muſt be leſſened, not with an intention to ſtrengthen the tree, but rather to prevent its requiring a large quantity of earth, and to confine it by a moderate vigour to a juſt proportion with the box. A new maſs of earth muſt then be heaped up on every ſide, and preſſed with a due compactneſs, in order to ſecure the ſtem from violent winds, and cauſe the earth to ſettle round the root with as much exactneſs as poſſible.

When the tree is to be placed in the box, care ſhould be taken to raiſe the upper part of the clod of the earth at its roots higher than the rim of the box, becauſe the weight of the tree and the action of the roots will afterwards lower the clod by degrees to a level with the edge of the box. If this precaution be neglected, the tree in proceſs of time will ſink too low. And, that the upper part of the clod may not be expoſed to the air, it ſhould be covered over with earth, and the whole ſuſtained by ſmooth ſtaves diſpoſed round the edges of the box.

When fruit-trees are to be pruned, care ſhould be taken to preſerve the ſmall branches in a thriving ſtate, in order to promote their fertility; but they are retrenched in an orange-tree, that a vacancy may be opened within. The ſame method is taken with the branches that ſhoot downwards in a perpendicular direction; and alſo with thoſe that are diveſted of their leaves, which only happens, when the tree is weak or diſtempered: but we carefully preſerve all the vigorous branches, whoſe advantageous ſituation contributes to the regularity of the head.

Oranges are brought from ſeveral parts. The beſt and moſt in eſteem for a good taſte are thoſe which grow in hot countries; not only becauſe the ſoil of the places, having ſtore of exalted ſulphur and volatile ſalts in it, communicates a great quantity of the ſame to theſe fruits, and gives them an agreeable ſmell, but becauſe the heat of the ſun there digeſts, and more completely ripens their juice, and gives them a more delicious taſte. *Miller's Gard. Dict.*

ORCHARD, a plantation of fruit-trees.

It is a rule among gardeners, that thoſe orchards thrive beſt which lie open to the ſouth, ſouth-weſt, and ſouth-eaſt, being ſcreened from the north, and have the ſoil dry and deep.

In planting of an orchard, great care ſhould be had to the nature of the ſoil, that ſuch trees as are adapted to grow upon the ground intended to be planted, may be choſen, otherwiſe there can be little hopes of their ſucceeding; and it is for want of rightly obſerving this method, that we ſee, in many countries, orchards planted which never arrive to any tolerable degree of perfection, their trees ſtarving, and their bodies either covered with moſs, or the bark cracks and divides; both which are evident ſigns of the weakneſs of the trees; whereas, if inſtead of apples, the orchard had been planted with pears, cherries, or any other ſort of fruit to which the ſoil had been adapted, the trees might have grown very well, and produced great quantities of fruit.

As to the poſition of the orchard, if you are at full liberty to chuſe, a riſing ground, open to the ſouth-eaſt, is to be preferred; but we would by no means adviſe to plant upon the ſide of an hill, where the declivity is very great; for in ſuch places the great rains commonly waſh down the better part of the ground, whereby the trees would be deprived of proper nouriſhment; but where the riſe is gentle, it is of great advantage to the trees, by admitting the ſun and air between them, better than it can upon an entire level; which is an exceeding benefit to the fruit, by diſſipating fogs, and drying up the damps, which, when detained amongſt the trees, mix with the air, and render it rancid: if it be defended from the weſt, north, and eaſt-winds, it will alſo render this ſituation ſtill more advantageous; for it is chiefly from theſe quarters that fruit-trees receive the greateſt injury: therefore, if the place be not naturally defended from theſe by riſing hills, which is always to be preferred, then you ſhould plant large growing timber-trees at ſome diſtance from the orchard, to anſwer this purpoſe.

You ſhould alſo have a great regard to the diſtance of planting the trees, which is what few people have rightly conſidered; for if you plant them too cloſe, they will be liable to blights; and the air, being hereby pent in amongſt them, will cauſe the fruit to be ill-taſted, having a great quantity of damp vapours from the perſpiration of the trees, and the exhalations from the earth mixed with it, which will be imbibed by the fruit, and render their juices crude and unwholeſome.

Wherefore we cannot but recommend the method which has been lately practiſed by ſome particular gentlemen with very great ſucceſs; and that is, to plant the trees fourſcore feet aſunder, but not in regular rows. The ground between the trees they plough and ſow with wheat and other crops, in the ſame manner as if it were clear from trees; and they obſerve their crops to be full as good as thoſe quite expoſed, except juſt under each tree, when they are grown large, and afford a great ſhade; and, by thus ploughing and tilling the ground, the trees are rendered more vigorous and healthy, ſcarcely ever having any moſs, or other marks of poverty, and will abide much longer, and produce better fruit.

If the ground in which you intend to plant an orchard has been paſture for ſome years, then you ſhould plough in the green ſward the ſpring before you plant the trees: and, if you will permit it to lie a ſummer fallow, it will greatly mend it, provided you ſtir it two or three times, to rot the ſward of graſs, and prevent weeds growing thereon.

At Michaelmas you ſhould plough it pretty deep, in order to make it looſe for the roots of the trees, which ſhould be planted thereon in October, provided the ſoil be dry; but, if it be moiſt, the beginning of March will be a better ſeaſon.

When you have finiſhed planting the trees, you ſhould provide ſome ſtakes to ſupport them, otherwiſe the wind will blow them out of the ground; which will do them much injury, eſpecially if they have been planted ſome time; for, the ground at that ſeaſon being warm, and for the moſt part moiſt, the trees will very ſoon puſh out a great number of young fibres; which, if broken off by their being diſplaced, will greatly retard the growth of them.

In the ſpring following, if the ſeaſon ſhould prove dry, you ſhould cut a quantity of green turf, which muſt be laid upon the ſurface of the ground about their roots, turning the graſs downward; which will prevent the ſun and wind from drying the ground, whereby a great expence of watering will be ſaved: and, after the firſt year, they will be out of danger, provided they have taken well.

Whenever you plough the ground between theſe trees, you muſt be careful not to go too deep among their roots, leſt you ſhould cut them off, which would greatly damage the trees: but, if you do it cautiouſly, the ſtirring of the ſurface of the ground will be of great benefit to them; though you ſhould obſerve never to ſow too near the trees, nor ſuffer any great rooting weeds to grow about them, which would exhauſt the goodneſs of the ſoil, and ſtarve them.

If, after the turf which was laid round the trees be rooted, you dig it in gently about the roots, it will greatly encourage them. There are ſome perſons who plant many ſorts of fruit together in the ſame orchard, mixing the trees alternately; but this is a method which ſhould always be avoided; for hereby there will be a very great difference in the growth of the trees, which will not only render them unſightly, but alſo the fruit upon the lower trees ill-taſted, by the tall ones overſhadowing them; ſo that, if you are determined to plant ſeveral ſorts of fruit on the ſame ſpot, you ſhould obſerve to place the largeſt growing trees backwards, and ſo proceed to thoſe of leſs growth, continuing the ſame method quite through the whole plantation; whereby it will appear at a diſtance in a regular ſlope, and the ſun and air will more equally paſs through the whole orchard, that every tree may have an equal benefit therefrom.

The ſoil of your orchard ſhould alſo be mended once in two or three years with dung, or other manure, which will alſo be abſolutely neceſſary for the crops ſown between; ſo that where perſons are not inclinable to help their orchard, where the expence of manure is pretty great; yet, as there is a crop expected from the ground beſides the fruit, they will the more readily be at the charge upon that account.

In making choice of trees for an orchard, you ſhould always obſerve to procure them from a ſoil nearly a-kin to that where they are to be planted, or rather poorer; for, if you have them from a very rich ſoil, and that wherein you plant them is but indifferent, they will not thrive well, eſpecially for four or five years after planting; ſo that it is a very wrong practice to make the nurſery, where young trees are raiſed, very rich, when the trees are deſigned for a middling or poor ſoil. The trees ſhould alſo be young and thriving; for, whatever ſome perſons may adviſe to the contrary, yet it has always been obſerved, that though large trees may grow, and produce fruit, after being removed, they never make ſo good trees, nor are ſo long-lived, as thoſe which are planted while young.

Theſe trees, after they are planted out, will require no other pruning but only to cut out dead branches, or ſuch as croſs each other, ſo as to render their heads confuſed and unſightly: the too often pruning them, or ſhortening their branches, is very injurious; eſpecially to cherries and ſtone-fruit, which will gum prodigiouſly, and decay in ſuch places where they are cut: and the apples and pears, which are not of ſo nice a nature, will produce a greater quantity of lateral branches, which will fill the heads of the trees with weak ſhoots, whenever their branches are thus ſhortened; and many times the fruit is hereby cut off, which, on many ſorts of fruit-trees, is firſt produced at the extremity of their ſhoots.

It may, perhaps, ſeem ſtrange to ſome perſons, that we ſhould recommend the allowing ſo much diſtance to the trees in an orchard, becauſe a ſmall piece of ground will admit of very few trees, when planted in this method: but they will pleaſe to obſerve, that, when the trees are grown up, they will produce a great deal more fruit than twice the number when planted cloſe, and will be vaſtly better taſted; the trees, when placed at a large diſtance, being never ſo much in danger of blighting as in cloſe plantations, as hath been obſerved in Herefordſhire, the great county for orchards, where they find that when orchards are ſo planted or ſituated, that the air is pent up amongſt the trees, the vapours which ariſe from the damp of the ground, and the perſpiration of the trees, collect the heat of the ſun, and reflect it in ſteams ſo as to cauſe what they call a fire-blaſt, which is the moſt hurtful to their fruit; and this is moſt frequent where the orchards are open to the ſouth ſun.

But, as orchards ſhould never be planted, unleſs where large quantities of fruit are deſired, ſo it will be the ſame thing to allow twice or three times the quantity of ground; ſince there may be a crop of grain of any ſort upon the ſame place, as was before ſaid, ſo that there is no loſs of ground: and, for a family only, it is hardly worth while to plant an orchard; ſince a kitchen-garden well planted with eſpaliers will afford more fruit than can be eaten while good, eſpecially if the kitchen garden be proportioned to the largeneſs of the family: and, if cyder be required, there may be a large avenue of apple-trees extended croſs a neighbouring field, which will render it pleaſant, and produce a great quantity of fruit; or there may be ſome ſingle rows of trees planted to ſurround the fields, &c. which will fully anſwer the ſame purpoſe, and be leſs liable to the fire-blaſts before-mentioned. *Miller's Gard. Dict.*

ORCHARD-GRASS, the name of a ſmall, coarſe, but very ſweet graſs. It is of very quick growth, and may poſſibly hereafter be cultivated to advantage.

ORE-WEED, a general name for weeds growing at the bottom of the ſea, and alſo on the muddy and rocky parts of the ſhore.

Sea-weeds are ſo beneficial a manure, that farmers ought not to grudge the expence of carrying them a few miles. In Devonſhire, Cornwall, and other maritime parts of England, theſe weeds are laid in heaps till they are rotten, and then ſpread upon the land, about a load to three rods: but this laſts only one year, unleſs ſand, or a ſtiff earth, according to the quality of the ſoil intended to be improved, be laid on or mixed with them; and then they become a laſting manure. In ſome places, theſe weeds are gathered in heaps, and burnt as ſoon as they are dry; after which about a buſhel of their aſhes is laid on upon three rods of ground. But theſe, like all other aſhes, ſhould be mixed with ſand, or ſtiff earth, if you would have the land laſt good: otherwiſe, they are only an improvement for a year. Theſe aſhes are particularly good for graſs grounds over-run with moſs. Looſe ſandy ſoils are likewiſe peculiarly benefited by this weed: but, being a ſub-marine plant, the wind and ſun ſoon exhale its moiſture; ſo that the more ſpeedily it is taken from the ſhore, where ſtorms often throw it up in great quantities, the better it is. When ſpread on the ground, and afterwards covered over, it ſoon diſſolves into a ſalt oily ſlime, proper to fertilize and bind light ſoils. This is the moſt approved way of applying it: though ſome lay it naked and freſh from the ſea, upon their barley lands, towards the end of March and beginning of April, and have a good crop of corn: but ſuch quantities of rank weeds are apt to ſhoot up afterwards, that no wholeſome plant is to be expected that year.

The value of the lands all along the coaſt of Scotland has been more than doubled by the uſe of this excellent manure. It is chiefly uſed there for barley; and the farmers watch every opportunity when it is thrown in by the ſea, and lay it on at all ſeaſons, in autumn, winter, and ſpring. But if they could chooſe their time, it would probably do beſt about the month of March; for being then ploughed into the ground, and afterwards ploughed up again to the ſeed, it would be incorporated and blended with the ſoil; whereas, if it be laid on in autumn, before the fallowing or firſt ploughing, it is too much waſted before the ſpring; and if it be laid on to the ſeed-furrow, it is apt to burn the ground in a dry ſeaſon, though it will do very well in this method in a wet ſummer. Its effects are but juſt felt the ſecond year; though it is laid on thicker upon ſtrong clay land, which receives no other manure for three crops, viz. barley, oats, peaſe, and beans; a method which might, perhaps, be altered for the better by omitting the oats, and ſowing alternately barley, and peaſe and beans, and laying on the ſea-ware, as theſe weeds are commonly called, for every ſecond crop of peaſe and beans.

We ſee by the abridgement of Mr. Scott's account of the manner of uſing ſea-ware in Scotland (publiſhed by Mr. Maxwell in his Miſcellaneous Papers) that much of this valuable manure muſt neceſſarily be loſt through want of proper management: for they have no reſervoirs to keep it in, when thrown aſhore at a ſeaſon in which they cannot uſe it, or where there is no ground in tilth, as is generally the caſe in winter, and during the buſy part of their hay and corn harveſt. It ſhould be collected on theſe occaſions, and lodged in a place free from any running water; and, as it is equally beneficial to ſtrong or light lands, it might be there covered with ſand or clay, according to the nature of the ſoil for which it is intended. This will prevent its being parched by the ſun, or its diſſolving into a putrid maſs, which, if not ſecured in this manner, would either be waſhed away by rains, or fly off into the air: whereas, when thus covered, it would greatly enrich the clay or ſand, and render them good manures for their oppoſite ſoils. If it be thrown aſhore at a time when it can be ploughed in directly, that is certainly the beſt manner of uſing it.

Mr. Scott obſerves, that there is a kind of land all along the coaſt, which is gravelly, and covered over ſo thick with ſea-ſtones, that, to look at it, one would not think corn could ſpring through them; and another ſort of land, which is a deadiſh ſand. To both theſe grounds ſea-ware is the only manure; for dung of all kinds has been often tried, but with no ſucceſs; and yet ſea-ware makes them bring excellent crops of barley. This kind of ground is ſeldom ploughed more than twice, and the ſea-weed is generally laid on before the firſt ploughing. Barley is ſowed during two years, and peaſe the third; a freſh manure of ſea-weed being laid on each year that barley is ſown. As little wheat is cultivated in the country where Mr. Scott lived, the farmers there might probably improve their practice of raiſing barley and peaſe, by ſowing them alternately, and laying the ſea-ware to the peaſe. In the ſummer, it is carried to a diſtance from the ſea, and laid upon ley-ground (arable land under graſs) which, though in very ill heart, will bear a good crop of oats with only once ploughing, or of barley, if ploughed again in the ſpring.

Another kind of ſea-ware, of a much ſtronger nature than that which is thrown up by the waves, is cut from the rocks at low water, and will laſt three years. It coſts more labour, but brings greater recompence. Mr. Scott thinks the beſt time of laying this on the ground would be in autumn, before the land is ploughed rough for a ſpring crop.

The farmers on the coaſt of Scotland (and I believe the ſame may be ſaid, in general, of thoſe in moſt of the maritime parts of England) prefer this manure to any other, eſpecially for their light grounds; and it has the advantage of being much more eaſily tranſported, becauſe one load of it will go as far as two of dung.

It does very well in kitchen-gardens, where Mr. Scott ſays he has ſeen pot-herbs and roots of an extraordinary ſize produced by its help; to which he adds, that he has known fruit-trees, perfectly barren before, rendered extremely fruitful by laying this manure about their roots.

Mr. Duhamel likewiſe informs us, that theſe ſea-weeds are uſed with great ſucceſs in the maritime provinces of France.

OST, *Ooſt*, or *Ouſt*. *See* OUST.

OVER-REACH, a wound in the fore-heel of a horſe, made by the point of the hind-ſhoe.

When this wound is only ſlight or ſuperficial, it is, in general, very eaſily cured by waſhing it clean, and applying the wound ointment: but it ſhould be obſerved from the nature and manner of the injury, where the blow has been ſmart, that it differs widely from a common cut; the part here being both torn and bruiſed, and conſequently it requires to be properly digeſted, in order to lay a good foundation for healing.

For this purpoſe, after waſhing out any dirt or gravel with ſope-ſuds, &c. let the wound be digeſted, by dreſſing it with doſſils of lint dipped in an ounce of Venice turpentine, divided with the yolk of an egg, to which half an ounce of tincture of myrrh may be added; over this dreſſing it would be adviſable to apply the turnip poultice, or that with ſtrong beer grounds and oatmeal, three or four times, or oftener, till the digeſtion is procured, and then both theſe dreſſings may be changed for the precipitate medicines, or the lime-water mixture; obſerving always to apply the doſſils carefully to the bottom, to fill up the ſore with the ſame even to the ſurface, and to bind all on with a compreſs and roller: and if any cavities appear that cannot conveniently be dreſſed to the bottom, they ſhould always be laid open, or no proper foundation for healing can be obtained. The hoof alſo ſhould be kept ſupple, or pared away, when the growth of it interrupts this end, as is ſometimes the caſe. *Bartlet's Farriery, page* 244.

OUGHTS, leavings.

OUST, a kiln, generally applied to that uſed in drying malt.

It is built with fire-places in the nature of malt-kilns; and at a proper diſtance over the fire is an hair-cloth ſtrained upon laths; and thereon the hops are laid, and raked even to the depth of about ſix or ſeven inches, for the better conveniency of drying them equally; and when they are properly cured on the under ſide, they are carefully turned; and by that means the upper ſide becoming the under, the whole ſhares the fire alike. The perſon that performs this part is called the dryer, whoſe buſineſs it is to manage the fires.

The fuel commonly made uſe of is charcoal, for its freeneſs from ſmoke, and affording a ſteady heat. Great nicety is required in this part; a ſmall fire being to be made, at firſt, that they may heat gradually, and ſo raiſed as they dry, that it may be done without ſcorching; and the fire is to be lowered by degrees, againſt they are ready to be taken off: the time required is about eight hours.

But as charcoal is very dear, being three or four pounds per load, many people have adopted the method of drying with ſea-coal, upon what they call cockle-ouſts, which are ſquare iron-boxes placed upon brick-work, and a flue and chimney in the back part of the building for the ſmoke to go off. The computation is, that a chaldron of ſea-coal, at about twenty-four ſhillings, will dry a load of hops, and that a load of charcoal will do no more. It is indeed expenſive to erect ſuch ouſts, as there muſt be no timber near them; and an iron-beam and iron-laths are to be uſed, and they covered with plates of tin or iron properly faſtened together.

A gentleman has lately claimed the merit of having invented a new method of drying hops with ſea-coal, or any kind of fuel whatever, by means of a moveable iron furnace: it is in form of an horizontal cylinder, ſtopped at both ends: it lies on an iron carriage, which rolls on four iron-wheels: in the fore-end of the cylinder is the furnace door, and a hollow iron flue runs in an horizontal direction along the upper ſurface of the cylinder from the back till it reaches the fore-end of it, when it takes a vertical direction, and is carried as high as is neceſſary to convey the ſmoke out of the ouſt. We cannot pretend to ſay what are the particular advantages reſulting from the uſe of this rolling furnace, never having ſeen it at work.

OUST-HOUSES, out-houſes, or ſuch as belong to, and are adjoining to the dwelling-houſes.

OX, the name of an animal well known, being a bull caſtrated.

Oxen, like other domeſtic animals, vary in colour, though the dun ſeems the moſt common; and the redder it is, the more it is eſteemed. A black coat is alſo valued; and bay oxen are ſaid to be vigorous and long lived; whereas the brown ſoon decay. The grey, the dappled, and the white, are proper only for the ſlaughter; no care can render them fit for labour; but whatever be the colour of an ox's coat, it ſhould be gloſſy, thick, and ſmooth to the touch; for if it be harſh, rough, or thin, there is reaſon to ſuppoſe that the animal is out of order, or at leaſt not of a ſtrong conſtitution. A good ox for the plough muſt be neither too fat nor too lean; the head ſhort and thick; the ears large and ſhaggy; the horns ſtrong, gloſſy, and of a middling ſize; the forehead wide, the eyes full and black; his muzzle large and flat; the noſtrils wide and open; the teeth white and even; the lips black; a fleſhy neck, large and heavy ſhoulders; the breaſt broad; the dew-lap hanging down to the knees; the reins very broad; a ſpacious deſcending belly; the flanks firm; the haunches large; and the rump thick; large and nervous thighs and legs; the back ſtraight and full; the tail reaching to the ground, and well covered with thick and fine hair; the feet firm; the hide thick and pliable; the muſcles raiſed; the hoof ſhort and broad: he muſt alſo anſwer to the goad, be obedient to the voice, and well trained; but it is only gradually, and by beginning early, that the ox can be brought willingly to bear the yoke, and be eaſily governed. At the age of two years and a half, or three at the lateſt, you muſt begin to tame him, and bring him under ſubjection; if delayed longer, he becomes froward, and often ungovernable. The only method of ſucceeding is, by patience, mildneſs, and even careſſes, for compulſion and ill-treatment will only diſguſt him irreclaimably; ſtroaking him gently along the back, clapping him, giving him occaſionally boiled barley, ground beans, and ſuch other aliments as pleaſe him beſt, all of them mingled with ſalt, of which he is very fond, will prove of the greateſt uſe. At the ſame time his horns ſhould be often tied, and ſome days after the yoke is to be put on his neck, and faſtened to a plough, with another ox of the ſame ſize ready trained; theſe are to be tied together at the manger, and in the ſame manner led to the paſture, that they may become acquainted, and accuſtomed to have one common motion. The goad is never to be made uſe of in the beginning, as that would only render him more untractable; he muſt alſo be indulged, and labour only at ſhort intervals; for till he is thoroughly trained, he tires himſelf very much; and for the ſame reaſon he is to be fed more plentifully than at other times.

An ox is to draw the plough only from his third to his tenth year, when it will be adviſable to fatten and ſell him, as being then of a better fleſh than if he was kept longer. The age of this creature is known by his teeth and horns. The firſt fore-teeth, which he ſheds at the end of ten months, are replaced by others, larger, but not ſo white; at ſix months the teeth next to thoſe in the middle fall out, and are alſo replaced by others; and in three years all the inciſive teeth are renewed. They are then equal, long, and pretty white; but as the ox advances in years, they wear, become unequal, and black. It is the ſame in the bull and cow: ſo that the growth and ſhedding of the teeth are not affected by caſtration, or the difference of ſexes. Nor is the ſhedding of the horns affected by either; as both bull, ox, and cow, loſe them alike at the end of three years; and theſe alſo are replaced by other horns, which, like the ſecond teeth, remain; only thoſe of the ox and cow are larger and longer than thoſe of the bull. The manner of the growth of theſe ſecond horns is not uniform, nor the ſhooting of them equal. The firſt year, that is the fourth year of the ox's age, two ſmall pointed horns make their appearance, nearly formed, ſmooth, and towards the head terminated by a kind of button. The following year this button moves from the head, being impelled by a corneous cylinder, which alſo lengthening, is terminated by another button, and ſo on; for the horns continue growing as long as the creature lives. Theſe buttons become annular joints, which are eaſily diſtinguiſhed in the horn, and by which the age of the creature may be readily known; counting three years for the point of the horn to the firſt joint, and one year for each of the other intervals.

OX-BOOSE, an ox-ſtall, or cow-ſtall, where theſe creatures ſtand in the winter.

OX-HARROWS, very large harrows, called, in ſome counties, drags.

OX-GANG, or *Ox-gate*, a quantity of land meaſuring fifteen acres, being as much ground as a ſingle ox is ſuppoſed to be capable of ploughing in a year.

P.

PACK-SADDLE, a ſaddle adapted to the carriage of heavy packs or burdens.

PAD, the road, a foot-path; alſo an eaſy paced horſe: likewiſe a low ſaddle.

PADDLE-STAFF, an inſtrument uſed by the ploughman to free the ſhare from ſtubble, clay, &c. which hinder its action.

PADDOCK, a ſmall field or incloſure. It alſo ſignifies a large frog or toad.

PAIGLE, a cowſlip.

PAIL, a wooden veſſel in which milk or water is commonly carried.

PALISADE, a row of handſome pales ſet up by way of ornament or defence. The gardeners uſe this word to denote a row of trees, which bear branches and leaves from the bottom, cut and ſpread in the manner of a garden wall, along the ſide of an alley or the like, ſo as to appear like a wall covered with leaves.

PALMS, the male flowers of the willow.

PALSY, a diſeaſe common to horſes, wherein the body or ſome of its members, loſe their motion, and ſometimes their ſenſation of feeling.

In paralytic diſorders, where the uſe of a limb or limbs is taken away, the internals (recommended under the article STAGGERS) ſhould be given in order to warm, invigorate, and attenuate the blood; and the following ſtimulating embrocation ſhould be rubbed into the parts affected.

> Take oil of turpentine four ounces, nerve ointment and oil of bays, of each two ounces; camphor rubbed fine, one ounce; rectified oil of amber three ounces, tincture of cantharides one ounce.

With this liniment the parts affected ſhould be well bathed for a conſiderable time, to make it penetrate; and when the hind parts are chiefly lame, the back and loins ſhould be well rubbed with the ſame: to the nervous medicines above recommended, may be added ſnake-root, contrayerva, muſtard-ſeed, horſe-radiſh root, ſteeped in ſtrong beer, or wine where it can be afforded. Take the following for an example, which may be given to the quantity of three pints a day alone, or two horns full may be taken after the nervous balls.

> Take ſnake-root, contrayerva and valerian, of each half an ounce, muſtard-ſeed and horſe-raddiſh root ſcraped, of each two ounces, long-pepper two drams, infuſe in three pints of ſtrong beer or wine.

When the horſe is recovering from any of the above diſorders, the following alterative purge may be repeated two or three times, as it operates very gently.

> Take ſuccotrine aloes one ounce; myrrh half an ounce; aſſa fœtida and gum ammoniacum, of each two drams; ſaffron one dram: make into a ball with any ſyrup.

Where a retention of dung is the cauſe of this diſorder, the great gut ſhould firſt be raked thoroughly with a ſmall hand, after which plenty of emollient oily clyſters ſhould be thrown up, and the opening drink given, till the bowels are thoroughly emptied of their impriſoned dung. Their diet ſhould for ſome days be opening, and conſiſt chiefly of ſcalded bran, with flower of brimſtone, ſcalded barley, &c.

PANIC, a plant reſembling millet in its ſtalks, leaves, and roots; but differing in its ſpikes, or ears, which are about the thickneſs of a man's finger at their baſe, and growing taper toward their points. They are about eight or nine inches long, and cloſely ſet with a ſmall roundiſh grain, ſometimes white, ſometimes red or purple, and ſometimes yellow. It is raiſed and reaped in the ſame manner as millet, but does not require ſo much rain. This plant grows naturally in both the Indies, and is cultivated in ſeveral parts of Europe for the food of men. Cakes and bread are made of it in Germany, Italy, and the ſouthern parts of France; but it is not reckoned ſo good nouriſhment as millet: nor is the German ſort ſo much eſteemed as the Italian; though the former ripens beſt in cold countries, where it is frequently ſowed in land which will not produce better grain. It thrives moſt in a dry ſtiffiſh ſoil, ſuch as the ſides of hills, and even in ſtony ground; grows to the height of about four feet, and branches very much; for which reaſon the horſe-hoeing huſbandry is by far the fitteſt for it. The plants, if managed rightly, ſhould ſtand at leaſt eighteen inches aſunder, in rows three feet apart, that there may be room to hoe the ground between them, and to keep them clear from weeds. When grown pretty tall, they ſhould be ſupported by ſtakes, leſt the wind break them down, and particular care muſt be taken to guard againſt birds when their ſeeds begin to ripen.

PANNAGE, the food which ſwine feed upon in woods, as acorns, and the maſt of beech. It alſo ſignifies the money taken by the king's agiſtors, for the privilege of feeding hogs in the king's foreſts.

PANNEL, a low ſaddle.

PARING *the ſole. See the article* SHOEING HORSES.

PARSLEY, the name of a well-known herb, which is cultivated in gardens for culinary purpoſes, it being more uſed in the kitchen than any other herb whatſoever; it will tolerably endure cold, but is apt to be deſtroyed in very ſevere winters, eſpecially where the land is moiſt; it is commonly ſown in the ſpring, and ſends forth a ſtalk the year after, which flowers in June or July, and the ſeeds ripen in Auguſt.

The common parſley is, by ſome ſkilful people, cultivated in fields for the uſe of ſheep, it being a ſovereign remedy to preſerve them from the rot, provided they are fed twice a week, for two or three hours each time, with this herb: but hares and rabbits are ſo fond of it, that they will come from a great diſtance to feed on it; ſo that whoever has a mind to have plenty of hares in their fields, by cultivating parſley, will draw all the hares off the country to them.

PARSNEP, the name of a plant propagated for the ſake of its roots.

Parſneps require a rich, mellow, and deep ſoil; in order that their roots, according to the bigneſs and length of which they are eſteemed, may have full room to thicken and run downward. The ſeeds of theſe plants ſhould be ſown in February or March, either alone, or with carrots, eſpecially if it be intended to draw theſe laſt very young; becauſe parſneps ſeldom ſpread much before the latter end of ſummer, by which time the carrots will, in this caſe, be gone. The practice of thoſe gardeners who ſow leeks, onions, and lettuces with their parſneps, is very wrong; becauſe ſo many different growths muſt impoveriſh one another.

The young parſneps muſt be hoed and weeded, or, if they were ſown in rows, the ground between thoſe rows muſt be dug, three or four times in the ſpring, or whenever elſe many weeds appear. By the latter end of the ſummer, their leaves will cover the ground, and prevent the farther growth of weeds; ſo that they will not require any more care after that ſeaſon.

When their leaves begin to decay, their roots may be dug up for uſe: but they are ſeldom well taſted before that time; nor are they good for much late in the ſpring, after they have ſhot out again. They, therefore, who would preſerve them for ſpring uſe, ſhould dig them up in the beginning of February, and bury them in ſand in a dry place, where they will remain good until the middle of April, or later.

To ſave the ſeeds of this plant in the moſt advantageous way, ſome of the longeſt, ſtraiteſt, and largeſt roots, ſhould be ſingled out, and planted about two feet aſunder, in a place where they will be defended from the ſtrong ſouth and weſt winds: for the ſtems of the parſneps generally grow to a great height, and are very apt to be broken by ſtrong guſts of wind, if they are expoſed thereto. This ground ſhould alſo be kept clear from weeds; and if the ſeaſon ſhould prove dry, watering of theſe plants moderately, twice a week, will increaſe the quantity, and improve the quality, of their ſeeds, which will be ripe about the end of Auguſt or beginning of September, when the heads ſhould be carefully cut off, and ſpread upon a coarſe cloth for two or three days, to dry. The ſeeds ſhould then be beaten off, and put up for uſe. But neither theſe, nor carrot-ſeeds, ſhould be depended on after they are above a year old.

Parſneps are an excellent, wholeſome, and very nouriſhing food for cattle. Their culture, as I have juſt obſerved, is exactly the ſame as that of carrots, with which they may therefore be ſown in the ſame ground. Their leaves will decay at nearly the ſame time, when the roots may be dug up, and laid by for uſe, likewiſe buried in dry ſand, in a dry place.

Parſnep-ſeeds ſeldom grow after they are above a year old.

It has long been a cuſtom in ſome parts of Britany, to ſow parſneps in the open field for the food of cattle; as we are informed by the firſt volume of the tranſactions of a Society inſtituted in that province, for the encouragement of the economical and commercial intereſts of their country. "It is of great importance," ſay they, "that parſneps ſhould be univerſally cultivated; becauſe they afford an excellent and wholeſome food for all kinds of cattle, during the winter, and may be uſed to great advantage to fatten them. Our hogs have no other food in all that ſeaſon, and our bullocks and oxen thrive well upon it. Our cows fed with parſneps give more milk than with any other winter fodder, and that milk yields better butter than the milk of cows nouriſhed with any other ſubſtance. Our horſes fatten with this food; though ſome pretend that it renders them leſs mettleſome, and hurts their legs and eyes.

"Cattle eat theſe roots raw at firſt, ſliced lengthwiſe; and when they begin not to reliſh them, they are cut in pieces, put into a large copper, preſſed down there, and boiled with only ſo much water as fills up the chaſms between them. They then eat them very greedily, and continue to like them."

PARTERRE, a level diviſion of ground, which, for the moſt part, faces the ſouth and beſt front of the houſe, and is generally furniſhed with greens, flowers, &c.

There are ſeveral ſorts of parterres, as plain graſs with borders, and parterres of embroidery, &c.

Plain parterres are more beautiful in England than in any other country, by reaſon of the excellency of our turf, and that decency and unaffected ſimplicity that it affords to the eye of the ſpectator. Other parterres are cut into ſhell and ſcroll work, with ſand alleys between them; which ſort of parterres are eſteemed fineſt in France.

As to the general proportions of parterres, an oblong, or long-ſquare, is eſteemed the beſt: therefore, a parterre ſhould not be leſs than twice as long as it is broad; twice and a half is accounted a very good proportion; and it is very rare that three times is exceeded. As to the breadth of a parterre, it is to take its dimenſions from the breadth of the front of the houſe; if the front of the houſe is one hundred feet long, the breadth of the parterre ſhould be one hundred and fifty feet; and if the front of the houſe be two hundred feet, the parterre ſhould be fifty feet broader: but where the front exceeds the breadth of this parterre, it will be a good proportion to make the parterre of the ſame dimenſions with the front.

There ſhould be a terrace-walk on each ſide of the parterre, for an elevation proper for view; and therefore, there ſhould never be the flat of a parterre between terrace-walk and terrace-walk, above three hundred feet; nor can it be well made leſs than one hundred and forty. As to the adorning and furniſhing theſe parterres, whether it be plain or with embroidery, that depends much upon the form of them, and therefore muſt be left to the judgment and fancy of the deſigner.

PARTRIDGE, a timorous and ſimple bird, and is ſo valuable at the table, that there are a great many ways of taking it invented by the ſportſmen, all of which ſucceed from the folly and fear of the animal.

The places that partridges moſt delight in, are corn fields, eſpecially while the corn grows; for that is a ſafe retreat, where they remain undiſturbed, and under which they uſually breed. They frequent the ſame fields after the corn is cut down, and that with another intent; for they then feed on the corn that has fallen from the ears, and find a ſufficient ſhelter for them under covert of the ſtalks, eſpecially of thoſe of wheat ſtubble. When the wheat ſtubble is much trodden by men or beaſts, they retire to the barley ſtubble, and will there hide themſelves in coveys of twenty or thirty. When the winter comes on, and the ſtubble fields are trodden down or ploughed up, they then retire to the upland meadows, where they lodge in the high graſs, and among ruſhes; ſometimes they reſort to the low coppice woods, eſpecially if there be corn lands near them.

PASSION-FLOWER, the name of a very beautiful plant, having long ſlender ſtalks, which run a great length, and require ſupport; they are covered with a purpliſh bark, and are furniſhed at each joint with a digitated leaf, compoſed of five ſmooth entire lobes, connected with the ſtalk by pedicles, about two inches long, having two ſmall leaves embracing the ſtalks at their baſe; and from the ſame point comes out a long tendril, which twiſts round the neighbouring ſupport; the flowers come out at the ſame joints as the leaves, ſupported on footſtalks almoſt three inches long; theſe flowers have a faint ſmell, and continue but one day; they come out in July, and there is a diurnal ſucceſſion till the froſt in autumn puts a ſtop to them.

This plant may be propagated either from ſeeds, layers, or cuttings; they require a good aſpected wall; where they may have height for their ſhoots to extend, which ſhould be properly trained againſt it; and in the ſpring the plants muſt be pruned, when all the ſmall weak ſhoots ſhould be cut off, and the ſtrong ones ſhortened to about four or five feet long, which will cauſe them to put out ſtrong ſhoots for flowering the following ſummer.

PASTURE, or *Paſture Land*, a general name for all ſorts of land reſerved for the purpoſes of feeding cattle.

Paſture ground is of two ſorts: the one is low meadow land, which is often overflowed; and the other is upland, which lies high and dry. The firſt of theſe will produce a much greater quantity of hay than the latter, and will not require manuring or dreſſing ſo often: but then the hay produced on the upland is much preferable to the other; as is alſo the meat which is fed in the upland more valued than that which is fatted in rich meadows: though the latter will make the fatter and larger cattle, as is ſeen by thoſe which are brought from the low rich lands in Lincolnſhire. But where people are nice in their meat, they will give a much larger price for ſuch as hath been fed on the downs, or in ſhort upland paſture, than for the other, which is much larger. Beſides this, dry paſtures have an advantage over the meadows, that they may be fed all the winter, and are not ſo ſubject to poach in wet weather; nor will there be ſo many bad weeds produced; which are great advantages, and do, in a great meaſure, recompenſe for the ſmallneſs of the crop.

We have already mentioned the advantages of meadow land, or ſuch as is capable of being overflowed with water, and given directions for draining and improving low paſture land, under the article LAND; therefore ſhall not repeat that here, but juſt mention ſome methods for improving of upland paſture.

The firſt improvement of upland paſture is, by fencing it, and dividing it into ſmall fields of four, five, ſix, eight, or ten acres each, planting timber trees in the hedge-rows, which will ſcreen the graſs from the dry pinching winds of March, which will prevent the graſs from growing in large open lands; ſo that, if April proves a dry month, the land produces very little hay; whereas in the ſheltered fields the graſs will begin to grow early in March, and will cover the ground, and prevent the ſun from parching the roots of the graſs, whereby it will keep growing, ſo as to afford a tolerable crop, if the ſpring ſhould prove dry. But, in fencing of land, it muſt be obſerved, as was before directed, not to make the incloſures too ſmall, eſpecially where the hedge-rows are planted with trees; becauſe, when the trees are advanced to a conſiderable height, they will ſpread over the land; and, where they are cloſe, will render the graſs ſour; ſo that, inſtead of being an advantage, it will greatly injure the paſture.

The next improvement of upland paſture is, to make the turf good, where, either from the badneſs of the ſoil, or for want of proper care, the graſs hath been deſtroyed by ruſhes, buſhes, or mole-hills. Where the ſurface of the land is clayey and cold, it may be improved by paring it off, and burning it in the manner before directed: but, if it is an hot ſandy land, then chalk, lime, marle, or clay, are very proper manures to lay upon it: but this ſhould be laid in pretty good quantities, otherwiſe it will be of little ſervice to the land.

If the ground is over-run with buſhes or ruſhes, it will be a great advantage to the land to grub them up towards the latter part of ſummer; and after they are dried, to burn them, and ſpread the aſhes over the ground juſt before the autumnal rains; at which time the ſurface of the land ſhould be levelled, and ſown with graſs-ſeed, which will come up in a ſhort time, and make good graſs the following ſpring. So, alſo, when the land is full of mole-hills, theſe ſhould be pared off, and either burnt for the aſhes, or ſpread immediately on the ground, when they are pared off, obſerving to ſow the bare patches with graſs ſeed, juſt as the autumnal rains begin.

Where the land has been thus managed, it will be of great ſervice to roll the turf, in the months of February and March, with an heavy wood roller; always obſerving to do it in moiſt weather, that the roll may make an impreſſion: this will render the ſurface level, and make it much eaſier to mow the graſs, than when the ground lies in hills; and will alſo cauſe the turf to thicken, ſo as to have what the people uſually term a good bottom. The graſs, likewiſe, will be the ſweeter for this huſbandry, and it will be a great help to deſtroy bad weeds.

Another improvement of upland paſtures is, the feeding of them: for, where this is not practiſed, the land muſt be manured at leaſt every third year; and where a farmer hath much arable land in his poſſeſſion, he will not care to part with his manure to the paſture. Therefore every farmer ſhould endeavour to proportion his paſture to his arable land, eſpecially where manure is ſcarce, otherwiſe he will ſoon find his error; for the paſture is the foundation of all the profit which may ariſe from the arable land.

Whenever the upland paſtures are mended by manure, there ſhould be a regard had to the nature of the ſoil, and a proper ſort of manure applied: as, for inſtance, all hot ſandy land ſhould have a cold manure; neat's dung and ſwine's dung are very proper for ſuch lands; but, for cold lands, horſe-dung, aſhes, and other warm manures, are proper. And, when theſe are applied, it ſhould be done in autumn, before the rains have ſoaked the ground, and rendered it too ſoft to cart on; and it ſhould be carefully ſpread, breaking all the clods as ſmall as poſſible, and then harrowed with buſhes, to let it down to the roots of the graſs. When the manure is laid on at this ſeaſon, the rains in winter will waſh down the ſalts, ſo that the following ſpring the graſs will receive the advantage of it.

There ſhould alſo be great care had to the deſtroying of weeds in the paſture every ſpring and autumn: for, where this is not practiſed, the weeds will ripen their ſeeds, which will ſpread over the ground, and thereby fill it with ſuch a crop of weeds as will ſoon overbear the graſs, and deſtroy it; and it will be very difficult to root them out, after they have gotten ſuch poſſeſſion; eſpecially ragwort, and ſuch other weeds as have down adhering to their ſeeds.

Theſe upland paſtures ſeldom degenerate the graſs which is ſown on them, if the land is tolerably good: whereas the low meadows, which are overflowed in winter, in a few years turn to an harſh ruſhy graſs, though the upland will continue a fine ſweet graſs for many years without renewing.

There is no part of huſbandry, of which the farmers are in general more ignorant than that of the paſture: moſt of them ſuppoſe, that when old paſture is ploughed up, it can never be brought to have a good ſward again: ſo their common method of managing their land, after ploughing, is, to ſow, with their crop of barley, ſome graſs ſeeds, as they call them; that is, either the red clover, which they intend to ſtand two years after the corn is taken off the ground, or rye-graſs, mixed with trefoil: but as all theſe are, at moſt, but biennial plants, whoſe roots decay ſoon after their ſeeds are perfected; ſo, the ground, having no crop upon it, is again ploughed for corn: and this is the conſtant round which the lands are employed in, by the better ſort of farmers; for I never have met with one of them, who had the leaſt notion of laying down their land to graſs for any longer continuance; therefore, the ſeeds which they uſually ſow, are the beſt adapted for this purpoſe.

But, whatever may have been the practice of theſe people, I hope to prove, that it is pooſſible to lay down land, which has been in tillage, with graſs, in ſuch a manner, as that the ſward ſhall be as good, if not better, than any natural graſs, and of as long duration. But this is never to be expected, in the common method of ſowing a crop of corn with the graſs ſeeds: for, wherever this has been practiſed, if the corn has ſucceeded well, the graſs has been very poor and weak; ſo that, if the land has not been very good, the graſs has ſcarcely been worth ſaving: for the following year it has produced but little hay, and the year after the crop is worth little, either to mow or feed. Nor can it be expected to be otherwiſe; for the ground cannot nouriſh two crops: and, if there were no deficiency in the land, yet the corn, being the firſt, and moſt vigorous of growth, will keep the graſs from making any conſiderable progreſs; ſo that the plants will be extremely weak, and but very thin, many of them, which came up in the ſpring, being deſtroyed by the corn; for, whenever there are roots of corn, it cannot be expected there ſhould be any graſs. Therefore, the graſs muſt be thin, and, if the land is not in good heart, to ſupply the graſs with nouriſhment, that the roots may branch out after the corn is gone, there cannot be any conſiderable crop of clover: and, as their roots are biennial, many of the ſtrongeſt plants will periſh ſoon after they are cut; and the weak plants, which had made but little progreſs before, will be the principal part of the crop for the ſucceeding year: which is many times not worth ſtanding.

Therefore, when ground is laid down for graſs, there ſhould be no crop of any kind ſown with the ſeeds; and the land ſhould be well ploughed, and cleaned from weeds; otherwiſe the weeds will come up the firſt, and grow ſo ſtrong, as to overbear the graſs, and, if they are not pulled up, will entirely ſpoil it. The beſt ſeaſon to ſow the graſs ſeeds upon dry land is about the middle of September, or ſooner, if there is an appearance of rain: for, the ground being then warm, if there happen ſome good ſhowers of rain after the ſeed is ſown, the graſs will ſoon make its appearance, and get ſufficient rooting in the ground before winter; ſo will not be in danger of having the roots turned out of the ground by the froſt, eſpecially if the ground is well rolled before the froſt comes on, which will preſs it down, and fix the earth cloſe to the roots. Where this hath not been practiſed, the froſt has often looſened the ground ſo much, as to let in the air to the roots of the graſs, and done it great damage; and this has been brought as an objection to the autumnal ſowing of graſs: but it will be found to have no weight, if the above direction is practiſed: nor is there any hazard of ſowing the graſs at this ſeaſon, but that of dry weather, after the ſeeds are ſown; for, if the graſs comes up well, and the ground is well rolled in the end of October, or the beginning of November, and repeated again the beginning of March, the ſward will be cloſely joined at bottom, and a good crop of hay may be expected the ſame ſummer. But, where the ground cannot be prepared for ſowing at that ſeaſon, it may be performed the middle or latter end of March, according to the ſeaſon's being early or late; for, in backward ſprings, and in cold land, we have often ſowed the graſs in the middle of April, with ſucceſs: but there is danger, in ſowing late, of dry weather, and eſpecially if the land is light and dry; for we have ſeen, many times, the whole ſurface of the ground removed by ſtrong winds at that ſeaſon; ſo that the ſeeds have been driven in heaps to one ſide of the field. Therefore, whenever the ſeeds are ſown late in the ſpring, it will be proper to roll the ground well ſoon after the ſeeds are ſown, to ſettle the ſurface, and prevent its being removed.

The ſorts of ſeeds which are the beſt for this purpoſe, are, the beſt ſort of upland hay-ſeeds, taken from the cleaneſt paſtures, where there are no bad weeds: if this ſeed is ſifted to clean it from rubbiſh, three buſhels will be ſufficient to ſow an acre of land. The other ſort is the *trifolium pratenſe album*, which is commonly known by the names white Dutch clover, or white honeyſuckle graſs. Eight pounds of this ſeed will be enough for one acre of land. The graſs ſeed ſhould be ſown firſt, and then the Dutch clover-ſeed may be afterwards ſown: but they ſhould not be mixed together; becauſe the clover-ſeeds, being the heavieſt, will fall to the bottom, and conſequently the ground will be unequally ſown.

When the ſeeds are come up, if the land ſhould produce many weeds, theſe ſhould be drawn out before they grow ſo tall as to overbear the graſs: for, where this has been neglected, the weeds have taken ſuch poſſeſſion of the ground, as to keep down the graſs, and ſtarve it; and, when theſe weeds have been ſuffered to remain until they have ſhed their ſeeds, the land has been ſo plentifully ſtocked with them, as intirely to deſtroy the graſs: therefore it is one of the principal parts of huſbandry, never to ſuffer weeds to grow on the land.

If the ground is rolled two or three times, at proper diſtances after the graſs is up, it will preſs down the graſs, and cauſe it to make a thicker bottom: for, as the Dutch clover will put out roots from every joint of the branches which are near the ground, ſo, by preſſing down of the ſtalks, the roots will mat ſo cloſely together, as to form a ſward ſo thick as to cover the whole ſurface of the ground, and form a green carpet; and will better reſiſt the drought. For, if we do but examine the common paſtures in ſummer, in moſt of which there are patches of this white honeyſuckle graſs growing naturally, we ſhall find theſe patches to be the only verdure remaining in the fields. And this, the farmers in general acknowledge, is the ſweeteſt feed for all ſorts of cattle; yet never had any notion of propagating it by ſeeds: nor has this been long practiſed in England; for, till within a few years, that ſome curious perſons imported the ſeed from Brabant, where it had been long cultivated, there was not any of the ſeeds ſaved in England: though now there are ſeveral perſons who ſave the ſeeds here, which ſucceed full as well as any of the foreign ſeeds which are imported.

As the white clover is an abiding plant, ſo it is certainly the very beſt ſort to ſow, where paſtures are laid down to remain: for as the hay-ſeeds which are taken from the beſt paſtures, will be compoſed of various ſorts of graſs, ſome of which may be but annual, and others biennial; ſo, when thoſe go off, there will be many and large patches of ground left bare and naked, if there is not a ſufficient quantity of the white clover, to ſpread over and cover the land. Therefore, a good ſward can never be expected, where this is not ſown: for in moſt of the natural paſtures we find this plant makes no ſmall ſhare of the ſward; and it is equally good for wet and dry land, growing naturally upon gravel and clay, in moſt parts of England: which is a plain indication how eaſily this plant may be cultivated, to great advantage, in moſt ſorts of land throughout this kindom.

Therefore, the true cauſe why the land which has been in tillage, is not brought to a good turf again, in the uſual method of huſbandry, is, from the farmers not diſtinguiſhing which graſſes are annual from thoſe which are perennial: for, if annual or biennial graſſes are ſown, theſe will of courſe ſoon decay; ſo that, unleſs where ſome of their ſeeds may have ripened and fallen, nothing can be expected on the land but what will naturally come up. Therefore this, with the covetous method of laying down the ground with a crop of corn, has occaſioned the general failure of increaſing the paſture in many parts of England, where it is now much more valuable than any arable land.

After the ground has been ſown in the manner before directed, and brought to a good ſward, the way to preſerve it good is, by conſtantly rolling the ground with an heavy roller, every ſpring and autumn, as hath been before directed. This piece of huſbandry is rarely practiſed by farmers: but thoſe who do, find their account in it; for it is of great benefit to the graſs. Another thing ſhould alſo be carefully performed; which is, to cut up docks, dandelion, knapweed, and all ſuch bad weeds, by their roots every ſpring and autumn: this will increaſe the quantity of good graſs, and preſerve the paſtures in beauty. Dreſſing of theſe paſtures every third year is alſo a good piece of huſbandry; for otherwiſe it cannot be expected the ground ſhould continue to produce good crops. Beſides this, it will be neceſſary to change the ſeaſons of mowing, and not to mow the ſame ground every year; but to mow one ſeaſon, and feed the next: for, where the ground is every year mown, it muſt be conſtantly dreſſed, as are moſt of the graſs grounds near London, otherwiſe the ground will be ſoon exhauſted. *Miller's Gard. Dict.*

The following Methods of improving wet Paſtures, will, we doubt not, be very acceptable to our Readers, as they are founded on Experience, and conſequently have no tendency to deceive the Huſbandman.

“ As I have, ſays our ingenious huſbandman, within a few years, not only had ſome experience in my own farm, but obſerved the methods employed by many neighbouring gentlemen and farmers in mending their paſtures, I ſhall communicate a few of my remarks to you on the improvement of wet paſtures; a ſubject which may prove, perhaps, of ſome little utility, as I ſhall ſpeak of nothing but what I have either performed myſelf, or ſeen hereabouts.

“ The particular lands of which I ſpeak are looſe, woodcock, brick-earth ſoils for about eighteen or twenty inches, and under that, clay to a great depth.

Some that I have improved myſelf were exactly level, ſo as to be quite poiſoned with the wet, which could not drain off.

“ From the beſt obſervations I could make on many experiments, the following is the method which anſwers beſt to improve them. I ſhall alſo give you the expence with us.

“ The firſt thing to be done is, to make large, deep ditches round every field, and, if the fields are large, to divide them into ſmaller, of five, ſix, or ſeven acres each, by new ditches; nothing is attended with a more ſudden improvement of all the ground near the borders of the fields, than good ditches.

“ I generally make mine ſix feet perpendicular deep, ſeven wide at top, and three at the bottom. I never pay for them by the rod (which is cuſtomary) but give twopence halfpenny per load, of thirty buſhels, for all the clay, &c. that is thrown out of them, and two ſhillings and ſixpence a ſcore loads for filling and ſpreading it.

“ Theſe ditches ſhould be made in ſuch a manner that no water can remain in them, but a deſcent from one to another to carry it quickly off.

“ It may be eaſily imagined how much theſe muſt drain the land, beſides the quantity of excellent manure (clay) which ariſes out of them. Add to this the great convenience of having ſuch fences about a farm, that the farmer is ſure to find his cattle wherever he turns them, inſtead of their breaking perpetually into his corn or hay fields, which, in multitudes of farms, is ſo often the caſe: it is ſometimes the work of a boy, only to be hunting after hogs and ſheep that go aſtray for want of good fences.

“ In the banks of new ditches we always lay white thorn, fifty roots to a rod (the workmen are allowed ſixpence per hundred for gathering them;) but I always avoid intermixing any thing with it, eſpecially haſel, for in the nut ſeaſon fences are pulled in pieces for the fruit by all the boys and girls in the neighbourhood; and oak, aſh, &c. only give an opportunity to get over the hedge with greater eaſe. Sallow, willow, elder, &c. are to be avoided in the hedge, or by way of hedge ſtake for the dead hedge, as they grow ſo faſt as quite to overſhadow the quick, and even deſtroy it. After frequent cuttings, to render the plants thick and ſtrong, I keep the quick regularly clipped, which, in a few years, renders the fence impenetrable to man or beaſt, conſidering the largeneſs of the ditch.

“ If an old fence is grown bad and thin, or compoſed of improper plants, I never yet obſerved it improved by planting quick in the gaps: the beſt way is, to reverſe the bank, and plant freſh quick.

“ One advantage ariſing from good fences is not apparent at firſt ſight. To the diſgrace be it ſpoken of moſt of the gentlemen of large fortunes round Bury, the game is wretchedly deſtroyed by poachers, who take it with night-nets. Theſe vermin, who are generally labourers, ſwarm in every village round me. Their method is this: they take the farmer's horſes out of his fields, and, after their doing a hard day's work, ride them all night, as faſt as they can make them go, over the ſtubbles, to catch the partridges, blundering over every hedge (except ſuch as I have deſcribed) in their way, oftentimes ſtaking the horſes (of which two inſtances have I ſeen this ſeaſon) making gaps in the fences, riding over ſtanding corn, clover for feed, or any thing that is a cover for birds, and, after damaging the farmer in a moſt ſhameful manner, carry the produce of their infamous labour to many, who, to their great diſhonour, encourage theſe raſcals for their convenience. The money they get is ſpent at the next alehouſe, and inſtead of doing the farmer a good day's work, they are drunk, aſleep, or idle, the whole day.

“ Now there are very few farmers horſes that will leap a gate; but moſt will plunge through ſuch hedges as are common hereabouts: none could paſs ſuch ditches as I always make and recommend. A farmer in this pariſh has ſo effectually fenced in his fields with prodigious ditches, that I have heard him declare, that not a ſingle night-netter has been on his grounds on horſe-back; and were they to attempt it, they would loſe more time in paſſing one ditch than was neceſſary to drag ſome whole farms.

“ The pernicious effects, to farmers, of this abominable practice, are notorious, and cry aloud for redreſs: if they would eaſe themſelves, I know of no way but ſuch ditches as I have deſcribed.

“ But to return.

“ When the ditching is done, the next work is to land-drain the whole fields in ſuch a manner that every part of them may be laid dry. In a paſture of ſix acres I did two hundred rod. If there is the leaſt fall in any part, or any place more wet than others, the drains ſhould be cut through them. If the ſurface is exactly level, the depth of the drains ſhould vary, ſo that the water may every where have a deſcent.

“ Theſe drains are made here, in general, thirty-two inches deep, twenty inches wide at the top, and four wide at the bottom. They are filled eight inches deep with either ſtones or wood; but I ſhould ever recommend

mend the former, as the moſt effectual and laſting, to thoſe who are not deſirous of ſaving the difference of the expence. However, I know many fields in this pariſh and neighbourhood that are drained with wood, and which anſwer extremely well; and I have been aſſured that they will laſt twenty or thirty years. Nay, in ſome parts of Eſſex I hear they do it with ſtraw alone; but this muſt be of ſervice for only a few years: if ſtone be uſed, there can be no doubt of its laſting. The labour of the whole is three-pence per rod; ſometimes it is done for two-pence halfpenny.

“ If with ſtone of the farmers, a load of thirty buſhels will do three rods, which coſts one ſhilling and a halfpenny ſtubbing and picking; ſo the expence of a rod is ſeven-pence, beſides carriage of the ſtone, which will not be much: but if he buys his ſtone, as is much the moſt probable in this country, we may ſuppoſe he muſt go two miles to fetch it, and give a ſhilling for eighteen buſhels ready picked: the carriage is worth a ſhilling more, and reckoning the eighteen buſhels to do a rod and half (which is near the matter) the ſtone of it will coſt per rod one ſhilling and four-pence.

“ If buſhes are uſed, a load of forty faggots will coſt if he buys them, or be worth if he has them, five ſhillings, and coſt cutting one ſhilling. They will do ten rods; ſo that the whole expence of doing a rod with them will be ten-pence, and of ſtone one ſhilling and ſeven-pence.

“ The very firſt year the prodigious advantage of theſe drains appears, eſpecially if the ſeaſon proves wet. The graſs (or corn if in ploughed fields, for it anſwers in all) will be freſh, vigorous, and ſweet, wherever the paſtures are drained.

“ I have a field of ſix acres (mentioned above) which by land-draining, ditching, and manuring, is an exceeding good paſture, and has produced two tons and ten hundred weight of hay per acre, in a very good year, and generally thirty-five hundred weight per acre; whereas the paſtures adjoining are ſcarce worth the farming, and let but at ſeven ſhillings per acre, producing ſcarce any thing but a little feed for lean cattle. The ſoil is the ſame in both; the ſix acres, about twelve years ago, being full as bad as the reſt.

“ To improve ſuch wet land, nothing can be more advantageous than the clay which is thrown out of the ditches. Eighty loads per acre is the quantity I have laid on, and have been told by ſeveral ſenſible farmers (who clay a good deal) that it is a proper covering; but if nothing is mixed with it, ninety-five or one hundred. I know a piece of graſs-land greatly improved, on which were ſpread one hundred and fifty loads.

“ My method is to make a large hill of manure, by firſt laying a quantity of clay regularly on a heap; then placing a thin layer of muck, ſuch as I have, upon it, either my ſtable or rack-yard dung, or bringing it of any kind in my waggon from Bury; on this layer, another thick one of clay; then the ſecond of dung, and ſo on; letting the proportion be about twenty loads of dung to fifty of clay. Theſe heaps, after remaining ſix months without ſtirring, I mix well together by turning them over, which a workman will do at the rate of eight ſhillings for one hundred loads. Let it lie ſix months longer in this ſtate, and then carry it on to the land, paying two ſhillings and ſixpence per ſcore loads for filling and ſpreading. This I take, from experience, to be by much the beſt way of manuring with clay, as it works and impregnates the ſoil much ſooner than alone.

“ Whenever I clay arable land, I do it on clover paſtures after the crop of corn is off, managing it in the ſame manner as for paſtures. If it is ploughed in directly, it is ſeveral years before it works; but having a winter and ſummer to diſſolve and powder it, it waſhes into the ſoil more equally, and in a properer ſtate for improvement. *See the article* CHALK.

“ Theſe are the principal points to be obſerved in improving ſuch wet, cold, looſe, paſtures as I have deſcribed: ſome that I have quite changed by theſe means were half over-run with moſs and ruſhes; but draining them thoroughly, and claying them, kills all rubbiſh of this ſort, and preſents the farmer with ſo admirable a view of good paſture for dairy or grazing, where ſo lately nothing could live, as is to be equalled in ſcarce any thing of the kind.

“ But as all improvement ceaſes to be ſuch when more money is ſpent in it than the advantages will repay, I ſhall in a few words diſplay how far this is from being the caſe here. I will ſuppoſe two or three fields are improved, amounting in the whole to twenty acres.

	l.	s.	d.
“ Sixty loads of clay per acre thrown out of the ditches, twelve hundred loads, at two-pence halfpenny per load – – – –	12	0	0
“ I will ſuppoſe ſixty rod of new ditching done, which, before clay is thrown out by the load, will coſt one ſhilling per rod – – –	3	0	0
“ Three thouſand quickſets, at ſixpence per hundred – – – – – –	0	15	0
“ Land-draining ſeven hundred rod with buſhes (this is the quantity I have now marked out in a field of twenty acres) at ten-pence per rod	29	3	4
“ N. B. I had a great part of my laſt crop of barley killed in this field with the wet: I had therefore a fine opportunity of marking exactly where the drains ſhould be made, which ought, on ſuch occaſions, never to be omitted, were it only for the common water-furrows which are made for every crop. In ſome fields, unleſs ſuch a guide offers, it is very difficult to tell exactly where to make the land-drains.			
“ Turning and mixing one thouſand ſix hundred loads of manure – – – –	6	8	0
“ Filling and ſpreading one thouſand ſix hundred loads, at two ſhillings and ſixpence per ſcore	10	0	0
“ I will ſuppoſe that the work may be done the ſooner if the farmer brings one hundred loads of the four hundred of dung from the neareſt town; and as I have not reckoned the horſes and driver for the clay cart, I ſhall not in the bringing the dung: therefore the expences per waggon load will be, the coſt three ſhillings, boy ſixpence, and turnpike ſixpence. A waggon load is two tumbrel loads (in this country) ſo fifty loads, at four ſhillings, are	10	0	0
Total	71	6	4

“ This is three pounds eleven ſhillings and three-pence per acre: and ſuppoſing the profit to laſt but twenty years, although the draining and ditching part will laſt twice that time, and the clay five and twenty as good as at firſt; and the farmers hereabouts ſeldom change their farms, if tolerable ones, living in them their lives, and their ſons after them, with leaſes of ſeventeen, twenty-one, and twenty-five years: ſuppoſing twenty years profit, I ſay, the expences will then be, per acre per annum, three ſhillings and ſixpence halfpenny.

“ So ſmall is the expence divided. But now let us conſider the profit.

“ Such land as I have deſcribed never lets here for more than ten ſhillings per acre, by far oftener for eight ſhillings, or eight and ſixpence; and it is from my own experience, as well as various obſervations, that I aſſert the ſame land, after the improvements, will let to any tenant for ſeventeen, eighteen, and twenty ſhillings per acre.

“ I will ſuppoſe it only ſixteen ſhillings, though I am certain that is conſiderably under the mark: he then gains, in point of rent, ſix ſhillings per acre; and the whole calculation is abſurd, if we do not add his whole proportional profit on the acre: ſuppoſing his profit on it before improvement was a rent, ten ſhillings; afterwards, it will undoubtedly be the ſame at leaſt; which adds ſix ſhillings more to the profit; ſo that the whole will be twelve ſhillings per acre per annum, or eight ſhillings and ſixpence clear, after the improvement is paid.

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“ Twelve ſhillings per acre is per annum, for twenty years – – – – – – –	240
“ Expences of improvement – – – –	71
“ Clear profit – – – – – –	169

“ Or eight pounds nine ſhillings per annum : and if we reckon five per cent. intereſt for the ſeventy-one pounds, that is, three pounds eleven ſhillings per annum, which, deducted from eight pounds nine ſhillings, leaves four pounds eighteen ſhillings per annum abſolute profit.

“ Thus, I think, I have ſtated the caſe of this improvement clearly ; and I muſt repeat it, that I ſpeak from experience. The ſum to be expended on twenty acres will appear large to moſt farmers, whoſe property is not conſiderable ; but the proportion holds for a ſingle acre, and thoſe who cannot afford to improve twenty, may three, four, or five ; and I make no doubt but ſuch as attempt it will find their account in it greater than I have ſtated it.

“ As I have mentioned a tumbrel-load to be thirty buſhels, and a waggon load to be but two tumbrels, I ſhould obſerve that we carry away of muck fifty buſhels at a time in our tumbrels, and ſo agree with our men in proportion to the thirty buſhel loads.

“ I have obſerved, that in making new ditches, or enlarging old ones, I never pay by the rod, but by the load : however, to thoſe who chuſe the former way, I would recommend that they have them worked by a frame of ſmall ſlit deal, nailed into the exact ſize of the intended ditch, and agree with the workmen to do their work by it : this will prevent diſputes which frequently ariſe.”

PATE, a brock or badger.

PEACH-TREE, a genus of fruit-trees well known, and ſaid to be natives of Perſia.

This tree, in England, grows to a tolerable ſize ; is generally trained againſt walls, &c. being too apt to miſcarry of its fruit when planted as a ſtandard ; when grown old it has a pretty thick ſtem, with many brittle branches, and a rediſh and browniſh bark ; the leaves are thin, oblong, acuminated, and for the moſt part crenated on their edges, having a bitter taſte ; the flowers appear in the beginning of the ſpring before the leaves, and are without pedicles, for they adhere to the tubercles of the branches, and are roſaceous, conſiſting each of five oblong oval petals inſerted in the cup ; they are of a light pink colour, and in the middle are many ſtamina ; the flower is ſucceeded by a well known globular, furrowed fruit, covered with a thick ſoft whitiſh down. In England there are ſeveral ſorts or varieties cultivated, as 1. The white nutmeg peach, this is ripe in July. 2. The red nutmeg, this ripens about the beginning of Auguſt. 3. The early purple, this is ripe by the middle of Auguſt. 4. The French mignon ; this is a moſt excellent melting peach, and ripens about the middle of Auguſt. 5. The red magdalen ; this peach is ripe about the end of Auguſt. 6. The early Newington ripens the end of Auguſt. 7. The nobleſt ; this is a fine melting peach, and ripens the end of Auguſt. 8. The chancellor, a good melting peach, and ripens the end of Auguſt. 9. The admirable ; this peach parts from the ſtone, and ripens the beginning of September. 10. The old Newington ; this peach adheres to the ſtone, and is reckoned one of the beſt ſort. 11. The Portugal peach ; this has a rich juice, and adheres to the ſtone, theſe ripen about the middle of September. 12. The nivette ; this is a melter, and ripens in September. 13. The pavy of pomponne, is a very large fine peach, and ripens in October. 14. The Catherine ; this adheres to the ſtone, is a high flavoured peach, and ripens in October : there are various other ſorts, which might be enumerated ; but the above-mentioned being of the beſt and richeſt flavour, we think it will ſuffice. The French diſtinguiſh thoſe we call peaches into two ſorts, viz. pavies, and peaches ; thoſe are called peaches which ſeparate from the ſtone, and thoſe whoſe fleſh cloſely adheres to the ſtone are called pavies ; theſe are much more eſteemed in France than the peaches, though in England the latter are preferred to the former by many perſons.

The beſt expoſitions for peach trees, are the ſouth, ſouth-eaſt, and ſouth-weſt, but they will do tolerably well on a weſt wall, which ripens its fruit juſt as thoſe of the ſouth are gone ; they ſhould not be planted in a cold wet ſoil, the fruit in ſuch places are always watery, and inſipid ; the beſt ſoil for theſe, is freſh untried earth, which is neither too ſtiff nor too moiſt, but of a kind loamy nature ; and if the earth in the borders is exhauſted where the trees are intended to be planted, it ſhould be taken away, and its place ſupplied with freſh ; all the ſorts of peaches are propagated by inoculation on plumb-ſtocks, and trained in the nurſeries for planting againſt walls, &c. but it is certainly beſt to make choice of ſuch trees, which are of one year’s growth from the budding, as they will ſoon overtake in growth thoſe which are called trained trees ; the beſt time to tranſplant them is in autumn, when the leaves are turned yellow, when they will have time to form freſh roots, before winter, and thereby be better prepared to ſhoot more vigorous in the ſpring ; but the head ſhould not be cut off at that time of planting ; but if the ſoil is very moiſt, it is better to plant in the ſpring juſt as the ſap begins to be in motion : in February the tops of the trees ſhould be cut off within four or five eyes of the place of inoculation ; and when the weather becomes hot and dry, it may be neceſſary to water the trees : in May the young ſhoots will have made ſome progreſs ; thoſe which have a fore-right direction, ſhould be diſplaced, and the others nailed horizontally to the wall ; this muſt be repeated as often as it is neceſſary : in October, the branches ſhould be ſhortened in proportion to the ſtrength of the tree, a vigorous branch may be left nine inches or a foot long, but if the ſhoots are weak, half that length is ſufficient ; obſerving to train them horizontally, as the middle of the tree will eaſily furniſh itſelf with branches : the ſecond ſummer, they are to be managed as the firſt, diſplacing all fore-right ſhoots as they are produced, and nailing in the others cloſe to the wall horizontally ; but the ſhoots ſhould not be ſhortened in the ſummer, unleſs in thoſe places where there happens to be vacancies : in October, ſhorten the ſhoots as before directed, and the following year’s management, is much the ſame as the preceding. The time for pruning is at the above-mentioned time, where the trees are planted in a dry ſoil ; but if the land is moiſt, it is better to defer it till the ſpring.

When peach-trees haſten to bear very ſoon, it is a ſign of decay, or weakneſs, the beſt help for them is to diſburthen the tree of its bloom, pruning it ſhort, and keeping it well watered in hot weather ; but when the trees are vigorous, cut out ſuch large branches as appear to be uſeleſs, and nail in the remainder at a good length ; and in making choice of ſhoots, always chooſe the middling wood as are full of ſwelling double buds, for thoſe produce fruit, which the flat ſingle ones do not, their product being wood and leaves only ; the diſtance theſe trees ſhould be planted, may be about ſixteen feet : when the fruit is ſet and grown to the bigneſs of a ſmall nut, they ſhould be thinned, leaving them at leaſt five or ſix inches aſunder, for when they are permitted to remain in bunches, as they are often produced, the nouriſhment which ſhould be employed wholly to the fruits deſigned to ſtand, will be equally ſpent amongſt the whole number, a great part of which muſt be afterwards pulled off, ſo that the ſooner this is done, the better it will be for the remainder ; and if it ſhould ſometimes happen, that a part of thoſe left, by any accident ſhould be deſtroyed, yet the remaining ones will be much the larger, and better flavoured for it, and the trees will gain more ſtrength ; for a moderate crop of fruit, is always preferable to a great crop ; for when the trees are overcharged with fruit, it is always ſmall, ill taſted, and the trees are generally ſo much weakened thereby, as not to be in a condition for bearing well for two or three years afterward.

The following curious and uſeful obſervations on the pruning of peach-trees, are extracted from a French treatiſe, entitled, *Traite de la Culture de Pechees* ; and will, we hope, prove agreeable to our readers.

“ The beſt time, ſays this author, for pruning is when the bloſſom-buds firſt begin to ſmell ; for then you may diſcover which bloſſom promiſes the faireſt for producing a fruit.

“ That you may not run the hazard of breaking off ſuch buds as you ſhould wiſh to preſerve, do not offer to prune a twig till the tree is entirely unnailed from the wall.

“ Your method of pruning muſt be regulated by the age, health, and vigour of the tree, and in ſome ſort muſt humour what has been already done.

“ I will begin with the tree in its firſt year : if it has made but weak ſhoots, you firſt reduce its ſhoots, leaving from two to four on each ſide, oppoſite to each other, and prune them to the length of five or ſix inches. If you find a ſmall bearing branch that looks exceedingly flouriſhing in the middle, you may leave it; but unleſs it is remarkably promiſing, cut it off, for the middle of the tree is ſure to be filled if you prune the ſides properly: and the whole beauty and goodneſs of the tree abſolutely depends upon your right treatment of it for the two firſt years.

" If your tree has thrown out in a good place, on each ſide, one ſtrong branch, prune it to eight or ten inches, leaving here and there a bearing branch.

" It is the way with many gardeners, who look on theſe ſtrong ſhoots as blood-ſuckers, to lop them off without mercy; but this ought to be done with diſcretion, for it is not uncommon for a tree, ſo ſeverely handled, to languiſh and pine away, and from that luxuriant ſtate to dwindle to nothing: the reaſon I take to be this, that, as in all trees the root bears a proportion to its head, the ſap, being here repelled, becomes ſuperfluous and putrid in the root.

" Experience has taught me, that by pruning ſuch kind of trees with judgment, they will, in two or three years, be brought into order: but if they ſtill continue to throw out ſuch ſtrong wood, I ſhould adviſe the ſtopping all ſuch ſmaller branches of the year, which have been thrown out on the ſides, in order more effectually to ſpend the ſap: by this means the exceſſive luxuriance of the tree will be moderated, and much good bearing wood procured.

" The only inconvenience to be apprehended from this practice, and what ſhould be carefully guarded againſt, is, that the lower part of the tree is apt to become bare; but this may be remedied by an attention to pinch off the tops of the ſhoots in the month of May, and to lighten the head well when you prune it.

" If there is one of theſe woody branches on the ſide, and one in the middle of the tree, they muſt both be taken entirely off, or the weak ſide will be totally overpowered, and the tree can never be brought into any handſome form: you muſt then likewiſe prune the leſſer branches, that the two ſides may be kept as equal as poſſible. Here I muſt obſerve, that none of theſe ill-placed branches would be ſeen, for by lightening the ſtrong ſide, the ſap would naturally find its way to the other; but, as few people will take this trouble, we muſt find ſome means of repairing the damage incurred by ſuch neglect.

" This is the method to be followed for the firſt year. Let us now proceed to the ſecond, and ſo on.

" I have ſpoken ſufficiently of ſuch trees as run into wood, whoſe redundancy muſt be moderated before they will throw out any bearing branches, and by what means it may be done: as to thoſe that are moderate, they muſt be treated proportionably; but, above all things, care muſt be taken to keep the middle of the tree ſhort, and the ſides perfectly equal: let no flattering promiſe of fruit induce you to deviate from this rule.

" In regard to the good management of the tree, let two or four proper branches be, as it were, the parents of the reſt; over theſe you muſt be particularly watchful: let them ſpread, and have all the ſpace you can think they will poſſibly cover: they may be allowed from twelve to fifteen inches when you find them of a reaſonable ſtrength. As to the leſſer, they ſhould be left ſix or eight inches long, as you think the vigour of the tree will bear, and the ſpace to be occupied requires; and according as the bloſſom-buds are more or leſs diſtant from the foot of the branch, your own prudence muſt direct you to leave the ſhoot longer if neceſſary.

" Take care to preſerve ſuch bloſſom-buds as come out with a leaf-bud between them: thoſe which come ſingle, though with a leaf-bud by the ſide, will rarely ſet, or come to perfection: notwithſtanding they look very promiſing, never ſuffer yourſelf to be tempted, by a proſpect of abundance of fruit, to allow too many to remain on the tree; for by this means you waſte the ſtrength of it, and, in the end, ruin both the middle and ſides.

" As to ſlender, ill-ripened branches, I reject them all; as alſo thoſe tender twigs which are ſo much reſpected by the generality of gardeners; that is, ſuppoſing I have well-ripened wood of a moderate ſize (not too large) ſufficient for my uſe, it being inconteſtibly proved, that ſuch good wood will nouriſh the fruit beſt, and bring it to the higheſt perfection. I would not be underſtood here to reject thoſe little ſpurs which are only an inch or two long, and are cluſtered like noſegays; no, theſe are to be preſerved with the utmoſt care, as they generally produce the fineſt of fruit.

" There is a good uſe to be made of the branches which I here condemn, namely, to prune them down to the laſt eye, when they are in a place which may poſſibly become bare in future time: one of theſe branches, ſo pruned, may, in the next year, produce a better, which, if it is not wanted, may again be reduced, and ſo on, till it ſhall be deſirable to make uſe of it.

" It will be always found uſeful to have ſome of theſe branches in reſerve in all parts of the tree for a ſupply, in caſe of blight, or when a branch has bore too much fruit the year before; and for that reaſon I ſhould adviſe the cutting even a good branch for this purpoſe, when others are wanting.

" As all trees naturally ſhoot upwards, you muſt uſe your utmoſt diligence to keep the bottom part full of wood, which is only to be effected by proper pruning, and laying the branches exactly even, and quite horizontal: great attention muſt be given to this; for a crooked, or bent branch, or one laid over another, will never produce good fruit.

" On the art of pruning depends the duration of the tree; and it conſiſts in not overcharging it, and keeping it in all parts full: this may appear very eaſy, but it is attended with difficulty, as to the choice of what is to be preſerved, and what rejected, and as to the keeping of promiſing bloſſom-buds, and not preſſing the tree too much if it has bore greatly the preceding year.

" Now let us paſs on to the time when the tree ſhall be found in its full beauty and vigour.

" Suppoſing it has been managed after the method I preſcribe, after it is unnailed, examine into the branches which bore the laſt year: theſe are eaſily diſcovered by their leanneſs, and the poor ſhoots which they have made. I cut them quite cloſe to the large branch from which they ſpring, unleſs they have by chance thrown out ſome very promiſing wood, which may be worthy of preſervation, eſpecially if there is nothing in the neighbourhood to take up the place; then I go to the ſhoots of the year, and cut out all the very ſtrong woody ones, and the very ſmall ones, preſerving only thoſe of a moderate ſize, and the little cluſters or noſegays, before-mentioned.

" If I muſt, out of neceſſity, keep any of the weak ſhoots, I juſt top them about the thickneſs of a crown-piece: this done, there remains nothing but branches of equal ſtrength and goodneſs, and I can ſee clearly what I have to do.

" My only buſineſs now is, to make choice of what I ſhall preſerve of the remainder; and this is my rule:

" Of all the ſhoots which are made from the wood pruned laſt year, I leave only one lower ſhoot; and by the precaution I have uſed in the month of May, by nipping the tops of the others, that will be found by far the beſt, or rather the only good one.

" As for ſuch as neglect this operation, they muſt make the beſt choice they can.

" After this I go over it a third time, and examine whether the tree has borne much fruit the laſt year, that I may prune accordingly. The magdalene is generally a vigorous tree, and will bear a greater burthen than ſome others.

" If my trees of every ſort have not been too much exhauſted, I prune to the length of eight inches, if the place will allow it; but if I am confined, and have nothing below to ſupply the place of a waſted branch, I ſhorten it to three or four inches.

" It will generally be found, that half my branches are ſhort, and half long, according to their ſituation; by which I am enabled to keep the tree always full of good wood without preſſing it to its hurt.

" I have ſaid, that I never leave more than one ſhoot on the laſt year's branch; but in caſe a blight has killed the neighbouring branch; or there appear two ſhoots on the lower part, ſo very equal in goodneſs that there can be no choice between them, I then prune to the length of five or ſix inches: but if I have not an abſolute neceſſity for both for preſent uſe, I prune the higheſt of the two to the length, and cut the loweſt quite down to its firſt eye, in order to inſure to myſelf a proviſion for the next year."

Our author next treats of budding, or nipping off the buds; from which we ſhall ſelect a few paſſages, which cannot, we think, fail giving pleaſure to our readers.

" What I ſhall here call nipping of trees, is an operation of all others the moſt important, and at the ſame time one the moſt of all neglected: when I ſay the moſt important, I mean to except the pruning. The uſe of nipping is this, that it helps and forwards all other operations, and gives to the fruit theſe three advantages, their certainty, beauty, and goodneſs.

" The proper time for nipping is the month of May, when the buds are ſufficiently formed for you to aſcertain your choice, and ſtill tender enough for you to nip them off with your finger and thumb, without any other inſtrument. This nipping is uſually confounded with two other operations, which are called pinching and ſtopping, becauſe they are generally all performed together; but I ſhall diſtinguiſh them, the one from the other.

" All the management of peaches (as I have ſaid before) may be determined in theſe two objects, namely, the good figure of the tree, and its abounding with good fruit: to accompliſh this, all your work ſhould tend.

" With this view therefore you are to diveſt it of all that may be uſeleſs or hurtful; and I muſt call all uſeleſs which is ill ſituated, though in itſelf good, and all hurtful which is ill in itſelf.

" Theſe two evils we muſt guard againſt, and they will be particularly found on the branches, which are pruned the year before; and theſe branches, according to my method, are moſt of them ſix or eight inches long, there will be found on them from eight to ten eyes, which are as many branches: ſuch a number of branches cannot poſſibly be equally well nouriſhed, and muſt, of courſe, breed confuſion.

" I reduce them, according to their ſituation, to two or three, which I chuſe on the loweſt ſide, oppoſite to each other, and the end one, provided the fruit is there, and that it is not lower.

" If the fruit is only ſet on the lower ſide, or if it is ſet all the way along it, where the number of eyes may be from eight to ten, in both caſes I reduce them to half their number, and preſerve only three or four of the moſt promiſing, always obſerving to leave at the end a fair young branch of the year.

" At the ſame time I pinch off with my nail ſuch branches as accompany the fruit, to the thickneſs of about two crown-pieces, which I call ſtopping: and if there are others which have not fruit, I pull them quite off, reducing the number to two or three.

" If the branch has not thrown out any fruit, I prune it down to the ſecond bud; that is to ſay, I only preſerve the two loweſt buds, unleſs the tree is too luxuriant, and it becomes neceſſary to leave more in order to conſume the ſap.

" With reſpect to ſuch branches as I have pruned ſhort, I preſerve only two of the new ſhoots, the uppermoſt and its oppoſite: I ſuppreſs all others which have not fruit by them; ſuch as have, I pinch them; but if the fruit fall off, I ſerve them all after the ſame faſhion: ſometimes, however, I leave only one of theſe new ſhoots, and it muſt be always the loweſt.

" If I find a woody, ſtrong ſhoot on the branch pruned laſt year, or even if it ſhoots from the body of the tree, I conſider whether it will weaken the tree, be detrimental to its neighbour, or not of immediate ſervice: if it anſwers no purpoſe, I take it entirely off.

" But if it may hereafter be found uſeful, either to fill a vacant place, or to waſte the ſap which too much abounds, I pinch it down to four or five leaves; and as there comes a new ſhoot from every leaf, I ſhall find preſently as many free ſhoots, of a moderate ſize, out of which I may chuſe, in the firſt nailing, ſuch as promiſe beſt. As to the weak ſhoots which come from the old wood, I ſuppreſs them entirely, unleſs they come opportunely to fill a preſent vacancy, or are deſirable for a future reſource; but the little cluſters, or noſegays, I always preſerve, let them be where they will.

" Great regard ſhould be paid to the bottom part of the tree, as it often puts forth good ſhoots, which will be found very convenient to ſupply ſuch wood as is exhauſted with bearing: theſe I preſerve with the utmoſt care, and, if they are ſtrong, pinch them off to five or ſix eyes. As for thoſe craving ſhoots which are to be known by their bright-green colour, with here and there red ſpots, and by their ſize, they muſt be wholly taken off, unleſs they are abſolutely neceſſary to fill a vacancy, and that you are without other reſource: if ſo, you muſt pinch them now, and again in the month of June.

" It generally happens, that from one eye, eſpecially that at the extremity of the laſt year's pruning, three ſhoots will come forth of nearly the ſame ſtrength: chuſe only one of them, and let it be that which is beſt placed.

" When you meet with twin fruit, take off the leaſt of them with all poſſible care not to ſhake the other: by this means you have a chance of having one good fruit, and if both are preſerved, neither will be ſo.

" Theſe are the chief points which relate to the nipping. The next thing is to ſhew the advantages it produces.

" It may eaſily be comprehended that theſe retrenchments, made in the proper time, are likely to ſtrengthen ſuch as are left, both fruit and branch, as, from a moderate ſhare of nouriſhment, they will by this means enjoy a better, till they are made perfect.

" Nay, more, it is poſſible that what you have retrenched of the ill-placed branches, which you muſt have cut off at the firſt nailing, might have been more favoured by the ſap, and have robbed the well-placed branch, which, by being left alone, now enjoys the whole of the nouriſhment, and becomes ſtrong and vigorous.

" By theſe retrenchments you reap this further advantage, that when you come to the nailing, inſtead of being obliged to clear with the pruning-knife, you have theſe branches ready cleared to your hand; by which you are ſaved an infinite deal of trouble, which the confuſion of ſuch a multitude of ſhoots occaſions, and are ſpared the diſagreeable ſight of abundance of ſtumps, which the ſummer-pruning muſt neceſſarily produce, and occaſion a deal of buſineſs when you come to the winter-pruning, unleſs you unadviſedly leave them on.

" It often happens likewiſe, that theſe naſty ſtumps, left at the time of nailing, throw out two or three ugly ſhoots, which waſte the ſap, breed confuſion, and ruin the fruit.

" It farther happens, that by your efforts to take off theſe ſuperfluous and ill-placed branches with the pruning-knife, and the uncertainty you work in, you rub off many of thoſe fruits which you would wiſh to preſerve, they being then paſt danger.

" By this nipping, which I ſo much recommend, you avoid the following inconveniencies, which the fruit hid, ſtifled, and, as it were, buried in leaves, would be ſubject to, namely, being made too tender, which may plainly be diſcerned by its whitiſh colour; and when it comes to be expoſed ſuddenly to the free air, joined to the ſtrong rays of the ſun, which are new to it, it is moſt probable that the greateſt part of them will wither and fall; for you muſt obſerve, that, as the ſap always puſhes forward to the extremity of the branch, and as only theſe extremities enjoy the benefit of the free air, the lower part of the branch, being ſmothered, caſts its leaves, or ſo great a part of them, that the fruit at beſt is but covered by halves.

" None of theſe inconveniencies will happen, if your branches have enjoyed the free air, in their whole length, and your fruit hath been early enured to the little inclemencies of the weather; for by making them hardy, by the time they arrive at the ſize of a wall-nut, you will ſcarcely find any fall, unleſs they are too many for the tree to nouriſh: you have this further advantage by an early expoſure of the fruit, which is, that the inſects, particularly ſnails, will not be ſo fond of it, as when made ſo tender by being covered with leaves.

" Regard muſt be always had to ſet ſuch fruit and branches at liberty as are confined by the nail; for if once a fruit is become deformed, no art will then reduce it, and a deformed fruit will never be well flavoured.

“ It will here be neceſſary to ſpeak of blights, which, by knotting the branches, and enlarging them improperly, ſwallow up the ſap you want to nouriſh the tree.

“ When the trees are ſo attacked, you ſhould not only take off all the infected leaves, but likewiſe cut away the branch beyond the infected place: by this you give the ſap the power of going into new ſhoots, which will be equally uſeful another year.

“ If your tree be infected to a great degree, your expectation of fruit for that year muſt not be great, for they will fall by degrees before they come to perfection.

“ The ants and lice will ſometimes occaſion the ſame diſorder among the leaves and branches; and in that caſe you muſt uſe the ſame means as directed above; but generally theſe inſects are inveterate in poiſoning the eyes of branches, ſo that the ſap is obſtructed.

“ If the tree ſhould be attacked with the gum, you ſhould prune it at leaſt an inch beyond the grieved part, which will prevent the deſtruction of the whole in cutting off the communication: from this you will have a ſhoot or two which will ſupply the place, and your loſs will be but trifling.

“ The laſt and greateſt advantage of nipping is, that you will find an ample compenſation for all the time you have ſo employed when you come to nailing, as you will ſee your work clearly before you, and every branch will naturally take the place that you would deſire to put it into, and you will ſcarce need to make uſe of the knife.

“ I have experienced, that I can ſooner nail three trees which have been nipped than one which hath not.

“ Notwithſtanding this operation may have been carefully performed, your work muſt be reviewed every eight or days, as well to deſtroy the vermin, as to take off any ſuperfluous or ill-placed ſhoots, which may put forth after a ſhower of rain; or when the morning-dew is on the tree, is the moſt likely time to find the ſnail at work.

“ Regard muſt alſo be had to ſtop the ravages of the gum, and you will find that time ſo employed is by no means thrown away.

“ For thoſe that are maſters of their time, it is as well to divide the operation of nipping in this manner: in the end of April I would take off ſuch ſhoots as come behind and before the branch; and in the latter end of May, when the fruit is ſet, I would perform the reſt.

“ Theſe rules which I have now laid down, for the well-pruning by the hand, ſtill demand that I ſhould make ſome diſtinction as to their ages.

“ For trees in their firſt year, I begin by taking off the backward and fore-right ſhoots at the latter end of April, and only leave ſuch as come on the ſides; and if one ſide has put forth more ſhoots than the other, I diſcharge that ſide in order to drive the ſap to the other: and at the end of May I make a ſecond review, and if I find one branch a great deal ſtronger than the other, I cut or pinch it off.

“ Nearly the ſame method may be purſued for the two or three following years, obſerving this difference, that if the tree be vigorous, I relieve it much leſs in nipping than if it is weak; for I would only diſcharge a vigorous tree of the ill placed and fore-right ſhoots which are put forth on the ſtrong branch left at the laſt pruning, preſerving always ſuch as come on the ſides, as many, at leaſt, as I can poſſibly find room for on my wall.

“ As for an old tree, I not only take off the ill-placed ſhoots, but likewiſe all ſuch as are weak to a certain degree; and, in order to ſtrengthen the reſt, I confine myſelf to a ſmall number of the beſt ſhoots, on which I leave but a ſmall quantity of fruit.

“ I nip ſuch trees the laſt of all, becauſe they are later in coming out.”

PEAR, a genus of fruit-trees, ſaid to have been originally brought from Alexandria, Numidia, Greece, &c.

As the ſpecies are very numerous, we ſhall only mention a few of the beſt, viz. 1. the little muſk-pear, which ripens in July; 2. the jargonelle, this is one of the beſt ſummer-pears; 3. the Windſor-pear; 4. the blanquette-pear; 5. the red orange-pear; 6. the royal-pear; 7. the ſummer-boncretien; 8. the rouſſellet; 9. the princes-pear; 10. the ſummer-bergamot; 11. the autumn-bergamot; 12. the brown-beurré; 13. the monſieur John; 14. the flowered-muſcat; 15. the green ſugar-pear; 16. la marquiſe; 17. the craſſan; 18. the colmar; 19. the vert-longue; 20. the virgoulé; 21. the winter-thorn; 22. the St. Germain; 23. the winter-rouſſelet; 24. the Eaſter-bergamot; 25. the Hollands-bergamot; 26. the winter-boncretien; 27. the Chaumontelle. (The following are baking-pears) 28. the pound-pear, or black-pear of Worceſter; 29. the winter citron-pear; 30. the franc-real; 31. the double flowering-pear, with many other ſorts: they are all propagated by budding or grafting upon ſtocks of their own kind (commonly called free-ſtocks) or upon quince-ſtocks; the latter are uſed for low walls, dwarfs, or eſpaliers; and eſpecially in wet lands, theſe ſtocks doth effectually prevent the too great luxuriancy of the plant, and cauſe it to produce fruit much ſooner than on a pear ſtock; but then, on the other hand, it has this evil attending it, that the tree is but ſhort-lived, and moſt of the ſorts of hard baking-pears are rendered ſtony and good for little: on the contrary, moſt melting ſoft pears are greatly improved by being grafted on quince-ſtocks, particularly if the ſoil is of a moiſt ſtrong nature.

The beſt ſeaſons to prune pear-trees is at the fall of the leaf, though it may be deferred till the ſpring, obſerving to cut out all luxuriant branches, which are known by the great diſtance of their buds, and to lay in no more wood than the roots may be reaſonably ſuppoſed capable of ſupplying with ſufficient juices, leaving them at a diſtance from each other, in proportion to the ſize of the fruit; ſuch ſorts whoſe fruit are ſmall may be allowed five or ſix inches, but the larger ones muſt be not leſs than ſeven or eight inches aſunder, always remembring to train the branches horizontally as they are produced, without topping them, by which means there will be little occaſion for much pruning theſe trees; for it appears, that pear-trees have their bearing-buds in three different ſtates, continually ſucceeding each other; the blowing-buds of three years old diſcover themſelves at the fall of the leaf, which, whilſt the fruit preceding them was growing and ripening, they were preparing to ſucceed them the enſuing year: theſe buds are produced upon curſons or ſpurs, and are known by their being very full and larger than the others, in a ſeeming ſwelling impatient ſtate of breaking out into its beautiful dreſs of delightful bloom, which is enwrapped within it: the preparative buds of two years are of a ſharp conic figure, and red ruſſet colour, growing very near the fruitful buds before deſcribed: the junior buds of one year are very ſmall, but full above the bark, and always break out near the buds of two years growth; to which may be added, there is a continued ſucceſſion of buds in embryo, ad infinitum.

The diſtance pear-trees ſhould be planted, either againſt walls or eſpaliers, ſhould not be leſs than thirty feet, for if they have not room to ſpread on each ſide, it will be impoſſible to preſerve them in good order, eſpecially thoſe on free ſtocks, for the more theſe trees are pruned the more they will ſhoot: many ſorts of pears produce their bloſſom-buds at the extremity of the ſhoots; ſo that when they are ſhortened the fruit will be cut away, which cannot be avoided where the trees have not room allowed in their firſt planting.

The beſt ſeaſon for planting pear-trees in a dry ſoil is at autumn, but if the land be moiſt the ſpring is to be preferred.

PEASE, a genus of plants cultivated in every part of England both in the field and kitchen-garden. We ſhall lay down the beſt methods for cultivating them in the kitchen-garden, from Mr. Miller's Gardener's Dictionary, and then proceed to give the beſt inſtructions in our power for obtaining large crops in the field.

With regard to the kitchen.—The diſtance between the rows of peas ſhould be proportioned to the ſize to which they grow. The channels in which they are ſown ſhould be about two inches deep; and the quickeſt and moſt regular way to perform this work is, to draw a ſmall hoe, directed by a line, along the ſurface of the ground, ſo as to open a drill, then to ſcatter the ſeeds in this furrow, and to earth them over with the help of a rake. By this means they will be well and equally covered; which is eſſentially neceſſary, becauſe if any of them lie above ground, they will attract mice, rooks, pigeons, and other birds, which will then ſoon find out the reſt, and deſtroy the whole plantation. The chief trouble after ſowing them is, to ſtick the larger ſorts which require ſupport, to keep the plants clear from weeds, and to earth them up; both which laſt parts of their culture are very eaſily, readily, and effectually executed when a ſmall plow can be introduced between the rows.

The names of the principal ſorts of garden peas now cultivated in England, and the order in which they naturally become fit for gathering, are as follow, viz. the golden hotſpur, the Charlton hotſpur, the Reading hotſpur, the maſter's hotſpur, the Eſſex hotſpur, the dwarf pea, the ſugar pea, the Spaniſh morotto, the nonpareil, the ſugar dwarf, the ſickle pea, the marrowfat, and the roſe, or crown pea: for the rouncival, the common white pea, the gray pea, the pig pea, and ſome other large winter peas, as they are commonly called, ſeldom find a place but in the field. But I muſt here obſerve, that ſeveral of the above-mentioned, which gardeners and ſeed-men have diſtinguiſhed by different appellations, are, in fact, only ſeminal variations, which will degenerate into their original ſtate in a few years, if they are not very carefully managed. The only way to prevent this, is to rogue them, as the gardeners term it, that is to ſay, to examine attentively thoſe which are intended for ſeeds, at the time of their beginning to flower (but before the flowers are open,) and to draw out all the bad plants from among the good ones, that the farina of the former may not impregnate the latter, and thereby make them change. It is chiefly owing to this particular care, and to the ſelecting of thoſe plants which bloſſom earlieſt, that the culture of peas has been very greatly improved of late years around this metropolis, and that, from a continuation of the ſame induſtrious endeavours to bring it to ſtill greater perfection, we may hope to ſee yet forwarder varieties of this moſt uſeful ſpecies of pulſe.

The hotſpur pea is, naturally, the earlieſt of all, and therefore I have named it firſt: but the gardeners about London raiſe, by art, from the dwarf pea, tranſplanted into a hot-bed, a crop which anticipates the ſpontaneous growth of the other. To effect this, they ſow their dwarf peas in warm borders, under walls or hedges, about the middle of October; and when the plants are riſen, they draw the earth up gently around their ſtems, to protect them from the froſt. They let them remain where they were ſown till the latter end of January, or the beginning of February (ſtill continuing to earth them up from time to time, as they advance in growth, and covering them with dry haulm, or ſtraw, in caſe of ſevere froſt,) and then remove them into a hot-bed made of good, new, well fermenting dung, properly mixed, that the heat may not be too great. This dung is laid from two to three feet thick, according as the ſeaſon is more or leſs advanced; it is covered with ſix or eight inches deep of light and freſh, but not too rich, earth; the frames, about two feet high at their back, and fourteen inches deep in front, are then put on, and covered with their glaſſes, which are propped up every day, during three or four days, to let the riſing ſteam paſs off; and when the bed is become of a moderate temperature, the plants are taken up as carefully as poſſible, to preſerve the earth about their roots, and planted in it about an inch aſunder in rows two feet diſtant from each other. They are then watered a little and ſhaded, till they have taken root, and aired whenever the ſeaſon is favourable, leſt they ſhould be drawn up very weak, grow mouldy, and decay. Their ſtems are alſo earthed up as they advance in height, and they are kept perfectly clear from weeds. This fiſt watering ſhould be gentle, and dealt out ſparingly; for too much of it would make them grow rank, and ſometimes rot them off at their ſhanks, juſt above the ground. If the weather becomes very hot, the glaſſes are covered with mats in the day-time, to ſcreen the plants from the too great violence of the ſun; and when they begin to fruit, they are watered oftener and more copiouſly than before; for they have nearly done growing by that time, and refreſhing of them frequently will make them produce the greater number of pods.

The dwarf pea is preferred for this purpoſe, becauſe it is more eaſily confined within frames, than any other ſort. The reaſon for ſowing it in the common ground, and afterwards tranſplanting it into a hot-bed, is, to check its growth, and thereby make it bear the more in a ſmaller compaſs.

The hotſpur, of which the ſorts before enumerated differ very little from each other, except in the forwardneſs of their fruit, in which the golden and the Charlton are earlieſt, ſucceeds the hot bed crop of the dwarf pea. But it is neceſſary to obſerve here, that both theſe kinds of hotſpur peas are particularly apt to degenerate, and become later in their podding, if they are cultivated in the ſame ground for three or four years running: wherefore the beſt way is to change their ſeeds annually, and always to prefer ſuch as come from a colder ſituation and a poorer ſoil, than the place where they are to be ſown, for theſe will be earlieſt in the ſpring; and if they are procured from a diſtant part, it will be ſo much the better.

Theſe peas muſt alſo be ſown in warm borders, about a fortnight after the former, that is to ſay, towards the end of October. When the plants are a few inches high, they ſhould be earthed up as before directed, to defend their ſtems from froſt; and if the winter be very ſevere, they ſhould be covered with haulm, or ſome other light covering: but this muſt be taken off as ſoon as the weather grows mild, leſt it ſhould draw them up weak and tender; and the weeding and earthing up ſhould be repeated as they advance in growth, but with care not to bury their leaves, for that might rot their ſtems, eſpecially in wet ſeaſons. Both of theſe works muſt be very carefully performed in the ſpring: and this is likewiſe the moſt proper time to kill the ſlugs, which, of all vermin, do the greateſt injury to peas. They lie all day in the hollows of the earth, near the ſtems of the plants, and come out in the night, to the ſometimes total ruin of the crop. They abound moſt in wet ſoils, and in neglected grounds over-run with weeds: for which reaſon they have the leaſt chance of finding ſhelter where the new huſbandry is well practiſed. Mr. Miller recommends, as the beſt method he could ever find to deſtroy them, to clear the ground thoroughly well around the plants, and there, very early in a fine mild morning, when theſe inſects are got abroad, to ſlake a quantity of lime and ſtrew it over the ground hot, and pretty thick. This will kill the ſlugs wherever it falls upon them, and will not do much hurt to the peas, if they be not over-loaded with it.

If this crop does well, it will immediately ſucceed that of the dwarf peas on the hot-bed: but leſt it ſhould miſcarry, it will be right to ſow two other crops, at the diſtance of about a fortnight or three weeks from each other. Theſe will ſuffice till the ſpring, when more crops of the ſame ſort may be ſown every fortnight, and by this means the early peas will be continued through the ſeaſon.

About the middle of February, ſome of the Spaniſh morotto, which is a great bearer, and a hardy pea, may be ſown in a clear open ſpot of ground, for the next uſe of the family. The rows of theſe, which are a larger kind, ſhould be four feet aſunder, and the peas ſhould be dropped at about an inch from each other in the drills.

To ſucceed theſe, another ſpot of ground ſhould be ſown about the end of February, either with the ſame, or any other large ſort of pea, and theſe ſowings ſhould be continued every fortnight, till the middle or latter end of May; only obſerving to allow diſtances proportioned to the ſize of the pea at it's full growth. Thus marrowfats, for example, ſhould not ſtand nearer than four feet and an half from row to row, and the roſe pea ſhould be at leaſt eight or ten inches aſunder in the rows: for all peas, (and the caſe is exactly the ſame in regard to every other plant) will run up in height, and yield but little fruit, if they are too much crowded.

When theſe larger ſorts of peas (which muſt be carefully weeded and earthed up as before directed) are grown about eight or ten inches high, ſome bruſh-wood ſhould be ſtuck up cloſe to them, to prevent their trailing upon the ground, which is very apt to rot theſe kinds in particular, eſpecially in wet ſeaſons: and another great advantage ariſing from their being thus ſupported, is that the air has then a free current between them, which will keep their bloſſoms from falling off before their time, and they will conſequently bear much better than they could if left trailing upon the ground. There will alſo, by this means, be proper room to hoe between the rows, and to paſs between them in order to gather the peas when they are ripe.

The marrowfat is the beſt taſted of all the large kinds of peas, and it will continue good till the end of Auguſt, if it be planted in a ſtrong ſoil. The other large growing ſorts may be raiſed for the common uſe of the family, becauſe they yield the moſt plentifully, and can endure the greateſt drought: but the early kinds are by far the ſweeteſt. It will therefore be well worth the maſter's while to ſee that a crop of theſe, and particularly of the early hotſpur, is ſown every fortnight, to ſupply at leaſt his own table during the ſeaſon.

All the dwarf peas yield plentifully, if the weather be not over dry; but they ſeldom continue to bear long. As they rarely ſurpaſs the height of one foot, or ſpread wider than ſix inches, about two feet and an half may be a ſufficient ſpace for weeding and ſtirring of the ground between their rows, in which they need not be ſet above an inch aſunder. Among theſe may be claſſed the ſickle pea, or ſugar pea, which is much cultivated in ſeveral foreign countries, but is ſeldom propagated here, except by curious gentlemen, for their own table. The pods of this pea, are crooked and ill-ſhaped, but extremely ſweet when boiled with their unripe fruit in them, as is the general way of dreſſing them; for they have not any tough inſide ſkin, like the pods of other peas. I wonder that this ſort is not yet to be met with in our markets; unleſs the reaſon be, that the trading gardeners, who furniſh them, find that their profit will not pay for the trouble and expence of defending theſe peas from birds, which are ſo exceſſively fond of them, that they will ſoon devour a whole crop, if they are not very carefully kept off. If theſe peas are planted in April, they will be fit for gathering at Midſummer. Their pods, when they are very young, and their tendrils, have an agreeable acid flavour in ſallets; as have alſo the young tendrils of the hop and the vine.

A general rule to be obſerved in the planting of peas, is that the later they are ſown, the ſtronger and moiſter the ſoil ſhould be.

Having thus delivered the beſt method for cultivating peas in the kitchen garden, we ſhall proceed to make ſuch obſervations as may be of uſe for obtaining large crops in the open field.

Mr. Liſle, for the greater eaſe and more certain guidance of country people, who are apt to be perplexed by a long liſt of particular names of different ſorts of field-peas, and of their ſeveral numerous varieties, judiciouſly ranges them under two general heads, viz. the tender and the hardy ſmall ſort, and the tender and the hardy great ſort; under the one or the other of which claſſes he thinks all kind of peas may properly be ranked, becauſe they equally agree or diſagree with the ſame ſoil. The tender pea, for example, is improper for a cold country, or, which amounts to the ſame, for cold ground in a warm country; and the large pea, by reaſon of its great haulm, is not proper for ſtrong rich land, becauſe its haulm will there increaſe to ſo great a length, that it will not be able to bear pods. His own experience in the year 1704, ſatisfied him fully that the beſt way to make peas pod well, is to ſow them on a mellow mould, rendered light by plowing: and he thinks it right to roll the ground ſoon after they are ſown.

Even the moſt general directions, and therefore theſe cannot but be of ſervice to the huſbandman: but more particular obſervations and actual experiments properly diverſified, are ſtill much wanted in the culture of this, and indeed of all other podded grains, and ſucculent plants, whoſe importance, as deſtroyers of weeds, improvers of land, and excellent preparers of it for other crops, is eſtabliſhed beyond diſpute. It is even a rule with farmers, not to ſow the ſame land a ſecond time with peas, till ſix, or at leaſt five years after the former crop of the ſame kind; becauſe, till then, the ground on which they grew will continue ſo rich as to make them run luxuriantly to haulm, in a manner inconſiſtent with the bearing of much fruit.

The common white pea does beſt on light ſandy land, or on a rich looſe ſoil. It is generally ſown with a broad caſt, and only harrowed in. Three buſhels of theſe peas are the uſual allowance of ſeed for an acre of ground; and the common time for ſowing them is about the latter end of March, or the beginning of April, on warm land: but a fortnight or three weeks later than this, will be early enough on cold ground. If ſown in drills, which is by far the beſt way, a buſhel and a half of ſeed will be full enough for an acre; and, when they are thus ſet regularly, the ground may be ſtirred with a hoe, to deſtroy the weeds, and earth up the plants, by which they will be greatly improved, and the peas will be much eaſier to cut in autumn, when they are ripe.

The green and the maple rouncivals require a ſtronger ſoil than the white, and ſhould be ſown a little later in the ſpring, alſo in drills, but farther aſunder, that is to ſay, at the diſtance of at leaſt two feet and a half, or three feet from each other, becauſe they are apt to grow rank, eſpecially in a wet ſeaſon. The ground between theſe rows ſhould be ſtirred two or three times with a hoe, which will not only deſtroy the weeds, but, by earthing up the peas, will greatly improve them, and alſo render the land fitter to receive whatever crop is put on it the following ſeaſon.

The gray and other large winter peas, as they are called, are ſeldom cultivated in gardens, becauſe they require a great deal of room. The beſt time for ſowing of theſe is about the beginning of March, when the weather is pretty dry; for if they are ſown in a very wet ſeaſon, they are apt to rot, eſpecially if the ground be cold. The diſtance between the rows ſhould here be at leaſt three feet, and theſe peas ſhould be ſown very thin in the rows: for if they are ſown too thick, their haulm will ſpread ſo as to fill the ground, and they will ramble over each other; by which means many of the plants will be rotted, and hindered from bearing. The common allowance of theſe large peas, is two buſhels to an acre: but that is certainly more than conſiſts with the very thin ſowing which is beſt for them.

The gray peas, in particular, thrive beſt on a ſtrong clayey land, in which they are commonly ſown under furrow. But by this method of ſowing, large peas, eſpecially, are always planted too thick, and at unequal depths, which prevent their coming up regularly. For this reaſon, among many others, all rank-growing plants, ſhould undoubtedly be ſown in drills, in which their ſeeds will be diſtributed much more equally in all reſpects.

If only a ſmall ſpot of ground be planted with theſe peaſe, a channel about two inches deep may be made with a hoe, guided by a line, the ſeeds may be dropped therein, and the earth may be drawn over them with a rake. By this means they will be covered equally, and with tolerable diſpatch, though not ſufficient for large fields, where, for this reaſon, a ſhallow furrow is commonly made with the plough, the ſeeds are ſcattered in it, and the earth is harrowed over them. The greateſt trouble then remaining is to keep the plants clear from weeds, and lay the earth up to their roots, which, in countries where labour is dear, is very expenſive to have done with the hand-hoe, but may be eaſily effected by drawing a horſe-hoe between the rows. This will entirely eradicate the weeds, ſtir the ſoil, render it mellow, and greatly promote the proper growth of the plants.

All ſorts of peaſe love limed or marled land: but when they are ſown late in the ſeaſon, the ſoil ſhould be ſtrong and moiſt; for they will then burn up and periſh in hot light land, or at leaſt not produce a crop worth taking off the ground. The authors of the *Maiſons Ruſtiques* approve of ſteeping them twenty-four hours in water before they are ſown, as well as to ſeparate the bad and faulty from the good, to enable theſe laſt to riſe the ſooner by being thus moiſtened. In general, the larger the pea is, and conſequently the later its uſual time of ripening, the earlier it ſhould be ſown, as experience has directed, and as Mr. Liſle rightly infers from the following curious obſervation, which, if duly attended to, may be of ſervice to huſbandmen and gardeners, and perhaps productive of ſome improvement in the culture of this plant.

In 1708, when the field and garden peaſe were near a foot high, he obſerved on the very top of them a purſe or neſt of buds of bloſſoms, lying in a bag together; and perceiving at the ſame time that there was no ſhew of bloſſoms putting forth at the lower joints, he concluded that the crops of peaſe would miſcarry that year, that they would not only have ſome top-kid, and that it would be vain to expect any on the lower joints, becauſe they are always forwarder in bloſſoming and kidding than the upper joints, and had not then the leaſt appearance of doing either. This afforded him ſome amuſements in reaſoning: but, not being ſatisfied, in a day or two after looked again into theſe upper pods or bags of bloſſoms, and, upon diſſecting a number of them, found ſometimes in a ſingle one near thirty bids of bloſſoms, two or three of which ſeemed uſually to have got the ſtart of the reſt, and to be bigger in bulk, and taller: moſt of the reſt ſeemed to lie in a huddle, without making any gradations: but as he had never ſeen, excepting the crown pea (which carries all its bloſſoms in a tuft at top, like a noſegay) other peaſe put forth above two bloſſoms and kids at top, which ſeldom come to any good, he ſuſpected that the many bloſſoms in this pod, muſt form the ſucceſſive gradations of bloſſoming joints, ariſing from that ſtock as from a common root, and that every bloſſom ſhot forth in order, as it grew forwarder than the reſt, while the main ſtem, advancing higher and higher, left behind the ſubaltern bloſſom of a lower joint. To be clear in this, he tied ſcarlet threads juſt under ſeveral of theſe pods, that he might know them again, and, as he expected, found in four or five days time a gradation of bloſſoms ariſing from joints with lobous leaves above his ſcarlet threads, and the pod of bloſſoms ſtill advanced on to the end, leaving behind farther joints of bloſſoms, till the whole ſtock was ſpent.

From this obſervation Mr. Liſle infers, 1. That by looking into this pod, or purſe of buds, while it is yet ſo much in its infancy as only to be viewed by a magnifying glaſs, we may judge what hopes there are of a future crop, provided the ſucceeding months prove favourable: and, 2. That we may learn from thence what ſort of peaſe to adapt to every ſort of ground: “ but, continues he, before I enter on this part and uſe of the above-mentioned obſervation, I muſt, for the better underſtanding thereof, premiſe, that the farmers vary in their judgment in no one point ſo much as in the nature of the pea. Several ſorts of peaſe are commonly ſown within the limits of the ſame pariſh, and each of the perſons who ſow them generally has a great prejudice to any other ſort than that which he ſows, having perhaps been diſappointed of his expected return from other peaſe, when he has ſowed them, and being, for the ſame reaſon, equally diſpoſed as readily to alter his opinion of his laſt favourite kind; for the produce of a crop of peaſe is always very uncertain. But if the farmer would conſider, from the foregoing obſervation, how early or rath-ripe a pea is, or how late in ripening, in its nature; and that (as all its ſtock or power to put forth bloſſoms lies within the foliage of one pod) the art muſt reſult from thence, ſo to ſow the peaſe, in ſuch ground, and at ſuch time, that each ſort of pea, according to its nature, may, before autumn and cold weather come to check them, ſend forth all its gradations of joints or bloſſoms, ſo that none may become abortive for want of ſummer enough to enable nature to bring her embrios to maturity, and carry the bud-bloſſoms into kids; then it is apparent (as all large peaſe ripen late, and run to great haulm or ſtalks, and ſmall peaſe have leſs haulm and ripen earlier) that the great or late ripe peaſe ſhould be ſowed as early as the climate will permit; for thereby ſuch pea will get ſo forward as to have time to put forth all its gradations of bloſſoms and kids, and to perfect them before a rainy autumn comes, and puts a ſtop to farther vegetation. Again, great peaſe ought to be ſowed on a white, or ſome mixed land, not too groſs of juice; but not on a cold clay: for the moiſture of this laſt will keep feeding the haulm, and be inconſiſtent with the main deſign of ſowing them early, which is, that they may bring all their fruit to maturity in due time. The white or mixed mould muſt be in good heart; for otherwiſe it cannot maintain a great pea. On the other hand, it is evident from hence that a pea which ripens early ſhould be ſowed in a ſtrong feeding land, becauſe ſuch land will nouriſh it more vigorouſly, without danger of too great an increaſe of its haulm, which is naturally ſhort; and, notwithſtanding the coldneſs of the ſoil, there need be no doubt but that all the kids will ripen.”

Moderate rains are of ſingular ſervice to peaſe while they grow, and particularly at their time of bloſſoming and filling up their pods; but a continuance of cold rain for many days, is perhaps as prejudicial as too much heat or drought. The blueiſh bloom upon their leaves, and their expending backward the two outermoſt and largeſt leaves of their bloſſoms, are undoubted ſigns of great health and vigour. Mr. Liſle is of opinion, that they neither ripen nor harden ſo well upon high grounds, as in the vallies, and conſequently that the former are not ſo fit for keeping as the latter.

Among the very few experiments on the culture of peaſe in field, the following, which M. Duhamel has given, afford a pretty ſtrong conviction of the benefits which ariſe from horſe-hoeing between their rows.

In April 1753, M. de Villiers, one of that ingenious gentleman's correſpondents, ſowed a ſmall field in Champagne, with peaſe, in double rows. Not being provided with a proper inſtrument to hoe the intermediate ſpaces, he made uſe of a narrow angular kind of ſhare, which ſtirred only three or four inches on the out ſide of the rows. Almoſt all the peaſe in his neighbourhood were deſtroyed that year by a kind of vermin called vine-fretters. His were hurt the leaſt of any; which was probably owing to the greater vigour of the plants, or the inſects being killed by the ſtirring of the ground. By a compariſon which he made of the produce of this ſpot, he found that it yielded ſix times as much as the ſame extent of the beſt land in the ſame country. “ In a good year, ſays M. Duhamel, the difference would not have been ſo great; but ſtill this experiment ſhews that plants cultivated in the new or horſe-hoeing way, are better able to reſiſt the inclemencies of the ſeaſons, and other accidents, than thoſe which are cultivated according to the old method.”

The next year, M. de Villiers, being provided with M. Duhamel's drill and horſe-hoe, ſowed peaſe again in rows, in ſome places two feet, and in others two feet and a half aſunder. But this diſtance was ſo narrow that it rendered the horſe-hoeing very difficult in many places, and quite impracticable in others. He was therefore obliged to contrive other means of ſtirring the ground, in which, notwithſtanding this, his peaſe flouriſhed extremely, and yielded more than any others on the very beſt land in the ſame diſtrict.

The ſame gentleman drilled peaſe again, in 1755, in a ſtrong heavy ſoil, in which no one had ever ventured to ſow any in the common huſbandry. They grew as high as if the ground had been ever ſo fit for them, and yielded half as much again as any ſown in the common way, beſides the ſaving in the ſeed, which in peaſe thus drilled, is about one half. They were ſown in double rows, with a ſpace about two feet and a half wide between the outmoſt rows of one range and the next outmoſt row of another, and this ſpace was ſtirred with the horſe-hoe.

When any particular ſorts of peaſe are intended for ſeed, they ſhould be carefully looked over whilſt in flower, in order to draw out all ſuch plants as are not of the right ſort; for there will always be, in every ſort, ſome roguiſh plants, as the gardeners term them, which, if left to mix, will degenerate the kind. As many rows as may be thought ſufficient to furniſh the deſired quantity of ſeed, ſhould then be marked out, and left till their pods turn brown and begin to ſpilt, when they ſhould immediately be gathered up, with the haulm; and if the huſbandman has not room to ſtack them till winter, they may be threſhed out as ſoon as they are dry, and put up in ſacks for uſe: but particular care ſhould be taken not to let theſe remain too long abroad after they are ripe, becauſe wet would rot them, and heat, after a ſhower of rain, would make their pods burſt in ſuch a manner that the greater part of their ſeeds would be loſt.

When peaſe are reaped, or hacked, as they call it in ſome parts of England, they are laid up in ſmall wads, and left in the field till their haulm and pods are dry: but during this time they ſhould be frequently turned, and raiſed as much as poſſible from the earth, that they may lie hollow for the wind to dry them, eſpecially when any rain happens to wet and beat them down. In Leiceſterſhire they ſet all their peaſe abroad in ſtacks, being perſuaded that they thence acquire a much better colour, than when houſed in a barn.

An ingenious farmer has obliged the public with the following method of preparing peaſe for hog-meat; and which we ſhall here give in his own words.

“ A few years ago, ſays he, I had a plentiful crop of peaſe on a ten acre piece, which lies near my houſe: when they were full podded and nearly ripe, I had them hooked in the uſual manner; but before I could get them in, there came a heavy ſhower of rain, which wetted them through and through; and the dull heavy weather, with quent ſhowers, which followed, prevented their drying for a conſiderable time.

“ I cauſed the wads to be from time to time turned, to prevent the haulm from rotting; and at length a few days ſunſhine dried them enough to be inned; for as they lay hollow, the wind was greatly aſſiſtant to the operation.

“ Before I got them in, on examining ſome of the pods, I found that the peaſe were all ſprouted to a conſiderable length: this was what I had expected, as I gave my crop over for loſt, till after a little recollection, as the weather ſtill continued fine, I determined to threſh them in the field.

“ This was accordingly done; and the corn, after it was caſt and riddled to ſeparate it from the rubbiſh, was dried on my malt-kiln.

“ When this operation was over, I began to reflect in what manner I ſhould diſpoſe of my peaſe, being ſenſible that they could not be proper for ſeed, and ſtanding no chance of diſpoſing of them to any advantage in the market.

“ At length, as it was then a time of war, and of courſe there was a great demand for pork for the uſe of the navy, I determined to buy in a conſiderable number of lean hogs, that I might by their means conſume this crop on my own premiſes, and in that manner make the moſt of it.

“ My expectations were more than anſwered, for I found, by repeated experience, that three buſhels of the peaſe I have mentioned went nearly as far in fattening the hogs I bought, as four buſhels got in dry and hard in the manner uſually practiſed.

“ This diſcovery I made ſeveral years ago, and it has turned out to my advantage; for, ſince that time, I have been quite indifferent as to the weather in which my peaſe are hooked, being rather better pleaſed, as far as relates to them, with wet, than dry weather: but if the weather happens to be dry at the time they are ripe, I always cauſe as many as I want for feeding my hogs, which are not a few in a year, to be regularly malted in the ſame manner, nearly, as my barley: this management has, of late ſucceeded very well with me, and I therefore intend to continue it.

“ Beſides feeding my hogs with theſe malted peaſe, I have beſides often given them to my horſes, with which they agree very well, and are heartening food.

“ Turkeys will fatten apace on them alſo, and be fine meat.

“ I have applied my malted peaſe to many other uſes, which I have not, at preſent, time to enumerate: but were they only uſed for feeding hogs and horſes, it is ſtill worth while to prepare ſome in this manner every year.” *Muſeum Ruſticum, vol.* I. *page* 109.

PEASE-BOLT, peaſe haulm.

PEAT, a ſpecies of earth uſed in many countries for firing.

Under the article ASHES we have given ſome account of the uſes of thoſe made from peat; and ſhall here add the obſervations of a very intelligent huſbandman, with regard to the value of thoſe aſhes, and the ſeveral crops to which they may be profitably employed as a manure.

“ The more general, ſays he, a manure is in its uſes, of ſo much the more value is it to the farmer; and, of all ſorts of manures, perhaps aſhes agree with the greateſt variety of ſoils and crops: aſhes, therefore, ſhould, one would imagine, be had in univerſal requeſt, for the purpoſe of dreſſing land; but the misfortune is, no great plenty can be procured, and the few that are to be got fetch a large price: this deters the farmer for making uſe of them often as manure.

“ I muſt, however, except one ſort of aſhes, which are on all accounts valuable; I mean peat or turf-aſhes: theſe are, in moſt places, eaſy to be procured, coſt no great matter, and have a wonderful effect on almoſt every ſoil and crop. You may believe what I ſay, as I have had many years experience of their good qualities.

“ The ſulphureous and ſaline particles with which theſe aſhes abound, have a moſt happy effect in promoting vegetation; and if uſed with diſcretion, the increaſe procured by them is truly wonderful.

“ I ſuppoſe few of your readers will be at a loſs to know what peat or turf is, moſt people having ſeen a kind of it burnt as fuel.

“ The ordinary peat is dug from wet bogs and moraſſes; but that which is of a much ſuperior quality and virtue in its aſhes, is dug from moory wettiſh lands, which will bear cattle: as to the peat that is pared from the ſurface of heaths and commons, for firing for the poor cottagers, the aſhes of it are of very little value, when compared with thoſe above-mentioned.

“ Peat is found in moſt low grounds that lie betwixt hills, eſpecially if timber has formerly ſtood on the ſpot. It lies at various depths, being often near the ſurface, and ſometimes ſix, eight, or ten feet deep, having a ſtratum of black moory earth over it, ſuch as is the ſoil of many of our low meadows near the banks of rivers: it ſometimes even lies under a bed of gravel.

“ Peat may be burnt, for the ſake of procuring its aſhes for manure, all the ſummer ſeaſon: as ſoon as it is dug, ſome of it is mixed in a heap regularly diſpoſed with faggot wood, or other ready burning fuel: after a layer or two of it mixed in this manner, peat alone is piled up to complete the heap. A heap will conſiſt of from one hundred to a thouſand loads.

“ After ſetting fire to it at a proper place, before on purpoſe prepared, it is watched in the burning, and the great art is to keep in as much of the ſmoke as poſſible, provided that as much vent is left as will nouriſh and feed the fire.

“ Whenever a crack appears, out of which the ſmoke eſcapes, the labourer in that place lays on more peat; and if the fire ſlackens too much within, which may eaſily be known by the heat on the outſide, the workman muſt run a ſtrong pole into the heap in as many places as is neceſſary to ſupply it with a quantity of freſh air. When managed in this manner, the work goes on as it ſhould do. It is to be noticed, that when once the fire is well kindled, the heavieſt rain does it no harm whilſt it is burning.

“ Having procured a ſufficient quantity of aſhes, the farmer's next care ſhould be to apply them properly to uſe; and to do this, he muſt be made well acquainted with the nature of the manure he is to lay on his land.

“ All aſhes are of a hot, fiery, cauſtic nature; they muſt therefore be uſed with caution. With reſpect to peat-aſhes, almoſt the only danger proceeds from laying them on in too great quantities at improper ſeaſons.

“ Nothing can be better than peat-aſhes for dreſſing low damp meadows, laying to the quantity of from fifteen to twenty Wincheſter buſhels on an acre: it is beſt to ſow them by hand, as they will then be more regularly ſpread.

“ This work ſhould be done in January or February at lateſt, that the aſhes may be waſhed in towards the roots of the graſs by the firſt rains that fall in the ſpring.

“ If they were ſpread more forward in the year, and a ſpeedy rain ſhould not ſucceed, being hot in their nature, they would be apt to burn up the graſs, inſtead of doing it any ſervice.

“ It is to be remembered, that the damper and ſtiffer the ſoil, the more peat-aſhes ſhould be laid on it; but in graſs lands the quantity ſhould never exceed thirty Wincheſter buſhels, and on light warm lands leſs than half that quantity is fully ſufficient.

“ On wheat crops theſe aſhes are of the greateſt ſervice, but they muſt be laid on with the utmoſt diſcretion. Were they to be ſpread in any quantity before the winter, after the ſowing the corn, they would make the wheat too rank, and do more harm than good; was the ſpreading this manure, on the contrary, deferred till the ſpring, the corn could not poſſibly during the winter ſeaſon be benefited by it. After due reflection and repeated experience, my method of management in this caſe is as follows:

“ About the beginning of November, before the hard froſts ſet in, I ſow on every acre of my heavy clayey wheat land about eight Wincher buſhels of theſe aſhes on my lighter warmer lands in wheat, I ſow only four buſhels at this ſeaſon.

"The winter-dreſſing is, I imagine, of great ſervice: trifling as the quantity may ſeem, it warms the roots of the plants, brings it moderately forward, preſerves its verdure, and diſpoſes it to get into a growing ſtate the firſt fine weather after Chriſtmas.

"About the latter end of February, or the beginning of March, on the above-mentioned heavy lands in wheat I beſtow another dreſſing of aſhes, by ſowing of them on every acre eight buſhels more: on my light lands, in this ſecond dreſſing, I allow only ſix buſhels.

"Theſe aſhes laid on in the ſpring are of the greateſt ſervice, without any probability of danger: if rain falls within a few days after the dreſſing is laid on, it is waſhed in, and has a happy effect on the ſucceeding crop, co-operating with the manure that was laid on in November: if, on the contrary, dry weather for a long continuance ſucceeds, the firſt winter-dreſſing has its full effect, and the quantity laid on in the ſpring is in fact ſo ſmall, that there is very little probability of its burning or hurting the crop.

"This method has ſucceeded very well with me, and I have no reaſon to think it can fail with any one elſe.

"This excellent manure is, I find, of great uſe in the turnep-huſbandry on many accounts, particularly as it much contributes to preſerve the young crop from being devoured by the fly.

"When I ſow my turneps, before I harrow in the ſeed, I have eight buſhels of theſe aſhes ſtrewed by hand on every acre, and when the plants ſhew their firſt leaves above ground, I ſow on every acre four buſhels more: by this management my crops ſeldom fail, when at the ſame time ſome of my neighbours ſow their turnep-land three or four times over.

"But one of the principal advantages derived from theſe aſhes I have not yet mentioned, which is the very great ſervice they are of to every kind of artificial paſture.

"Saintfoin receives great benefit from this manure, and ſo does clover, ray-graſs, and trefoil, provided it is laid on with diſcretion: the proper ſeaſon is about the month of February: the quantity muſt be regulated by the nature of the crop and ſoil; but, in my opinion, it ought ſcarcely in any inſtance to exceed thirty Wincheſter buſhels. Clover, with the help of this manure, grows with great luxuriance, inſomuch that I have often had two large crops of hay from the ſame field in a year, and good autumn feed afterwards.

"But the effect of it is moſt ſeen in tares or vetches, and on them it is I beſtow moſt of this manure, as they will bear it, being a very ſucculent plant. I had laſt ſummer a crop of tare-hay that was aſtoniſhing, by the help of theſe aſhes, being above three large loads on an acre. The field contained ſix acres; it was a dryiſh loam, and not very rich. In the beginning of February I cauſed ten buſhels, Wincheſter meaſure, to be ſtrewed on each acre: immediately after the firſt rains had waſhed them in, the ſame quantity was in like manner ſpread, and about the middle of March I beſtowed on each acre ſix buſhels more for the laſt dreſſing. I am fond of dividing my entire quantities, thinking my crops are thereby leſs expoſed to the danger of being burned, and the manure is beſides more gradual and laſting in its effects.

"My tares came on amazingly, but they run chiefly to haulm, which was what I wiſhed, not having any deſire of ſaving the ſeed, but intending to make the crop in hay: my only fear was, that it would rot on the ground before it was in a proper condition to cut; but this I luckily eſcaped, by the ſoil being tolerably dry, and by the fineneſs of the weather. It was ſo heavy in the ſwarth, that I was obliged to pay an extraordinary price for mowing it.

"I have obſerved above, that I was fearful my tares would have rotted on the ground before they were fit to cut; this was owing entirely to the invigorating quality of the aſhes, which by their ſalts, &c. promoted the growth of the plants even to luxuriance.

"Before I well knew the great fertilizing quality of theſe aſhes, I loſt, by improper management, a fine three acre piece of hog-peaſe. I laid on this field, ſoon after the peaſe came up, threeſcore Wincheſter buſhels of theſe aſhes at one dreſſing: this brought them forward a great pace, but at harveſt I found, to my grief, I had ſcarcely any corn, for I had overdone it in laying on ſo much, and the peaſe were run all to haulm.

"Ever ſince this accident I have declined uſing them as a common dreſſing for my peaſe; and this I have been the more induced to do, as, in ſeveral little experiments I have ſince made, I have found it extremely difficult to apportion the ſeveral quantities which ought to be laid on various ſoils when ſown with peaſe; for the quantity that has one year ſucceeded very well with me, has the next, owing to the difference of ſeaſons, on the ſame ſoil, in another part of the ſame field, totally diſappointed me; ſo that, for peaſe, I eſteem it a very critical manure, therefore very cautiouſly to be uſed.

"The effects of this manure will be viſible at leaſt three years, and it does not, like ſome others, leave the land in an impoveriſhed ſtate, when its virtues are exhauſted and ſpent.

"Peat-aſhes are not ſo certain a manure for barley and oats as for the winter-corn: for as theſe are quick growers, and occupy the land but a few months, this warm manure is often apt to puſh them forward too faſt, and make them run too much to coarſe ſtraw, yielding only a lean immature grain. Oats, however, are not ſo apt to be damaged by it as barley.

"To get a good crop of barley, I often ſow it after turneps, which have two light dreſſings of aſhes, in the manner above deſcribed.

"When the turneps are fed off, or drawn, I give the field, if the ſeaſon permits, a good ploughing: if they were fed off, the land will want no more aſhes; but if they were drawn, and either carried into another ground to feed ſheep, or given to my ſtall-fed oxen, I ſtrew on each acre, after this ploughing, five Wincheſter buſhels of aſhes, leaving them to be waſhed in by the firſt rain. In this manner I let the land lie till I give it the ſecond and laſt ploughing before it is ſown. The manure has by this management the deſired effect, and the barley generally produces full and heavy ears.

"When I ſow my barley after turneps, I give the land only two ploughings, becauſe the ſoil was before much looſened by the hoeings beſtowed on the turneps; but in other caſes I am fond of allowing three, and ſometimes four ploughings to my lands deſtined for barley; and I generally find it anſwer very well; for many years experience has convinced me, that upon a fine tilth barley always thrives beſt, and yields moſt: in fact, the crop is almoſt always governed by the condition of the land, and a well-tilled ſoil is leſs expoſed to danger in an untoward ſeaſon.

"Peat-aſhes approach, in their effects on the ſeveral crops on which they are laid, to coal-ſoot; but two-thirds of the quantity that is uſed of ſoot, will be ſufficient of the aſhes, as they are in a much ſtronger degree, impregnated with a vegetative power; and they are, beſides, in moſt places eaſier procured in quantities, and at a cheaper rate.

"It may poſſibly be objected, that this manure requires great nicety in the application: I allow it does; yet every intelligent farmer, who knows the nature and qualities of the ſoils of his ſeveral fields, will ſoon be able, with great preciſion, to judge how much he ought to lay on each acre: his chief care at firſt ſhould be not to overdo it; for therein conſiſts the principal danger; though, after all, theſe aſhes will, at the worſt, unleſs laid on in very great exceſs indeed, only occaſion the inexperienced farmer the perhaps partial loſs of a ſingle crop; for the ſucceeding year they will, in all probability, have a very ſalutary effect on the land, and ſometimes even repay the preceding loſs.

"When the error is in the exceſs, it is very eaſy for a farmer to avoid falling into it; for, independent of every other conſideration, the ſole view of leſſening his expences will, it is imagined, ſufficiently induce him to be attentive to this particular.

"When peat is burnt for the ſake of its aſhes in ſummer time, it is neceſſary that ſome care ſhould be taken to defend them from the too powerful influence of the ſun, air, dews, rains, &c. or great part of their virtue would be exhaled and exhauſted. If the quantity of aſhes procured is not very great, they may be eaſily put under cover in a barn, cart-lodge or hovel; but large quantities muſt neceſſarily, to avoid expence, be kept abroad; and when this is the caſe, they ſhould be ordered as follows.

" A dry ſpot of ground muſt be choſen; and on this the aſhes are to be laid in a large heap, as near as poſſible in the form of a cone ſtanding on its baſe, the top as ſharp pointed as poſſible: when this is done, let the whole be covered thinly over with a coat of ſoil, to defend the heap from the weather: the circumjacent earth, provided it is not too light and crumbly, will always ſerve for this purpoſe.

" When thus guarded, the heap may very ſafely be left till January or February, when it is in general the ſeaſon for ſpreading it: but, before it is uſed, it is always beſt to ſift the aſhes, that the cinders, ſtones, and half burnt turf, may be ſeparated from them.

" This may, perchance, by many be eſteemed an unneceſſary trouble; but experience, which is the beſt guide, has convinced me, that by this means I can better aſcertain the quantity that ought to be ſown on the ſeveral ſorts of land; for the ſmall powdered aſhes, being equal in quality, are of courſe equal in effect; whereas, when there has been any other mixture with them, the effect has often been greater or leſs than I could have wiſhed. Thus, when I mentioned the number of buſhels I ſtrew on an acre, it is always to be underſtood of ſifted aſhes: ſhould any farmer be inclined to try them rough as they are firſt produced after burning, the quantity to be allowed for an acre muſt be more in proportion to the mixture of other matter that is in them.

" Theſe peat-aſhes are almoſt, as I have already obſerved, a general manure ſuited to every ſoil. On cold clay they warm the too compact particles, diſpoſe it to ferment, crumble, and of courſe fertilize, and, in fine, not only aſſiſt it in diſcloſing and diſpenſing its great vegetative powers, but alſo bring to its aid a conſiderable proportion of ready prepared aliment for plants.

" On light lands theſe aſhes have a different effect: here the pores are too large to be affected, or farther ſeparated by the ſalts or ſulphur contained in them; but, being cloſely attached to the ſurfaces of the large particles, of which this earth is generally compoſed, this manure diſpoſes them, by means of its ſalts, to attract the moiſture contained in the air: by this operation, the plants which grow on theſe porous ſoils, are prevented from being ſcorched up and burnt; and if they want, which they generally do, more nouriſhment than the land is of itſelf capable of affording, this is readily and abundantly ſupplied by this uſeful manure.

" In large farms it is very uſual to ſee all the home-fields rich and well-mended by the yard-dung, &c. whereas the more diſtant lands are generally poor, impoveriſhed, and out of heart, for want of proper manure being applied in time.

" Whilſt the farmers depend almoſt entirely on their yard-dung, this cannot fail being the caſe; for dung is of very heavy carriage: they are willing, therefore, to drop it as near home as poſſible, being in this way able to do a great deal more work in the ſame ſpace of time: but would they once try the virtue of peat-aſhes, all their lands might be alike improved, though at a very conſiderable diſtance from the home-ſtall; for ſo few of them are required, and they are ſo light of carriage, that a ſingle tumbril will hold as many as ought, in moſt caſes, to be laid on two acres of land; by which means, when theſe aſhes are uſed as a dreſſing for the diſtant fields, it coſts the farmer leſs in carriage than does that of the ſtable-dung for his home-fields." *Muſeum Ruſticum, vol.* I. *page* 222.

PENNY-ROYAL, the name of an herb, that propagates itſelf very faſt by its numerous trailing branches, which faſten themſelves to the ground at every joint, and from thence put forth roots and new ſhoots. Nothing therefore is requiſite in order to its culture, but to cut off ſome of thoſe rooted branches, and to tranſplant them into other beds. This ſhould be done in September, that the young plants may have time to fix, and gather ſtrength before the winter comes on: for by this means they will yield a much larger crop the next ſummer, than they would do if removed in the ſpring. They ſhould be ſet, at leaſt, a foot aſunder every way, that they may have ſufficient room to grow in: for the roots of this plant multiply ſo exceedingly, that if planted at a ſmaller diſtance, they will meet together in the ſpace of a year, and afterwards ſoon rot one another in the winter.

Their favourite ſituation is moiſt, and ſomewhat ſhady; and if planted in ſuch places they will flouriſh amazingly. *Miller's Gard. Dict.*

PENNY-*earth*, a term uſed by the farmers for a hard, loamy, or ſandy earth, with a very large quantity of ſea ſhells intermixed in it; ſome of which being round and flat, and in ſome meaſure reſembling pieces of money, have occaſioned the earth's being called by this name. It is an earth not eaſily dug, but is uſually undermined with pickaxes, and then falls in large lumps; which, with the froſts, break to pieces, and leave the ſhells looſe. It is prepared by breaking and mixing well with water, and then makes very deſirable floors. The Jerſey combers comb-pots are alſo made of it, and the ſides and roofs of ovens are plaiſtered with it; and, being rightly managed, it combines into a flower almoſt as ſtrong as plaiſter of Paris. *Moreton's Northamptonſhire.*

PERRY, the name of a very pleaſant and wholeſome liquor extracted from pears, in the ſame manner as cyder is from apples. *See the article* CYDER.

The beſt pears for perry, or at leaſt the ſorts which have been hitherto deemed the fitteſt for making this liquor, are ſo exceſſively tart and harſh, that no mortal can think of eating them as fruit; for even hungry ſwine will not eat them, nay, hardly ſo much as ſmell to them. Of theſe the Boſbury pear, the Bareland pear, and the horſe pear, are the moſt eſteemed for perry in Worceſterſhire, and the ſquaſh pear, as it is called, in Glouceſterſhire; in both which counties, as well as in ſome of the adjacent parts, they are planted in the hedge-rows and moſt common fields.

There is this advantage attending pear trees, that they will thrive on land where apples will not ſo much as live, and that ſome of them grow to ſuch a ſize, that a ſingle pear tree, particularly of the Boſbury and the ſquaſh kind, has frequently been known to yield, in one ſeaſon, from one to four hogſheads of perry. The Boſbury pear is thought to yield the moſt laſting and moſt vinous liquor. The John pear, the Harpary pear, the Drake pear, the Mary pear, the Lullum pear, and ſeveral others of the harſheſt kinds, are eſteemed the beſt for perry, but the redder or more tawny they are, the more they are preferred. Pears, as well as apples, ſhould be full ripe before they are ground.

Dr. Beale, in his general advertiſements concerning cyder, ſubjoined to Mr. Evelyn's Pomona, diſapproves of Palladius's ſaying, that perry will keep during the winter, but that it turns ſour as ſoon as the weather begins to be warm; and gives, as his reaſons for being of a contrary opinion, that he had himſelf taſted at the end of ſummer, a very briſk, lively, and vinous liquor, made of horſe pears; that he had often tried the juice of the Boſbury pear, and found it both pleaſanter and richer the ſecond year, and ſtill more ſo the third, though kept only in common hogſheads, and in but indifferent cellars, without being bottled; and that a very honeſt, worthy, and ingenious gentleman in his neighbourhood aſſured him, as of his own experience, that it will keep a great while, and grow much the ſtonger for keeping, if put into a good cellar, and managed with due care. He imputes Palladius's error to his poſſibly ſpeaking of common eatable pears, and to the perry's having been made in a very hot country: but he would have aſcribed it to a more real cauſe, perhaps, had he pointed out the want of a thorough regular fermentation, to which it appears plainly that the ancients were entire ſtrangers; for all their vinous liquors were medicated by boiling, before they were laid up in order to be kept. *See the article* CYDER.

PHEASANT, a bird ſo nearly allied to our common poultry, that it would naturally appear a very eaſy thing to breed them up from young; but the proper food of them is not ſufficiently enquired into. Though they eat corn when full grown and in health, yet they have recourſe in their young ſtate, and when ſick, to another ſort of food, preying on ſeveral inſects, and that in a very voracious manner.

The young pheaſants and partridges prey upon ants; and they will never ſucceed with us, if they have not a proper quantity of ants to have recourſe to, as ſoon as they leave their rooſt in a morning. When muſty corn, or want of due care in cleaning their houſes, has made them ſick, a repaſt of ants will often recover them. When that fails, they may be offered millepedes or earwigs, or both together, which will always do much better than either ſingly. To this medicine muſt be added a proper care that their common food of corn be very ſweet, their habitation kept nicely clean, and their water ſhifted twice a day. They muſt not be let out of the houſe in a morning till the dew is off the ground; and after ſun-ſet they muſt be immediately taken in again: in the heat of the day they muſt be allowed to baſk in the ſun in a dry ſandy place. With theſe regulations the birds of this kind will ſucceed much better than they uſually do. The pheaſant is a bird of a ſullen diſpoſition, and, when the coupling time is over, there are ſeldom found more than one in a place. *Philoſ. Tranſ.* N° 23.

PIGEON, the name of a well known bird, and of which here are two kinds, the wild and the tame; the latter differ from the former only in bigneſs and familiarity: the wild uſually perch upon trees, being ſeldom ſeen on the ground. Pigeons are of various ſorts, ſuch as carriers, powters, runts, turbets, &c. *See* CARRIERS, &c.

There are two ſeaſons when you may eaſily procure a ſufficient ſtock of pigeons, viz. May and Auguſt: for at theſe ſeaſons there are a great number of young pigeons, which may then be purchaſed very reaſonably.

PIGEON HOUSE, a houſe erected full of holes within for the keeping, breeding, &c. of pigeons, otherwiſe called a dove-cote.

Any lord of a manor may build a pigeon-houſe on his land, but a tenant cannot do it without the lord's licence. When perſons ſhoot at or kill pigeons within a certain diſtance of the pigeon-houſe, they are liable to pay a forfeiture.

In order to erect a pigeon-houſe to advantage, it will be neceſſary, in the firſt place, to pitch upon a convenient ſituation, of which none is more proper than the middle of a ſpacious court-yard, becauſe pigeons are naturally of a timorous diſpoſition, and the leaſt noiſe they hear frightens them. With regard to the ſize of the pigeon-houſe, it muſt depend entirely upon the number of birds intended to be kept; but it is better to have it too large than too little; and as to its form, the round ſhould be preferred to the ſquare ones; becauſe rats cannot ſo eaſily come at them in the former as in the latter. It is alſo much more commodious; becauſe you may, by means of a ladder turning upon an axis, eaſily viſit all the neſts in the houſe, without the leaſt difficulty; which cannot ſo eaſily be done in a ſquare-houſe.

In order to hinder rats from climbing up the outſide of the pigeon-houſe, the wall ſhould be covered with tin plates to a certain height, about a foot and a half will be ſufficient; but they ſhould project out three or four inches at the top, to prevent their clambering any higher.

The pigeon-houſe ſhould be placed at no great diſtance from water, that the pigeons may carry it to their young ones; and their carrying it in their bills will warm it, and render it more wholeſome in cold weather.

The boards that cover the pigeon-houſe ſhould be well joined together, ſo that no rain may penetrate through it. And the whole building ſhould be covered with hard plaſter, and white-waſhed within and without, white being the moſt pleaſing colour to pigeons. There muſt be no window, or other opening, in the pigeon-houſe to the eaſtward; theſe ſhould always face the ſouth, for pigeons are very fond of the ſun, eſpecially in winter.

The neſts or covers in a pigeon-houſe, ſhould conſiſt of ſquare holds made in the walls of a ſize ſufficient to admit the cock and hen to ſtand in them. The firſt range of theſe neſts ſhould not be leſs than four feet from the ground, that the wall underneath being ſmooth, the rats may not be able to reach them. Theſe neſts ſhould be placed in quincunx order, and not directly over one another. Nor muſt they be continued any higher than within three feet of the top of the wall: and the upper row ſhould be covered with a board projecting a conſiderable diſtance from the wall, for fear the rats ſhould find means to climb the outſide of the houſe.

M. Duhamel thinks that pigeons neither feed upon the green corn, nor have bills ſtrong enough to ſearch for its ſeeds in the earth; but only pick up the grains that are not covered, which would infallibly become the prey of other animals, or be dried up by the ſun. “From the time of the ſprouting of the corn, ſays he, pigeons live chiefly upon the ſeeds of wild uncultivated plants, and therefore leſſen conſiderably the quantity of weeds that would otherwiſe ſpring up; as will appear from a juſt eſtimate of the quantity of grain neceſſary to feed all the pigeons of a well-ſtocked dove-houſe.” But Mr. Worlidge and Mr. Liſle alledge facts in ſupport of the contrary opinion. The latter relates, that a farmer in his neighbourhood aſſured him he had known an acre ſowed with peas, and rain coming on ſo that they could not be harrowed in, every pea was fetched away in half a day's time by pigeons: and the former ſays, “It is to be obſerved, that where the flight of pigeons falls, there they fill themſelves and away; and return again where they firſt roſe, and ſo proceed over a whole piece of ground, if they like it. Although you cannot perceive any grain above the ground, they know how to find it. I have ſeen them lie ſo much upon a piece of about two or three acres ſown with peas, that they devoured at leaſt three parts in four of the ſeed, which, I am ſure, could not be all above the ſurface of the ground. That their ſmelling is their principal director, I have obſerved; having ſown a ſmall plat of peas in my garden, near a pigeon-houſe, and covered them ſo well that not a pea appeared above ground. In a few day, a parcel of pigeons were hard at work in diſcovering this hidden treaſure; and in a few days more I had not above two or three peas left out of about two quarts that were planted; for what they could not find before, they found when the buds appeared, notwithſtanding they were hoed in, and well covered. Their ſmelling alone directed them, as I ſuppoſed, becauſe they followed the ranges exactly. The injury they do at harveſt on the peas, vetches, &c. is ſuch that we may rank them among the greateſt enemies the poor huſbandman meets withal; and the greater, becauſe he may not erect a pigeon-houſe, whereby to have a ſhare of his own ſpoils; none but the rich being allowed this privilege, and ſo ſevere a law being alſo made to protect theſe winged thieves, that a man cannot encounter them, even in defence of his own property. You have therefore no remedy againſt them, but to affright them away by noiſes, or ſuch like. You may, indeed, ſhoot at them; but you muſt not kill them; or you may, if you can, take them in a net, cut off their tails, and let them go; by which means you will impound them: for when they are in their houſes, they cannot bolt or fly out of the tops of them, but by the ſtrength of their tails, after the thus weakening of which, they remain priſoners at home.”

Mr. Worlidge's impounding the pigeons reminds me of a humourous ſtory of a gentleman who, upon a neighbouring farmer's complaining to him, that his pigeons were a great nuiſance to his land, and did ſad miſchief to his corn, replied jokingly, Pound them, if you catch them treſpaſſing. The farmer, improving the hint, ſteeped a parcel of peas in an infuſion of coculus indicus, or ſome other intoxicating drug, and ſtrewed them upon his grounds. The pigeons ſwallowed them, and ſoon remained motionleſs on the field: upon which the farmer threw a net over them, incloſed them in it, and carried them to an empty barn, from whence he ſent the gentleman word that he had followed his directions with regard to the pounding of his pigeons, and deſired him to come and releaſe them.

PIGGIN, a little pail or tub, with an erect handle.

PIKE, a name given in ſome counties to what is generally called a fork, uſed for carrying ſtraw, &c. from the barn, cocking of barley, &c.

PINE, the name of a foreſt tree, of which there are various ſpecies, but two only that deſerve cultivating; namely, the Scotch-pine, and the white pine, commonly called in England lord Weymouth's, or New England pine.

The Scotch-pine, ſo called from its growing naturally on the mountains of Scotland, is the tree that affords the red or yellow deal, which is the moſt durable of any of the kinds yet known. The leaves of this tree are pretty broad and ſhort, of a greyiſh colour, growing two out of each ſheath; the cones are ſmall, pyramidal, and end in narrow points; they are of a light colour, and the ſeeds are ſmall.

This ſort grows well upon almoſt every ſoil; I have planted numbers of the trees upon peat bogs, where they have made great progreſs. I have alſo planted them in clay, where they have ſucceeded far beyond expectation; and upon ſand, gravel, and chalk, they likewiſe thrive as well; but as they do not grow near ſo faſt upon gravel and ſand, as upon moiſt ground, ſo the wood is much preferable; for thoſe trees which have been cut down upon moiſt ſoils, where they have made the greateſt progreſs, when they have been ſawn out into boards, have not been valuable, the wood has been white, and of a looſe texture; whereas thoſe which have grown upon dry gravelly ground, have proved nearly equal to the beſt foreign deals; and I doubt not but thoſe plantations, which of late years have been made of theſe trees, will, in the next age, not only turn greatly to the advantage of their poſſeſſors, but alſo become a national benefit.

The white pine is one of the talleſt trees of all the ſpecies, often growing a hundred feet high, as I have been credibly informed. The bark of this tree is very ſmooth and delicate, eſpecially when young; the leaves are long and ſlender, five growing out of each ſheath; the branches are pretty cloſely garniſhed with them, ſo make a fine appearance; the cones are long, ſlender, and very looſe, opening with the firſt warmth of the ſpring: ſo that if they are not gathered in winter, the ſcales open and let out the ſeeds. The wood of this ſort is eſteemed for making of maſts for ſhips; it is in England called lord Weymouth's, or New England pine, as hath been already obſerved. As the wood of this tree was generally thought of great ſervice to the navy, there was a law made in the ninth year of queen Anne, for the preſervation of the trees, and to encourage their growth in America; and it is within forty years paſt theſe trees began to be propagated in England in any plenty, though there were ſome large trees of this ſort growing in two or three places long before, particularly at lord Weymouth's, at Longleet, Sir Wyndham Knatchbull's in Kent; and it has been chiefly from the ſeeds of the latter that the much greater number of theſe trees now in England have been raiſed; for although there has annually been ſome of the ſeeds brought from America, yet thoſe have been few in compariſon to the produce of the trees in Kent: many of the trees, which have been raiſed from the ſeeds of thoſe trees, now produce plenty of the ſeeds, particularly thoſe in the gardens of the late duke of Argyle at Whitton, which annually produce large quantities of cones, which his grace, when living, moſt generouſly diſtributed to all the curious.

All the ſorts of pines are propagated by ſeeds, which are produced in hard woody cones; the way to get the ſeeds out of theſe cones, which are cloſe, is to lay them before a gentle fire, which will cauſe the cells to open, and then the ſeeds may be eaſily taken out. If the cones are kept entire, the ſeeds will remain good ſome years, ſo that the ſureſt way to preſerve them, is to let them remain in the cones, until the time for ſowing the ſeeds: if the cones are kept in a warm place in ſummer, they will open, and emit the ſeeds; but if they are not expoſed too much to heat, many of the ſorts will remain entire ſome years, eſpecially thoſe which are cloſe and compact; and the ſeeds, which have been taken out of cones of ſeven years old, have grown very well, ſo that theſe may be tranſported to any diſtance, provided the cones are well ripened, and properly put up.

The beſt time for ſowing the ſeeds of pines, is about the end of March; when the ſeeds are ſown, the place ſhould be covered with nets to keep off birds, otherwiſe, when the plants begin to appear with the huſk of the ſeed on their tops, the birds will pick off the heads of the plants, and deſtroy them.

Where the quantity of ſeeds to be ſown is not great, it will be a good way to ſow them either in boxes or pots filled with light loamy earth, which may be removed from one ſituation to another, according to the ſeaſon of the year; but if there is a large quantity of the ſeeds, ſo as to require a good ſpace to receive them, they ſhould be ſown on an eaſt or north-eaſt border, where they may be ſcreened from the ſun, whoſe heat is very injurious to theſe plants at their firſt appearance above ground. Thoſe ſeeds, which are ſown in pots or boxes, ſhould alſo be placed in a ſhady ſituation, but not under trees; and if they are ſcreened from the ſun with mats, at the time when the plants firſt come up, it will be a good method to preſerve them.

When the plants appear, they muſt be conſtantly kept clean from weeds, and, in very dry ſeaſons, if they are now and then gently refreſhed with water, it will forward their growth; but this muſt be done with great care and caution, for if they are haſtily watered, it will waſh the tender plants out of the ground, or lay them down flat, which often rots their ſhanks; and when this is too often repeated, it will have the ſame effect; ſo that unleſs it is judiciouſly performed, it will be the beſt way to give them none, but only ſcreen them from the ſun.

If the plants come up too cloſe, it will be a good method to thin them gently about the beginning of July. The plants, which are drawn up, may then be planted on other beds, which ſhould be prepared ready to receive them, for they ſhould be immediately planted as they are drawn up, becauſe their tender roots are ſoon dried and ſpoiled at this ſeaſon of the year. This work ſhould be done, if poſſible, in cloudy or rainy weather, and then the plants will draw out with better roots, and will ſoon put out new fibres again; but if the weather ſhould prove clear and dry, the plants ſhould be ſhaded every day from the ſun with mats, and now and then gently refreſhed with water. In drawing up of the plants, there ſhould be great care taken not to diſturb the roots of the plants left remaining in the ſeed-beds, &c. ſo that if the ground be hard, the beds ſhould be well watered ſome time before the plants are thinned, to ſoften and looſen the earth; and if, after the plants are drawn out, the beds are again gently watered to ſettle the earth to the roots of the remaining plants, it will be of great ſervice to them; but it muſt be done with great care, ſo as not to waſh out their roots, or lay down the plants. The diſtance, which ſhould be allowed theſe plants, is four ur five inches row from row, and three inches in the rows.

In theſe beds the plants may remain till the ſpring twelve-months after, by which time they will be fit to tranſplant where they are to remain for good; for the younger plants are, when planted out, the better they will ſucceed; for although ſome ſorts will bear tranſplanting at a much greater age, yet young plants planted at the ſame time will in a few years overtake the large ones, and ſoon outſtrip them in their growth; and there is an advantage in planting young, by ſaving the expence of ſtaking, and much watering, which large plants require. I have ſeveral times ſeen plantations of ſeveral ſorts of pines, which were made of plants ſix or ſeven feet high, and at the ſame time others of one foot high planted between them, which in ten years were better trees than the old ones, and much more vigorous in their growth; but if the ground, where they are deſigned to remain, cannot be prepared by the time before mentioned, the plants ſhould be planted out of the beds into a nurſery, where they may remain two years, but not longer; for it will be very hazardous in removing theſe trees at a greater age.

The beſt ſeaſon to tranſplant theſe pines, is about the latter end of March, or the beginning of April, juſt before they begin to ſhoot; for although the Scotch pine, and ſome of the moſt hardy ſorts, may be tranſplanted in winter, eſpecially when they are growing in ſtrong land, where they may be taken up with balls of earth to their roots, yet this is what I would not adviſe for common practice, having frequently ſeen it attended with bad conſequences; but thoſe which are removed in the ſpring rarely fail.

Where theſe trees are planted in expoſed ſituations, they ſhould be put pretty cloſe together, that they may ſhelter each other, and, when they have grown a few years, part of the plants may be cut down to give room for the others to grow; but this muſt be gradually performed, leſt by too much opening the plantation at once, the air ſhould be let in among the remaining trees with too great violence, which will ſtop their growth.

Wherever large plantations are deſigned to be made, the beſt method will be to raiſe the plants either upon a part of the ſame land, or as near to the place as poſſible, and alſo upon the ſame ſort of ſoil; a ſmall piece of ground will be ſufficient to raiſe plants enough for many acres; but, as the plants require ſome care in their firſt raiſing, if the neighbouring cottagers, who have many of them ſmall incloſures adjoining to their cottages; or, where this is wanting, a ſmall incloſure ſhould be made them for the purpoſe of raiſing the plants, and they be furniſhed with the ſeeds and directions for ſowing them, and managing the young plants, till they are fit for tranſplanting, the women and children may be uſefully employed in this work, and the proprietors of land agreeing with them to take their plants, when raiſed, at a certain price, it would be a great benefit to the poor, and hereby they would be engaged to have a regard for the plantations when made, and prevent their being deſtroyed.

The Scotch pine, as was before obſerved, being the hardieſt of all the kinds, and the wood of it the moſt uſeful, is the ſort which beſt deſerves care. This will thrive upon the moſt barren ſands, where ſcarce any thing elſe except heath and furze will grow; ſo that there are many thouſand acres of ſuch land lying convenient for water carriage, which at preſent is of little benefit to any body, that might, by plantations of theſe trees, become good eſtates to their proprietors, and alſo a national benefit; and as the legiſlators have taken this into their conſideration, and already paſſed ſome laws for the encouraging theſe plantations, as alſo for their preſervation and ſecurity; ſo it may be hoped that this will be undertaken by the gentlemen who are poſſeſſed of ſuch lands in all the different parts of the kingdom, with proper ſpirit; for although they may not expect to receive much profit from theſe plantations in their own time, yet their ſucceſſors may with large intereſt, and the pleaſure which theſe growing trees will afford them, by beautifying the preſent dreary parts of the country, will in ſome meaſure recompenſe them for their trouble and expence, and by creating employment for the poor, leſſen thoſe rates which are now, in many parts of England, ſcarce to be borne.

The expence of making theſe plantations is what moſt people are afraid of, ſo would not engage in it; but the greateſt of the expence is that of fencing them from the cattle, &c. for the other is trifling, as there will be no neceſſity for preparing the ground to receive the plants, and the charge of planting an acre of land with theſe plants will not be more than thirty ſhillings where labour is dear, excluſive of the plants, which may be valued at forty ſhillings more. I have planted many acres of land with theſe trees, which was covered with heath and furze, and have only dug holes between to put in the plants, and afterward laid the heath or furze, which was cut upon the ſurface of the ground about their roots, to prevent the ground drying, and few of the plants have failed. Theſe plants were moſt of them four years old from ſeed, nor was there any care taken to clean the ground afterward, but the whole left to ſhift, and in five or ſix years the pines have grown ſo well, as to over-power the heath and furze, and deſtroy it.

The diſtance which I have generally planted theſe plants in all large open ſituations, was about four feet, but always irregular, avoiding planting in rows as much as poſſible; and in the planting, the great care is not to take up the plants faſter than they can be planted, ſo that ſome men have been employed in digging up of the plants, while others were planting. Thoſe who take up the plants, muſt be looked after to ſee they do not tear off their roots, or wound their bark; and as faſt as they are taken up, their roots ſhould be covered to prevent their drying, and put into their new quarters as ſoon as poſſible. In planting them, care ſhould be had to make the holes large enough for their roots, as alſo to looſen and break the clods of earth, and put the fineſt immediately about their roots, then to ſettle the earth gently with the foot to the roots of the plant. If theſe things are duly obſerved, and a proper ſeaſon choſen for performing it, there will be very little hazard of their ſucceeding; but I have ſeen ſome plantations made with plants, which were brought from a great diſtance, and had been ſo cloſely packed up, as to cauſe a heat, whereby moſt of the plants within had their leaves changed yellow, and few of them have grown, which has diſcouraged others from planting, not knowing the true cauſe of their failure.

After the plantations are made, the only care they require for five or ſix years, will be to ſecure the plants from cattle, hares, and rabbits; for if theſe are admitted to them, they will make great deſtruction in a ſhort time, for if the branches are gnawed by hares or rabbits, it will greatly retard the growth of the plants, if not deſtroy them.

In about five or ſix years after planting, the branches of the young trees will have met, and begin to interfere with each other, therefore they will require a little pruning; but this muſt be done with great caution. The lower tier of branches only ſhould be cut off; this ſhould be performed in September, at which time there will be no danger of the wounds bleeding too much, and the turpentine will harden over the wounds as the ſeaſon grows cold, ſo will prevent the wet from penetrating of them. Theſe branches ſhould be cut off cloſe to the ſtem of the plants, and care ſhould be taken in the doing of this, not to break any of the remaining branches of the young trees. This work ſhould be repeated every other year, at each time taking off only the lower tier of branches; for if the plants are much trimmed, it will greatly retard their growth, as it does in general that of all trees; but as theſe trees never put out any new ſhoots where they are pruned, ſo they ſuffer more from amputation than thoſe which do.

In about twelve or fourteen years theſe will require no more pruning, for their upper branches will kill thoſe below where they have not air; but ſoon after this, if the plants have made good progreſs, it may be neceſſary to thin them; but this ſhould be gradually performed, beginning in the middle of the plantation firſt, leaving the outſide cloſe to ſcreen thoſe within from the cold, ſo by degrees coming to them at laſt, whereby thoſe, which were firſt thinned, will have had time to get ſtrength, ſo will not be in danger of ſuffering from the admiſſion of cold air. When theſe plantations are thinned, the trees ſhould not be dug up; but their ſtems cut off cloſe to the ground, for their roots never ſhoot again, but decay in the earth, ſo there can no harm ariſe by leaving them, and hereby the roots of the remaining plants are not injured. The trees which are now cut, will be fit for many purpoſes; thoſe which are ſtrait, will make good putlocks for the bricklayers, and ſerve for ſcaffolding poles, ſo that there may be as much made by the ſale of theſe, as will defray the whole expence of the planting, and probably intereſt for the money into the bargain.

As the upright growth of theſe trees renders their wood the more valuable, they ſhould be left pretty cloſe together, whereby they will draw each other up, and grow very tall. I have ſeen ſome of theſe trees growing, whoſe naked ſtems have been more than ſeventy feet high, and as ſtraight as a walking cane, and from one of theſe trees there were as many boards ſawed, as laid the floor of a room near twenty feet ſquare. If theſe trees are left eight feet aſunder each way, it will be ſufficient room for their growth; therefore, if at the firſt thinning a fourth part of the trees are taken away, the other may ſtand twelve or fourteen years longer, by which time they will be of a ſize for making ladders, and ſtandards for ſcaffolding, and many other purpoſes; ſo that from this ſale, as much may be made, as to not only pay the remaining part of the expence of planting, if any ſhould be wanting in the firſt, but rent for the land with intereſt, and the ſtanding trees for fortunes of younger children. This may be demonſtrated by figures, and there has been ſeveral examples of late years, where the profits have greatly exceeded what is here mentioned. *Miller's Gard. Dict.*

Pitch, tar, reſin, and turpentine, are all made from theſe trees by a very familiar proceſs. In the ſpring time, when the ſap is moſt free in running, they pare off the bark of the pine-tree, to make the ſap run down into a hole which they cut at the bottom to receive it: in the way, as it runs down, it leaves a white matter like cream, but a little thicker: this is very different from all the kinds of reſin and turpentine in uſe, and it is generally ſold to be uſed in the making of flambeaux, inſtead of white bees wax. The matter that is received in the hole at the bottom, is taken up with ladles, and put in a large baſket; a great part of this immediately runs through, and this is the common turpentine. This is received into ſtone or earthen pots, and is ready for ſale. The thicker matter, which remains in the baſket, they put into a common alembic, adding a lage quantity of water; they diſtil this as long as any oil is ſeen ſwimming upon the water; this oil they ſeparate from the ſurface in large quantities, and this is the common oil or ſpirit of turpentine; the remaining matter, at the bottom of the ſtill, is common yellow reſin. When they have thus obtained all that they can from the ſap of the tree, they cut it down, and, hewing the wood into billets, they fill a pit dug in the earth with theſe billets, and, ſetting them on fire, there runs from them, while they are burning, a black thick matter; this naturally falls to the bottom of the pit, and this is the tar. The top of the pit is covered with tiles, to keep in the heat; and there is at the bottom a little hole, out at which the tar runs like oil: if this hole be made too large, it ſets the whole quantity of the tar on fire; but, if ſmall enough, it runs quietly out.

The tar, being thus made, is put up in barrels, and, if it be to be made into pitch, they put it into large boiling veſſels, without adding any thing to it: it is then ſuffered to boil a while, and, being then let out, is found, when cold, to be what we call pitch. *Phil. Tranſ.* Numb. 243.

PINE-APPLE, the name of a very curious plant, of which Tournefort has enumerated three, and Mr. Miller ſix, ſpecies.

The pine-apple, ſo called from its reſembling the cones of the European pine-tree, is a native of the torrid zone; but has for ſome years been cultivated here in tolerable perfection. The plant that produces it nearly reſembles the aloe, except that the leaves of the pine-apple are much thinner, longer, and moſt of them near the ground ſtand in a horizontal poſition; but as they approach nearer the fruit, diminiſh in length, and become leſs expanded. The plant, in its native climate, ſeldom grows to above three feet in height, and terminates in a flower reſembling a lilly, but of ſo elegant a crimſon as to dazzle the eye. The pine-apple makes its firſt appearance in the center of the flower, about the ſize of a nut; and as this increaſes, the luſtre of the flower fades, and the leaves expand themſelves to make room for it, and ſerve it at once for a baſe and ornament. On the top of the apple itſelf is a crown or tuft of leaves, like thoſe of the plant, and of a very lively blue-green colour. This crown grows in proportion with the fruit, till both have attained their utmoſt magnitude. As ſoon as this happens the fruit begins to ripen, and its green changes into a bright ſtraw-colour; during this alteration of colour, the fruit exhales ſuch a fragrancy as to diſcover it, though concealed from ſight. While it continues to grow, it ſhoots out, on all ſides, little thorns or prickles, which, as it approaches towards maturity, dry and ſoften, ſo that the fruit is gathered without the leaſt inconvenience.

The ſingularities that concenter in this product of nature cannot fail of ſtriking a contemplative mind with admiration. The crown which formed a kind of apex, while growing, becomes itſelf a new plant; and the ſtem, after the fruit is cut, dies away, as if ſatisfied with having anſwered the intention of nature in ſuch a production; but the roots ſhoot forth freſh ſtalks, or ſuckers, for the farther increaſe of ſo váluable a ſpecies.

Theſe plants are propagated by planting the crowns which grow on the fruit, or the ſuckers which are produced either from the plants, or under the fruit, either of which I have found to be equally good; although, by ſome perſons, the crown is thought preferable to the ſuckers, as ſuppoſing it will produce fruit ſooner than the ſuckers, which is certainly a miſtake; for by conſtant experience I find the ſuckers (if equally ſtrong) will fruit as ſoon, and produce as large fruit as the crowns.

The ſuckers and crowns muſt be laid to dry in a warm place for four or five days, or more (according to the moiſture of the part which adhered to the old plant or fruit) for, if they are immediately planted, they will rot. The certain rule of judging when they are fit to plant, is by obſerving if the bottom is healed over, and become hard; for, if the ſuckers are drawn off carefully from the old plants, they will have a hard ſkin over the lower part; ſo need not lie ſo long as thoſe which by accident may have been broken. But whenever a crown is taken from the fruit, or the ſuckers from the old plants, they ſhould be immediately diveſted of their bottom leaves, ſo high as to allow depth for their planting; ſo that they may be thoroughly dry and healed in every part, left, when they receive heat and moiſture, they ſhould periſh, which often happens when this method is not purſued. If theſe ſuckers or crowns are taken off late in the autumn, or during the winter, or early in the ſpring, they ſhould be laid in a dry place in the ſtove, for a fortnight or three weeks before they are planted; but in the ſummer-ſeaſon they will be fit for planting in three or four days.

As to the earth in which theſe ſhould be planted, if you have a rich good kitchen-garden mould, not too heavy, ſo as to detain the moiſture too long, nor over light and ſandy, it will be very proper for them without any mixture: but, where this is wanting, you ſhould procure ſome freſh earth from a good paſture, which ſhould be mixed with about a third part of rotten neats-dung, or the dung of an old melon or cucumber-bed, which is well conſumed. Theſe ſhould be mixed ſix or eight months at leaſt before they are uſed; but if it be a year, it will be the better; and ſhould be often turned, that their parts may be the better united, as alſo the clods well broken. This earth ſhould not be ſcreened very fine; for, if you only clear it of the great ſtones, it will be better for the plants than when it is made too fine. You ſhould always avoid mixing any ſand with the earth, unleſs it be extremely ſtiff; and then it will be neceſſary to have it mixed at leaſt ſix months or a year before it is uſed; and it muſt be frequently turned, that the ſand may be incorporated in the earth, ſo as to divide its parts: but you ſhould not put more than a ſixth part of ſand; for too much ſand is very injurious to theſe plants.

In the ſummer ſeaſon, when the weather is warm, theſe plants muſt be frequently watered; but you ſhould not give them large quantities at a time. You muſt alſo be very careful that the moiſture is not detained in the pots by the holes being ſtopped; for that will ſoon deſtroy the plants. If the ſeaſon is warm, they ſhould be watered every other day; but, in a cool ſeaſon, twice a weak will be often enough: and, during the ſummer ſeaſon, you ſhould once a weak water them gently all over their leaves, which will waſh the filth off them, and thereby greatly promote the growth of the plants. There are ſome perſons who frequently ſhift theſe plants from pot to pot; but this is by no means to be practiſed by thoſe who propoſe to have large well-flavoured fruit; for, unleſs the pots be filled with the roots, by the time the plants begin to ſhew their fruit, they commonly produce ſmall fruit, which have generally large crowns on them; ſo that the plants will not require to be new potted oftener than twice in a ſeaſon; the firſt time ſhould be about the end of April, when the ſuckers and crowns of the former year's fruit (which remained all the winter in thoſe pots in which they were firſt planted) ſhould be ſhifted into larger pots. i. e. thoſe which were in halfpenny or three farthings pots, ſhould be put into penny, or at moſt three halfpenny pots, according to the ſize of the plants; for you muſt be very careful not to overpot them, nothing being more prejudicial to theſe plants. The ſecond time for ſhifting them is towards the latter end of Auguſt, or the beginning of September, when you ſhould ſhift theſe plants which are of a proper ſize for fruiting the following ſpring into two-penny pots, which are full large enough for any of thoſe plants. At each of theſe times of ſhifting the plants, the bark-bed ſhould be ſtirred up, and ſome new bark added, to raiſe the bed up to the height it was at firſt made; and, when the pots are plunged again into the bark-bed, the plants ſhould be watered gently all over the leaves, to waſh off the filth, and to ſettle the earth to the roots of the plants. If the bark-bed be well ſtirred, and a quantity of good freſh bark added to the bed, at this latter ſhifting, it will be of great ſervice to the plants; and they may remain in the tan until the beginning of November, or ſometimes later, according to the mildneſs of the ſeaſon, and will not require any fire before that time. During the winter ſeaſon theſe plants will not require to be watered oftener than every third or fourth day, according as you find the earth in the pots to dry: nor ſhould you give them too much at a time; for it is much better to give them a little water often, than to over-water them, eſpecially at that ſeaſon. You muſt obſerve never to ſhift thoſe plants which ſhew their fruit into other pots; for, if they are removed after the fruit appears, it will ſtop the growth, and thereby cauſe the fruit to be ſmaller, and retard its ripening; ſo that many times it will be October or November before the fruit is ripe: therefore you ſhould be very careful to keep the plants in a vigorous growing ſtate from the firſt appearance of the fruit, becauſe upon this depends the goodneſs and ſize of the fruit; for, if they receive a check after this, the fruit is generally ſmall and ill-taſted.

The method of judging when the fruit is ripe, is by the ſmell, and from obſervation; for, as the ſeveral ſorts differ from each other in the colour of their fruit, that will not be any direction when to cut them; nor ſhould they remain ſo long as to become flat and dead, as they alſo do when they are cut long before they are eaten: therefore, the ſureſt way to have this fruit in perfection, is to cut it the ſame day it is eaten; but it muſt be early in the morning, before the ſun has heated the fruit, obſerving to cut the ſtalk as long to the fruit as poſſible, and lay it in a cool, but dry, place, preſerving the ſtalk and crown to it, until it is eaten. *Miller's Gardener's Dictionary.*

The following Method of cultivating the pine-apple Plants, was communicated by the late Mr. Allen, of Bath; and has been practiſed with great Succeſs:

Let the pine-apple plants be planted as ſoon as poſſible, in pots of about eight or nine inches diameter, and plunged into a bed of tanner's bark, about three foot and a half thick; and let the laſt half foot on the top of the bed be old tan that has loſt its heat, which will prevent the plants being ſcorched at the roots. In September ſhift them into large pots with all the earth about them: at the ſame time ſhaking up the tan to the bottom of the pit, adding ſome freſh to keep it up to its proper height; ſtill obſerving to keep about ſix inches of old tan at the top. This will be ſufficient to keep them till they ſhew their fruit, which will probably be in February or March; when being prepared with a bed of freſh tan, cover it over about two inches thick with earth; then turn the plants out of the pots, without diſturbing the roots, and place them on the bed at proper diſtances, filling up the interſtices with good earth; where they may remain till the fruit is ripe: water them about twice a week all over the bed, but not on the fruit.

There may be few objections raiſed againſt this method, the principal of which is, That thoſe plants which do not ſhew when they are turned out of the pots, there is a great probability of their paſſing the ſummer without fruiting; or, if there ſhould be any that ripen late, the houſe cannot be at liberty to receive the plants for the ſucceeding year; and if it is all new tan, as propoſed, it is apt to cake and want freſh ſtirring when the fruit is three parts grown, in order to ſwell the fruit out to a large ſize.

There are two ſorts of the ananas principally cultivated in England; one called the queen-pine, the other the Montſerrat. The queen is moſt eſteemed among the gardeners, as being more regular and certain in their bearing; whereas the Montſerrat ſort frequently miſs the proper ſeaſon; and many that are brought from that iſland, though fine plants to look at, are apt to produce but trifling fruit. One cauſe of this, perhaps, may be, the ill choice that is made in promiſcuouſly taking the ſuckers from the plants that have produced but indifferent fruit.

It generally happens that pine plants which are brought from the Weſt-Indies, have a white inſect adhering to them, and which, if not deſtroyed, may infect a whole houſe of plants to their great prejudice, as they never thrive while theſe inſects prey on them. Some gardeners infuſe the plants in tobacco water, in order to deſtroy theſe inſects, but this often rots the plants: a much better method therefore is, when the plants arrive, to ſtrip the ſmall leaves from the roots, and clean them dry; for it is in that part theſe inſects moſtly harbour. While the bottoms of the plants are hardening, make a hot-bed with dung, and lay ſeven or eight inches of old tan on it, which cover with glaſſes. When the violence of the heat is a little abated, ſtick the plants in the tan, and let them remain there about three weeks; by which time they will be fit for potting, and the inſects intirely deſtroyed by the ſteam of the dung. As for plants that do not immediately come from abroad, they are never troubled with theſe inſects, unleſs the waterings have been neglected, or the plants by ſome other means are become unhealthy; for they will not prey upon any perfectly healthful plant.

The following Eſtimate of the Expence of building a Stove for raiſing Pine-apples; together with the annual Charges for Tan, Labour, &c. appeared in the Muſeum Ruſticum, *Vol. III. Pag.* 142.

A ſtove, forty feet long, and twelve wide, is the proper ſize for one fire-place, and contains as much air as one fire will properly warm: I ſhall therefore calculate my expences for one of that ſize, and particularly as it will produce about one hundred and fifty pines a year, which is fruit enough for a moderate-ſized family.

The height in front is three feet, and the back part about ſeven feet.

The front, one end, and roof to be of glaſs, the other end brick, where ſhould be a room about twelve feet ſquare, and it ought not to be leſs, for the convenience of laying the fuel, and for making the fire.

As to the dimenſions of the flues, &c. it is not neceſſary here to inſert them; but I will beg leave to refer any gentleman, who wants to build one, to that ingenious bricklayer, Mr. Salter Field, of Walton upon Thames, who has ſhewed great ſkill and judgment in building ſeveral.

The expence of building ſuch a ſtove will be about eighty pounds, ſuppoſing all the materials to be new, and at the prices given in London and its neighbourhood; but if you have the conveniency of a wall ready built to erect it againſt, it will ſave about fifteen pounds.

The price of the plants will be according to their ſizes, from two or three ſhillings each to ten or twelve, and entirely depends on how long you will wait for fruit, and whether you will buy ſuch as will produce fruit of only one pound weight each, or two or three pounds; but about fifty pounds will ſtock it properly at firſt, to have fruit immediately.

The yearly Expences as follows.

	l.	s.	d.
Eight hundred buſhels of tan to fill the pit at firſt, at three half-pence per buſhel	5	0	0
Sixteen loads carriage	0	16	0
Three chaldrons and a half of coals, at thirty-ſix ſhillings per chaldron	6	6	0
Two hundred buſhels of tan more, to keep the bed level with its former height, at three half-pence per buſhel	1	5	0
Four loads carriage	0	4	0
Filling the pit with tan, and planting the pots, two days, two men, at two ſhillings a day each	0	8	0
Stirring the tan up, and adding freſh four times more, at ditto	1	12	0
The time in attending the fires, watering, &c. is worth at the moſt eighteen-pence a week, which comes to	3	18	0
Repairing the windows, painting, and white-waſhing	1	11	0
Total	21	0	0

The aſhes from your houſe, and rubbiſh from your garden, or, where you can get peat or turf cheap, will abate ſomething in coals; and I think there are few places in England where all the articles together will coſt ſo much: thus you will have one hundred and fifty pines of one pound and a half weight each, one with another, for leſs than three ſhillings a-piece; and with good management moſt of them will weigh two or three pounds a-piece, eſpecially if you plant only your prime crowns and ſuckers.

Beſides pines, you may have vines come through the walls, and nailed to the roofs, and on the flues French-beans, ſtrawberries, and cucumbers.

PIP, *or* PEP, a diſeaſe among poultry, conſiſting of a white thin ſkin, or film, which growing under the tip of the tongue, hinders their feeding. It uſually ariſes from their drinking puddle-water, or eating filthy meat; and is cured by pulling off the film with the fingers, and rubbing the tongue with ſalt.

PLEURISY, and inflammation of the lungs, &c. are diſorders in horſes, though they have ſcarce been mentioned by any writer in farriery before Mr. Gibſon; who, by frequently examining the carcaſes of dead horſes has found them ſubject to the different kinds of inflammations here deſcribed.

He has often diſcovered matter on the pleura (or membrane which lines the cheſt internally) making its way into the cheſt; he has found in ſome horſes the whole ſubſtance of the lungs black, and full of a gangrened water; and in others abſceſſes of various ſizes; and in ſhort, inflammations in every bowel. He has frequently ſeen the blood veſſels ſo over-loaded, that the blood has burſt out of the ſmaller veſſels, and run over their carcaſſes in many places, while the collar-maker was fleaing off their hides, and on cutting open the larger veſſels, the blood has guſhed out as from a fountain, filling all the cavity of the body; an evident proof, that plentiful evacuations had been neglected. In order to diſtinguiſh theſe diſorders from others, we ſhall deſcribe the ſymptoms in Mr. Gibſon's own words.

“ A pleuriſy then, which is an inflammation of the pleura; and a peripneumony, which is an inflammation of the lungs; have ſymptoms very much alike; with this difference only, that in a pleuriſy a horſe ſhews great uneaſineſs, and ſhifts about from place to place; the fever, which at firſt is moderate, riſes ſuddenly very high; in the beginning he often ſtrives to lie down, but ſtarts up again immediately, and frequently turns his head towards the affected ſide, which has cauſed many to miſtake a pleuritic diſorder for the gripes, this ſign being common to both, though with this difference:

“ In the gripes a horſe frequently lies down, and rolls, and when they are violent, he will alſo have convulſive twitches, his eyes being turned up, and his limbs ſtretched out, as if he was dying; his ears and feet ſometimes occaſionally hot, and ſometimes as cold as ice; he falls into profuſe ſweats, and then into cold damps, ſtrives often to ſtale and dung, but with great pain and difficulty; which ſymptoms generally continue, till he has ſome relief: but in a pleuriſy, a horſe's ears and feet are always burning-hot, his mouth parched and dry, his pulſe hard and quick; even ſometimes when he is nigh dying, his fever is continued and increaſing; and though in the beginning he makes many motions to lie down, yet afterwards he reins back as far as his collar will permit, and makes not the leaſt offer to change his poſture, but ſtands panting with ſhort ſtops, and a diſpoſition to cough, till he has relief, or drops down.

“ In an inflammation of the lungs, ſeveral of the ſymptoms are the ſame, only in the beginning he is leſs active, and never offers to lie down during the whole time of his ſickneſs; his fever is ſtrong, breathing difficult, and attended with a ſhort cough; and whereas in a pleuriſy, a horſe's mouth is generally parched and dry, in an inflammation of the lungs, when a horſe's mouth is open, a roapy ſlime will run out in abundance; he gleets alſo at the noſe a reddiſh or yellowiſh water, which ſticks like glue to the inſide of his noſtrils.

“ In a pleuriſy, a horſe heaves and works violently at his flanks, with great reſtleſſneſs, and for the moſt part his belly is tucked up; but in an inflammation of the lungs, he always ſhews fullneſs, and the working of his flanks is regular, except after drinking and ſhifting his poſture; and his ears and feet are for the moſt part cold, and often in damp ſweats.

“The cure of both theſe diſorders is the ſame. In the beginning a ſtrong horſe may loſe three quarts of blood, the next day two quarts more; and if ſymptoms do not abate, the bleedings muſt be repeated, a quart at a time; for it is ſpeedy, large, and quick repeated bleedings that are in theſe caſes chiefly to be depended on. But if a horſe has had any previous weakneſs, or is old, you muſt bleed him in leſs quantities, and oftener. Mr. Gibſon recommends rowels, on each ſide the breaſt, and one on the belly; and a bliſtering ointment to be rubbed all over his briſket upon the foremoſt ribs.

“ The diet and medicines ſhould be both cooling, attenuating, relaxing, and diluting; and the horſe ſhould have warm maſhes, and plenty of water or gruel. The following balls may be given thrice a day.

> “ Take of ſpermaceti and nitre, of each one ounce; oil of anniſeed thirty drops; honey enough to make a ball.

“ A pint of barley-water, in which figs and liquorice-root have been boiled, ſhould be given after each ball; to which the juice of lemons may be added; and if the lungs are greatly oppreſſed with a dry ſhort cough, two or three horns full of the decoction may be given three or four times a day, with four ſpoonfuls of honey and linſeed oil. A ſtrong decoction of the rattle-ſnake root is alſo much recommended in pleuritic diſorders, and may be given to the quantity of two quarts a day, ſweetened with honey. It remarkably attenuates the blood, and diſperſes the inflammation, and in ſome parts is deemed a ſpecific for this complaint.

“ An emollient clyſter ſhould be injected once a day, to which may be added two ounces of nitre, or cream of tartar.

“ In two or three days he will probably run at the noſe, and begin to feed; but ſhould he not, and continue hot and ſhort breathed, you muſt bleed him again, and give the following clyſter:

> “ Take ſenna and marſhmallows, of each two ounces; fennel and bay-berries, each one ounce: boil in five pints of water to two quarts, pour off the clear, and add four ounces of purging ſalts, two or three of ſyrup of buckthorn, and half a pint of linſeed, or any common oil.

“ If by theſe means he grows cooler, and his pain moderates, repeat the clyſter the next day, unleſs it worked too much; then intermit a day; and when he comes to eat ſcalded bran and picked hay, leave off the balls, and continue only the decoction, with now and then a clyſter.

“ But let it be obſerved, that a horſe ſeldom gets the better of theſe diſorders, unleſs he has relief in a few days; for if the inflammation is not checked in that time, it uſually terminates in a gangrene, or collection of matter, which for want of expectoration, ſoon ſuffocates him.

“ But as pleuritic diſorders are apt to leave a taint on the lungs, great care ſhould be taken of the horſe's exerciſe and feeding, which ſhould be light and open for two or three weeks. Thus a quartern of bran ſcalded, with a ſpoonful of honey and flour of brimſtone, may be given every day, with two or three ſmall feeds of oats, ſprinkled with chamber-lye. Inſtead of the bran, for a change, give about a quart of barley ſcalded in a double infuſion of hot water, that it may be ſoftened, and the water given to drink. His exerciſe ſhould be gradual, in an open air and fair weather; and when his ſtrength is recovered, a gentle purge or two ſhould be given; that of rhubarb, when it can be afforded, is beſt, or the purging drink already recommended for this purpoſe.

“ There is alſo an external pleuriſy, or inflammation of the muſcles between the ribs, which when not properly treated, proves the foundation of that diſorder, called the cheſt-founder; for if the inflammation is not diſperſed in time, and the viſcid blood and juices ſo attenuated by internal medicines, that a free circulation is obtained; ſuch a ſtiffneſs and inactivity will remain on theſe parts, as will not eaſily be removed, and which is generally known by the name of cheſt-founder.

"The ſigns of this inflammation, or external pleuriſy, are a ſtiffneſs of the body, ſhoulders, and fore-legs; attended ſometimes with a ſhort dry cough, and a ſhrinking when handled in thoſe parts.

"Bleeding, ſoft pectorals, attenuants, and gentle purges are the internal remedies; and externally the parts affected may be bathed with equal parts of ſpirit of ſal armoniac, and ointment of marſhmallows, or oil of chamomile.

"Theſe outward inflammations frequently fall into the inſide of the fore-leg, and ſometimes near the ſhoulder; forming abſceſſes, which terminate the diſorder.

"The membrane which ſeparates the lungs, and more particularly the diaphragm, or midriff, is often alſo inflamed; which is ſcarce to be diſtinguiſhed from the pleuriſy, only in this, that when the midriff is greatly inflamed, the horſe will ſometimes be jaw-ſet, and his mouth ſo much cloſed, that nothing can be got in: but the method of cure is the ſame." *Bartlet's Farriery, page* 51.

PLOUGH, a well known machine for breaking up the ground.

The advantage of digging with the ſpade, or ſuch other inſtrument, very naturally led men to the invention of the plough, a greatly more expeditious way of doing the ſame thing; that is, cutting and breaking the earth into ſmall pieces; but in this the ſpade has the advantage of the common plough, as it goes deeper, and divides the earth more minutely; but the improvement of the common plough into the four-coultered one, ſhews that it is eaſy to make the plough perform this office as much better, as it uſually does it worſe than the ſpade.

The plough deſcribed by Virgil had no coulter; and at this time, the ploughs of Italy and the ſouth of France, have none; and the ploughs in Greece, and in the eaſtern nations in general, are of the ſame kind. Neither is it indeed poſſible to uſe a coulter in ſuch a plough; becauſe the ſhare does not cut the bottom of the furrow horizontally, but obliquely: in going one way it turns off the furrow to the right-hand, but in coming back it turns it off to the left; therefore if it had a coulter, it muſt be on the wrong ſide every other furrow.

It is a great miſtake in thoſe who ſay that Virgil's plough had two earth-boards, for it had really none at all; but the ſhare itſelf always going obliquely, ſerved inſtead of an earth-board; and two ears, which were the corners of a piece of wood lying under the ſhares, did the office of ground-wriſts. This faſhion of the plough continues to this day in thoſe countries; and in Languedoc this ſort of plough performs tolerably well when the ground is fine, and makes a ſhift to break up light land. This is the ſort of land that is common in the eaſt, and the arable lands about Rome, being never ſuffered to be fallow ſo long as to come to turf: this plough ſucceeds very well in ſuch places, but it would be wholly impoſſible to turn up what in England we call ſtrong land, with it.

The Engliſh ploughs are therefore different from theſe, as the ſoil is different. Our ploughs, where well made, cut off the furrow at the bottom horizontally; and therefore, it being as thick on the land ſide as on the furrow ſide, the ploughs cannot break it off from the whole land at ſuch a thickneſs, being ſix times greater than what the eaſtern ploughs have to break off, and for this purpoſe it muſt have, of neceſſity, a coulter to cut it off: by this means the furrow is turned perfectly whole, and no part of the turf of it is broken; and if it lie long without new turning, the graſs from the edges will ſpread, and form a new turf on the other ſide, which was the bottom of the furrow before the turning; but is now become the ſurface of the earth, and will ſoon become greener with graſs than it was before ploughing.

If whole, ſtrong, turfy furrows are ploughed croſs ways, as is too commonly practiſed, the coulter cannot eaſily cut them; becauſe, being looſe underneath, they do not make a proper reſiſtance or preſſure againſt its edge, but are apt to be drawn on heaps, and turned in all directions, but without cutting.

Some of our ploughs have heavy drags, with long iron tines in them; and though theſe broken pieces of furrows, being now looſer than before, require keener edges to cut them, theſe tines have no edges at all. Thus the clods of earth are toſſed into heaps again, and the ſurface left bare between them, and great labour and expence is uſed to very little purpoſe: all this is owing to the one coulter.

If the ſoil be ſhallow, it may be broken up with a narrow furrow, which will the ſooner be brought into tilth; but if it be a deep ſoil, the furrows muſt be proportionably enlarged, or elſe a great part of the good mould will be left unmoved, and ſo be loſt. The deeper the land is, the worſe it is broke by one coulter; that is, it is broke into larger furrows, and it requires ſuch repeated labour to conquer this, that, often, the beſt land will ſcarcely pay the tillage.

This gives an opportunity to ſervants to cheat their maſters. They plough ſuch deep land with a ſmall furrow, and ſhallow, to the end, that the turf and furrows may be broken the ſooner, and the ſuperficial part made fine. They pretend the plough will go deeper the next time; but this is never the caſe.

This ſort of land muſt not be ploughed the ſecond time in wet weather; for this will cauſe the weeds to multiply, and the earth will be formed into thick and heavy clods where trodden: and in dry weather, the reſiſtance of the untouched earth below, and the ſlight preſſure of the plough above, will always be reaſons why the plough will enter no deeper the ſecond time than it did the firſt.

Another way to conquer a ſtrong turf, is to plough it up firſt with a breaſt plough, very thin; and when the ſwerd is rotten, then it is to be ploughed to the proper depth: but this method is liable to great objections; it is very troubleſome and expenſive, and if the turf be pared off in the winter, or early in ſpring, it is a chance but the rains come on, and ſet it to growing faſter than before: if, on the other hand, it be pared later in the year, though the turf be thoroughly killed by the ſucceeding dry weather, yet the time is loſt, and the farmer loſes the ſowing ſeaſon for wheat, which is the proper corn for ſuch ſtrong land.

Paring Plough, an inſtrument uſed in ſeveral parts of England, for paring off the ſurface of the ground, in order to its being burnt. *See the article* Burn-Baking.

One of the beſt and ſimpleſt inſtruments of this kind is that which Mr. Bradley gives, with the following deſcription.

From A to A, Fig. 1. Plate XXI. is the plough-beam, about ſeven feet long, mortiſed and pinioned into the block B, which is of clean timber, without knots. CC are the ſheaths or ſtandards, made flat on the inſide, to cloſe equally with the paring-plate, and be faſtened to it with a bolt and key on each ſide, as is marked at D.

E is the paring-plate, of iron laid with ſteel, about four inches wide, and from twelve to eighteen inches long, as the buſineſs may require. This plate muſt be made to cut on the ſides, which are bolted to the ſtandards, as well as at the bottom part.

FF are two iron braces, to keep the ſtandards from giving way. Theſe ſtandards muſt be mortiſed near their outſides, and through the block.

GG are the plough handles, which muſt be fixed ſlopewiſe between the beam and the ſtandards.

The pin-holes in the beam, the uſe of which is to make this plough cut more or leſs deep, by fixing the wheels nearer to or farther from the paring-plate, ſhould not be above two inches aſunder.

Rotherham, or *Patent* Plough, the name of a plough, very ſimple in its conſtruction, eaſily worked, and therefore deſerves the huſbandman's particular attention.

Fig. 2. Plate XXI. repreſents the left or land ſide of this plough, of which AB is the beam, CD the ſheath, EBD the main handle, FR, the ſmaller handle, GH the coulter, KI the ſock or ſhare, NP the bridle, S the fly-band, ML a piece of wood in place of a head. The forms of all theſe different parts, as they appear on this ſide of the plough, are here repreſented, and their ſizes and diſtances may be meaſured by the annexed ſcale of feet and inches.

Fig. 3. repreſents the right-hand ſide of this plough, with all the parts that can be ſeen on that ſide, in which TV is the mould-board, &c.

Fig. 4. ſhews the under part of this plough turned up, in which may be ſeen the ſhape and ſize of the ſhare, and

the manner in which it is fixed on the ſheath, mould-board, and ground-reſt, with the angle which they make.

Fig. 5. repreſents the hind-part of the plough, in which are ſeen the two handles EF, with the hinder-part of the mould-board VT, and a piece of wood in the place of the head LM, in their proper ſhapes and ſizes by the ſcale.

Fig. 6. repreſents an upper view of this plough, as it appears while it works, with the bridle NP extended, the mould-board TV, fixed in its proper poſition, and all the other parts as they appear in this ſituation, in their ſeveral ſhapes and ſizes according to the ſcale.

Fig. 7. is the upper part of the ſock or ſhare.

Fig. 8. ſhews the opening of the ſhare, as it is fixed on the end of the ſheath and mould-board.

Fig. 9. is a perſpective view of the bridle.

The whole of this plough ſhould be made of aſh or elm; the irons ſhould be ſteeled and well tempered; and that part of the plough which is under ground in tilling, ſhould be covered with plates of iron.

The difference betwixt this and the common ploughs, ſeems to conſiſt in the bridle at the end of the beam, by which the ploughman can give the plough more or leſs land by the notches at N in Fig. 4, and 6. or make it cut deeper or ſhallower by the holes at P in Fig. 2, and 3. in the coulter and ſhare, which are made and ſet ſo as to cut off the new furrow without tearing; and in the mould-board, which is ſo ſhaped at firſt to raiſe a little, and then gradually turn over the new cut furrow with very little reſiſtance. But the greateſt advantage of all is, its being ſo eaſy of draught, that it will do double the work of any common plough, as experience has proved; and, with only one man and two horſes, will perform, even in ſtiff land, as much as two men and ſix horſes can do in a moderately light ſoil with any of the wheeled ploughs generally uſed, or indeed known in this country, where their great defect is, that they are too complex, and weigh too much upon the fore-carriage, ſo that the friction of their wheels becomes a conſiderable addition to the draught: for the beſt plough certainly is that which is the moſt ſimple in its make and tackle; which requires the leaſt ſtrength to draw it, in proportion to the ſtiffneſs of the ſoil; which can be made always to cut to a proper depth; and which, by the ſhape of its mould-board, is beſt adapted to turn the furrow upſide down. The principle of the Kentiſh plough, with the ſhifting mould-board, is very good, where the land is dry, and will admit of it.

Meſſieurs de Chateauvieux and Duhamel, ever ſtudious to promote the welfare of mankind, have endeavoured to remedy theſe inconveniencies in wheeled ploughs, by the following improvements, which, with their uſual ſpirit of univerſal benevolence, they have moſt obligingly communicated to the world. We ſhall begin with the invention of the former of theſe gentlemen, becauſe it was rather prior, in point of time, to that of M. Duhamel.

The fore-part of M. de Chateauvieux's plough is compoſed of a wheel thirty-two inches in diameter, which may be extended to thirty-four inches, or reduced to thirty: but to fall ſhort of, or to exceed theſe meaſures, would be attended with inconveniencies. This wheel may be made very light, eſpecially if it be encircled with a thin hoop of iron. The plough itſelf is repreſented in Plate XXII. Fig. 1, 2, and 3. where Fig. 2. is the plan, and Fig. 1. the profile.

The frame in which the wheel is placed, is formed by two ſhafts AB, CD, Fig. 2. diſtant from each other eighteen inches, from inſide to inſide; which fixes the length of the nave of the wheel. Theſe ſhafts are four feet eight inches long, and may be reduced to four feet four inches, by ſhortening them at the ends C and A. They are about two inches and a quarter ſquare: but the edges ſhould be rounded off. Theſe two pieces are faſtened together by the two croſs ſtaves EF, GH, which are two inches and a half wide, and about an inch thick. They are riveted to one of the ſhafts, at E and G, where they are not to be looſened at all; and at their other ends F and H, the ſhaft muſt be moveable, ſo as to be taken off, to let the two croſs ſtaves through two mortiſes in the beam IK of the plough; after which the ſhaft CD is put in its place, and fixed with two iron pins, *a*, *b*. Between the two ſhafts is placed the wheel LM, the nave of which is pierced through its center, with a hole proportioned to the thickneſs of the iron pin or ſpindle NO, which ſerves for an axle-tree, and is repreſented by the two pricked lines. This ſpindle, or axle-tree, the diameter of which is about three quarters of an inch, ought not to project beyond the outſide of the ſhafts, leſt it ſhould lay hold of or hurt the ſtalks of the corn, when this plough is uſed for ſtirring the earth between the rows in the New Huſbandry, as will hereafter be more particularly mentioned. To fix it at N, that end is flattened, and bent over the ſhaft to the middle of its upper ſide, where it is faſtened at *d*, by a ſmall pin driven through it and the ſhaft.

On the upper ſurface of each of the ſhafts, at the ends A and C, are the hooks AC, to which the harneſs is faſtened: and at the other ends B and D, are two rings, the uſe of which will be explained hereafter.

The ſhafts AB, CD, ſhould be pierced with four or five holes, to ſet the wheel more or leſs forward or backward, in order to make the plough ſtrike more or leſs deep into the earth, as may be ſeen in Fig. 1. at *a*, *b*, *c*, and *d*. The ſame holes are indicated by the pricked lines on the two ſhafts of Fig. 2. from A to N, and from C to O.

The hind part of this plough conſiſts of the beam IK, Fig. 1, and 2. the ground-reſt CD, Fig. 1. which is covered by the ſhare LD; the handles KP, KQ, Fig. 2. and KP, Fig. 1. the ſheat EF, Fig. 1. of which part is pricked in Fig. 1. and the end appears at X in Fig. 2. the mould-board RS, Fig. 2. part of which is ſeen at N in Fig. 1. the coulter GH, Fig. 1. and TV, Fig. 2. and the ſhare LD, Fig. 1. part of which is ſeen at Y, in Fig. 2.

The beam is four feet eight inches long, excluſive of the tenon which traverſes the handles. Three inches and a quarter ſquare are very ſufficient in its thickeſt part, which is from X to V, Fig. 2. The mortiſes in the beam, which are under *g*, *h*, and through which the two croſs-ſtaves EF, GH, are ſlipt, ſhould be ſo fitted, that the croſs-ſtaves may not ſhake or be looſe in them, at the ſame time that the beam ſhould, by their help, ſlip with eaſe over the croſs-ſtaves, either to the right towards EG, or to the left towards FH, according as the intended ploughing may require. The beam ſhould be faſtened, either by two nuts ſcrewed on at *m*, *n*, which will fix it tight to the croſs-ſtaves EF, GH; or by two iron pins ſtuck through the holes *p* and *q* in the two croſs-ſtaves, one to the right in the croſs ſtaff EF, and the other to the left in the croſs-ſtaff GH. Theſe pins will keep the beam ſteady in its place.

The lower part of the ground-reſt ſhould be ſomewhat concave, as is repreſented at CD, Fig. 4. in order to leſſen its friction againſt the earth.

The beam IK, Fig. 1, and the ground-reſt CD, are faſtened together by the ſheat FE, and the handles PK, both of which laſt are riveted to the ground-reſt by two ſtrong iron pins, the heads of which are ſeen at *g* and *h*; and to the beam, as alſo to the tenon of the beam which traverſes the handles at *m*, *n*; and by the two wedges, *p*, *o*, and *q*, another uſe of which will be explained hereafter.

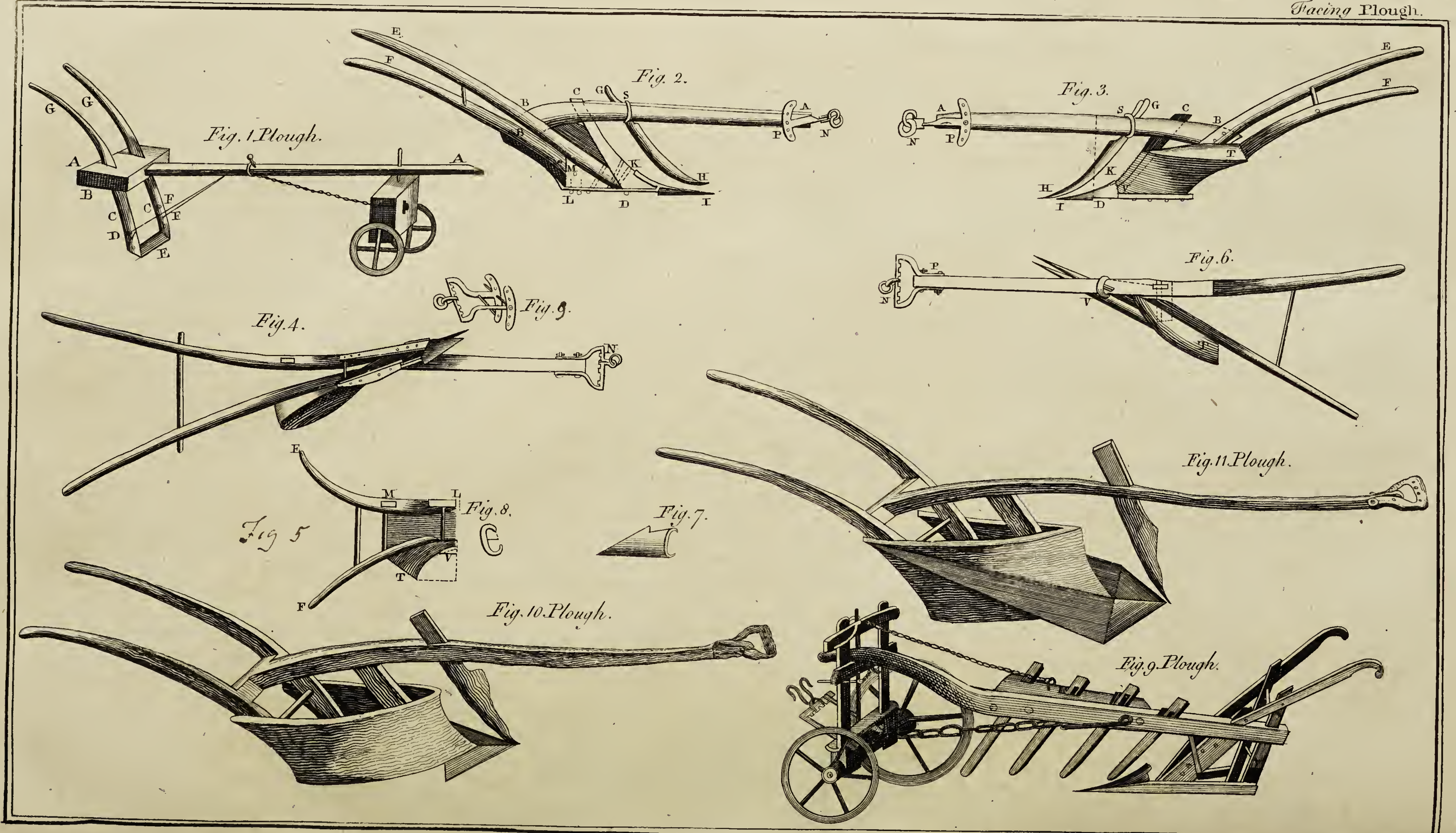
Wood naturally crooked is beſt to make the handles of, that they may be all of one piece, which ſhould be ſo diſpoſed, that one third of the ſpace between the two handles, ſhould be left on the left ſide, and the two other thirds on the right ſide, in order to facilitate the plowman's walking in the furrow. This diſpoſition is ſhewed in Fig. 2. in which a line *e*, *f*, drawn from the middle of the beam, between the two handles, gives to the left ſide a third P*f*, of the diſtance PQ between the two handles, and the two other thirds *f*Q to the other ſide.

For want of wood naturally bent to a proper ſhape, theſe handles may be made of two pieces firmly riveted and faſtened together; and if it ſhould be more convenient to the plowman, the whole ſpace between the handles may be on the right-ſide, as in Fig. 6.

The ſheat EF, Fig. 1, ſhould be very ſtrongly and cloſely faſtened by its tenon to the ground-reſt, at *g*. An

PLATE XXI.

Facing Plough.



intelligent workman will eaſily make it of a proper ſize, which is about two inches and a half wide, and a full inch thick. The inclining of this piece with the ground-reſt, gives it greater ſtrength to reſiſt, than if it was faſtened to it at right angles.

The mould-board, repreſented by RS, Fig. 2, and AB, Fig. 7, is from thirty to thirty-one inches long, and ten inches high or deep. It ought to be placed as in Fig. 8, where its end A forms an acute angle, terminating at the junction of the fin of the ſhare: its other end B extends beyond the length of the ground-reſt, againſt which it ſhould incline, in ſuch manner that, ſuppoſing the ground-reſt to be lengthened out as far as C, the line CB would be twelve or thirteen inches long, reckoning from the fartheſt lateral ſurface of the ground-reſt to the fartheſt lateral ſurface of the mould-board, which, being thus placed, will form the width of a furrow.

The lower part of this mould-board is ſloped a little inward, as is expreſſed by the ſhade in Fig. 7: and the part *b* Fig. 7, ſhould jet out at leaſt two inches beyond the part *a*. To this end, the mould-board ſhould be made of a plank about three inches thick, which will bear being ſcooped on one ſide and rounded off on the other, in order to give it the concavity without, and the convexity within, repreſented in Fig. 3. and 7.

The mould-board ſhould be well faſtened, to prevent its being diſplaced by the reſiſtance of the earth. The upright piece CD Fig. 7, which joins to the handles at its end D, and to the mould-board at its other end C, ſupports it ſtrongly. It is highly neceſſary to cover the part of the mould-board which bears upon the earth, with a thin plate of iron, in order to preſerve it; for otherwiſe it would ſoon be worn out.

The coulter GH, Fig. 1. ſhould be made of good iron well ſteeled. A notch is cut in the beam to receive it, as in Fig. 9 and 10; and as the corners of that notch, C and B, againſt which the coulter bears hardeſt when the plough works, would ſoon be worn away if the wood was left bare, it is proper to ſecure them with two ſmall pieces of iron AB, CD, about the ſixth part of an inch in thickneſs, ſcrewed on with flat-headed ſcrews. Theſe pieces of iron will keep the coulter ſteady in its place.

The coulter ſhould be pierced with ſeveral holes from E to F, Fig. 10, to take it higher up, or let it lower down, as occaſion may require. It is faſtened to the beam, which is pierced at E, Fig. 9, by a ſtrong iron pin with a ſquare flat head, which is let into the beam and lies even with it, as in Fig. 10. The other end of this pin, E, Fig. 10, is a ſcrew, fitted with its nut, by which the coulter is faſtened tight to the beam. Upon this ſcrew hangs the handle A, Fig. 1, which ſerves to turn it, and at the end of which is the key that faſtens on the nuts of the iron pins which ſecure the ſhare. By this means, the key to turn the ſcrews is always carried with the plough.

M. de Chateauvieux's coulters weigh but five or ſix pounds a-piece at moſt, and frequently not more than three pounds.

He places his coulter ſo that its point G, Fig. 1. projects about an inch beyond the outſide of the ſhare LC.

Fig. 12 repreſents the ſhape of the ſhare, with its dimenſions, as do alſo Fig. 13 and 14. The point of this ſhould be made of good ſteel, and the reſt of good iron, neither too ſoft, nor too high tempered, that it may not be ſubject to break or bend. The tail of the ſhare, AB, Fig. 12, ſhould be thickeſt from A to C, becauſe that is the part which bears the greateſt ſtreſs. Its thickneſs diminiſhes gradually to B, where the ſhare is faſtened to the ground-reſt. This tail is pierced with two round holes at A and B, Fig. 13, through which are put the iron pins DE, FG, Fig. 12. which have ſquare flat heads, lying even with the tail of the ſhare. Theſe pins paſs through the ground-reſt, where they are faſtened on the other ſide by the nuts EG. A third round hole may be added at *x*, Fig. 13, in order to faſten the ſhare ſtill more firmly to the ground-reſt, with a ſhort flat headed ſcrew.

M. de Chateauvieux has likewiſe made ſome ploughs with the round holes *ab*, Fig. 13, near A and B; that the iron pins DE, FG, Fig. 12, might not traverſe the tenons of the ſheat and handles; and inſtead of thoſe iron pins, he has riveted them with wooden pins, and found them keep the whole tighter together than the iron ones.

To the left ſide of the plough ſhould be faſtened the thin board N, Fig. 1 and 7, the uſe of which is to prevent the earth from tumbling over between the ſhare and the mould-board. As plowing wears the point of the ſhare, though it will not hurt this ſo much as it does that of the common plough, it muſt be new pointed from time to time, always obſerving to make the point incline a little towards the earth, as is repreſented by the pricked line DL, Fig. 1; that the ſhare may ſcarcely touch the ground at any other part than D and L, in order to leſſen the friction.

The hind part of the plough, thus formed, is joined to the fore carriage, by running the croſs ſtaves EF, GH, Fig. 2. through the mortiſes of the beams, *g h*; and is fixed there, either by the ſcrews *mn*, or the pins *p*, *q*. The traces of the firſt and ſecond horſe are faſtened to the hooks AC; and if a third horſe be uſed, the traces of that third horſe are faſtened to thoſe of the ſecond. Horſes will do better for this plough, than oxen, unleſs theſe laſt have been uſed to be harneſſed one before the other.

The plough thus equipped, may eaſily be carried to the field, if its hind part is laid upon the little carriage ÆW, Fig. 2. conſiſting of an iron axle-tree ÆW, two ſmall wheels *ki*, *lr*, and the two pieces B*t*, D*v*, at the end of which are the hooks B and D. Theſe wheels are about twenty-one inches, or two feet in diameter; and three feet ſix inches, or even four feet aſunder. They are very light, having but a ſmall weight to bear. The hooks of theſe two pieces B*t*, D*v*, are inſerted in the rings B and D at the end of the ſhafts; and by this means the plough will be carried upon three wheels, of which Fig. 1 and 2 ſhew ſufficiently the arrangement and uſe. Fig. 5, ſhews the ſlope that ſhould be given to the upper ſurface of the middle of the axle-tree of this ſmall carriage, on which the reſt of the plough is to be loaded in order to remove it from one place to another, that the ground-reſt and other pieces may lie flat and ſteady upon it.

To open the firſt furrow with this plough, the wheel muſt be placed at the laſt hole, towards the extremity of the ſhafts. This makes the ſhare incline the more, and conſequently cut the deeper. But as it would be ſomewhat troubleſome to change the poſition of the wheel, at every firſt cut of the plough, a very little attention will remedy that inconvenience. It is only inclining the handles of the plough to the right or left, inſtead of holding them even. The whole plough will incline with the handles, and the ſhare will then enter into the ground with eaſe, and open the firſt furrow. The other furrows are plowed without any ſort of difficulty; and for them, the plough is to be held even, or inclined but very little, either to the right-hand or the left, as the ſituation of the land may require.

M. de Chateauvieux generally reſts the beam on the left-hand ſide of the fore-carriage. It is eaſy to place it ſo as to leave whatever diſtance is thought proper between the outmoſt row of corn and the furrow that is actually plowing.

The forwarder the wheel is ſet, the deeper the plough cuts; and ſo on the contrary. But if one would have it cut ſtill deeper, or ſhallower, than it can be made to do by altering the poſition of the wheel, that too may eaſily be effected. By looſening a little the wedge above the beam *p*, *o*, Fig. 1. and driving farther in the wedge *q*, the plough will cut leſs deep: as, on the other hand, the ſhare will be more inclined, and therefore cut deeper, if the wedge *q* under the beam is looſened, and the wedge *p*, *o*, over it is driven in tighter.

The chief differences between M. de Chateauvieux's plough, and that of M. Duhamel, are as follow.

1. The beam of this laſt, ABC, Fig. 1. Plate XXIII. bends from C to B; whereas that of M. de Chateauvieux's is nearly ſtrait all along.

2. In conſequence of this bending, the hindmoſt extremity of M. Duhamel's beam is joined at B to the hindermoſt part of the ground-reſt E, after paſſing through a mortiſe F, in the lower part of the handles: ſo that this beam is joined to the ground-reſt by its extremity B, the bottoms of the handles F, and the ſheat G; whilſt that

of M. de Chateauvieux's plough, is joined to the ground-reſt by this ſheat, another which this plough has not, and the lower part of the handles: for the beam does not anſwer to the ground-reſt.

3. The mould-board HI, Fig. 2, of this plough, is lighter than that of M. de Chateauvieux's, and differently ſhaped.

4. The two handles KK, are at equal diſtances from the beam, and are joined together by a croſs ſtaff M.

5. The ſhare N, Fig. 3, is pretty much like that of M. de Chateauvieux's plough, but ſhorter and narrower; ſo that it cuts leſs wide furrows, which M. Duhamel rightly thinks the beſt way of plowing.

6. The coulter O of this plough paſſes through a mortiſe in the beam, which is there ſtrengthened by hoops of iron, to prevent the beam's being ſplit by the driving in of the wedges PP which fix the coulter.

M. Duhamel thinks this hind part of his plough preferable to that of M. de Chateauvieux's, for light lands: but it would not do ſo well in ſtiff ſoils, becauſe the earth would be apt to clog about the ſheat at Q; whereas it is thrown off by M. de Chateauvieux's plough. M. Duhamel likewiſe approves of making the beam ſtrait as M. de Chateavieux's is, inſtead of giving it the bending from C to B, eſpecially for ſtiff lands.

7. The beam CA, is fixed to the croſs ſtaves RR of the fore-carriage of this plough, by the ſcrews and nuts SS.

8. The ſhafts TT, are faſtened before by a croſs ſtaff V, which gives great ſolidity to the fore-carriage, and cannot be added to M. de Chateauvieux's plough; not only becauſe the wheel is too large, but likewiſe becauſe it muſt be ſet forwarder or backwarder, in order to make the ſhare cut more or leſs deep.

The wheel of this plough is not ſo large as that of M. de Chateauvieux's, becauſe the axle-tree, inſtead of being inſerted in the ſhafts TT, is let into the ſide pieces X, Fig. 4, which are faſtened to the ſhafts by the ſcrews and nuts YY.

The advantages of having the wheel ſmaller, are, 1. That the plough is leſs apt to lean too much on its ſide, and is more eaſily held upright; 2. That the croſs-ſtaff V may be added to the fore-carriage, by which it is rendered more ſolid; and 3. That the fore-carriage may be made ſhorter than it otherwiſe could be.

The bare inſpection of the draught of this plough, ſhews that it is made to cut more or leſs deep, by ſcrewing the nuts Y more or leſs tight, and putting a thicker or thinner wedge between the ſide piece X and the ſhaft; which is an eaſier and quicker way, than changing the ſituation of the wheel. But ſtill, a readier method is, to have under the ſhafts TT, a falſe ſhaft ZZ, Fig. 5, fixed with hinges, &c. for then, by only ſticking the peg *a*, into one of the holes *b*, the beam is raiſed or lowered, in a moment, to whatever degree is thought proper, without altering the poſition of the wheel.

It is likewiſe evident, that in order to give the ſhare a greater or leſs degree of entrance into the earth, nothing more is requiſite than to place the beam nearer to, or farther from, the right-hand ſhaft: for the horſes, which are harneſſed one before another, go, as does alſo the wheel, in the laſt made furrow, and the plowman goes in the furrow actually making.

dd. Are hooks to faſten on the harneſs of the horſes.

ee Cramps to faſten the fore-carriage.

ff. Pins to fix the beam to the ſheat.

gg. Pegs to faſten the croſs ſtaves.

h. A ſtrong pin which goes through the hole *i*, to keep the mould-board ſteady.

Four coultered PLOUGH, an inſtrument invented by Mr. Tull, being an improvement on the common plough, that makes it cut the pieces of earth into four; that is, it thus divides the earth four times as ſmall as the common plough.

The common two-wheeled plough has of late years become univerſally uſed in many countries, and is found greatly preferable to the ploughs they uſed before; there is an objection to it, indeed, in regard to ſome ſtiff and miry lands, in which the wheels become clogged up, and cannot turn. This, however, is eaſily remedied by twiſting thumb ropes of ſtraw about the iron circle and ſpokes of the wheels; theſe ſpreading as they turn, and, as the circle twiſt bears upon the ground, throw off the dirt, and never clog. The two principal parts of this plough are the head and the tail: the plough-head contains the two wheels and their axis, or ſpindle, paſſing through a box, and turning round both in it and in the wheels.

There are fixed perpendicularly in this box two crow-ſtaves, as they are called, which are flat and narrow boards, each having on it two rows of holes, whereby to raiſe or ſink the beam of the plough, by pinning up or down the pillow, to increaſe or diminiſh the depth of the furrow. Behind are a pair of gallows, through which the crow-ſtaves paſs at the top by mortiſes, into which they are pinned; and to theſe are faſtened what are called the wilds, which are rings and crooks of iron, by which the whole plough is drawn in the working. From the box to the center of the beam there is carried an iron-chain, conſiſting of four, five, or more long links, and called the tow-chain: this faſtens the plough-tail to the plough-head. It is fixed to an iron collar, faſtened in the beam at one end, and at the other paſſes through a hole in the middle of the box, and is pinned in with a wooden pin.

From the ſame iron-collar to which the tow-chain is fixed, there is alſo another chain faſtened, called the bridle-chain: this runs above the beam, as the tow-chain does below it, and is compoſed of ſmaller and more numerous links. At the upper end, as the tow-chain enters the box of the plough, this bridle-chain is fixed to the top of what is called the ſtake of the plough: this is a perpendicular ſtick, carried up parallel with the left crow-ſtaff, and pretty near it, and faſtened to it by a wyth or rope, or by the end of the bridle-chain itſelf, when that is long enough. This ſtake is alſo faſtened in its lower part, under the gallows, to the ſame crow-ſtaff, by another wyth or piece of rope.

Theſe are the parts of which the head-part of the plough is compoſed. The plough-tail conſiſts of the beam carried from the head to the very extremity, and ſerving as the ſupport and baſe of all the reſt. A little below the collar to which the tow-chain and bridle-chain are faſtened, this beam is pierced with a large hole, which lets through the coulter: this is a long and narrow piece, terminating in an edge, and reaching juſt to the ſhare; and it is fixed immoveably in its place by means of a wedge which is driven into the hole of the beam with it: the office of this coulter is to cut the earth as it is thrown up by the ſhare. Behind theſe, the ſame beam is pierced with two more holes, one very near its end: theſe give paſſage to two oblong pieces, called the fore-ſheat and hinder-ſheat, by which the plough-ſhare is ſupported in its place. To the top of the hinder-ſheat there is faſtened a ſhort handle by a wooden pin. Parallel to the hinder-ſheat there runs up a piece of wood of much the ſame form, called the drock; and to this is faſtened another horizontal piece, called the ground-wriſt: theſe are all on the right-hand ſide of the plough, and parallel with the fore-ſheat. There runs another piece of much the ſame form with it, on the right-hand; and the bottom of this is the earth-board. The long handle of this, which reaches as far as that of the ſheat, is faſtened to the drock by a pin, the other end of which goes into the beam. Near the lower end of the fore-ſheat, there are two flat pieces of iron, which paſs from the two ſides of it up to the beam; and being let through it, are faſtened to the upper part by ſcrews and pins. Theſe keep the ſheat in its place.

The ſtructure of the four-coultered plough is different, in ſome reſpects from this, though in general founded on it. Its beam is ten feet long, whereas that of the common plough is but eight. The beam is ſtraight in the common plough, but in this it is arched in one fourth part of its length, near the plough-head. At the diſtance of three feet two inches from the end of the beam at the plough-tail, the firſt coulter, or that next the ſhare, is let through; and at thirteen inches from this, a ſecond coulter is let through: a third at the ſame diſtance from that; and, finally, the fourth at the ſame diſtance from the third, that is, thirteen inches.

The crookedneſs of the upper part of the beam in this plough is contrived to avoid the too great length of the three foremoſt coulters, which would be too much, if the beam was ſtraight all the way; and they would be apt to bend

PLATE XXII.

Facing Plough.

Fig. 1.

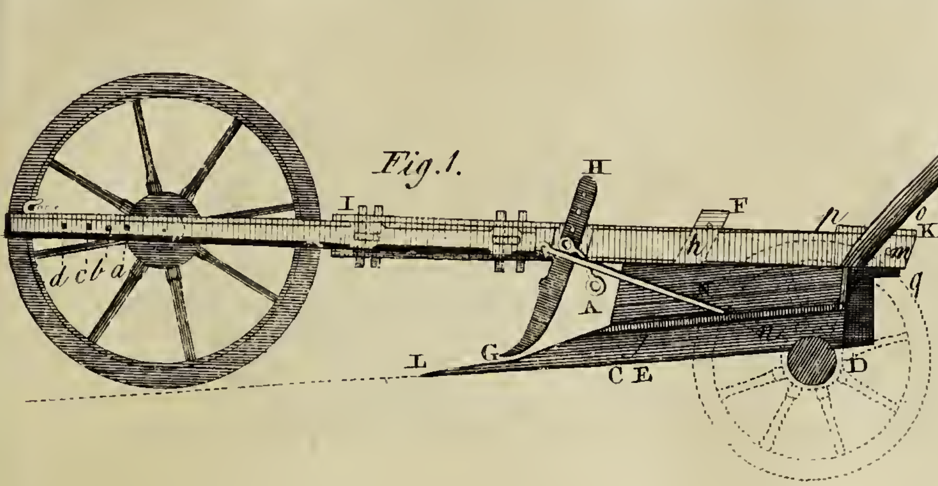


Fig. 4.

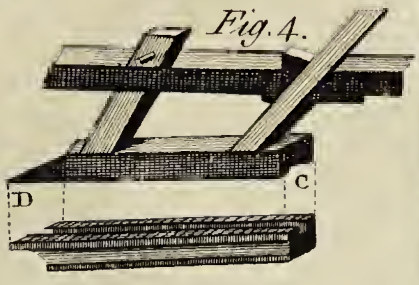


Fig. 9.

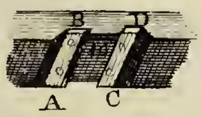


Fig. 2.

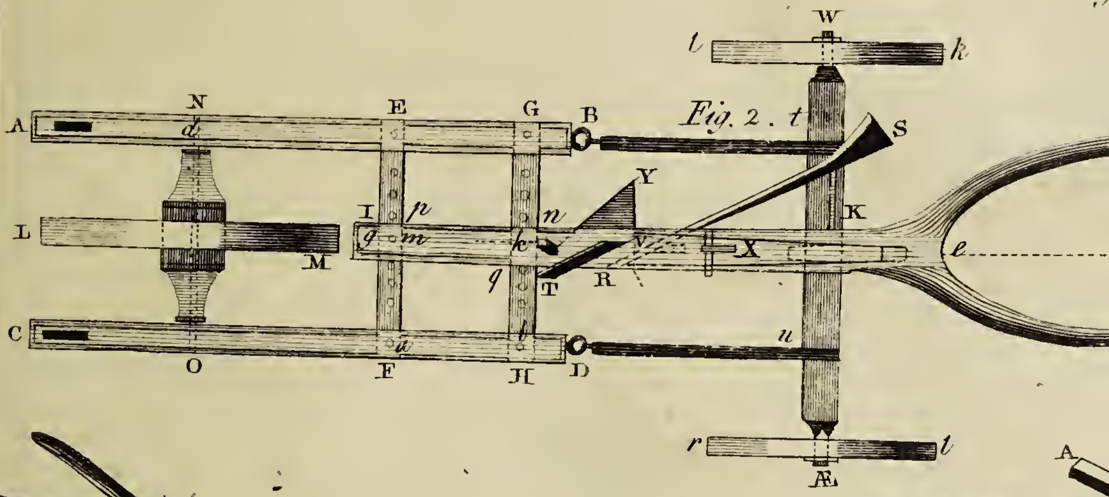
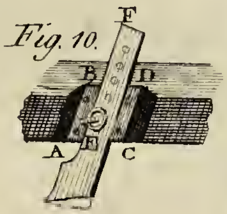


Fig. 10.



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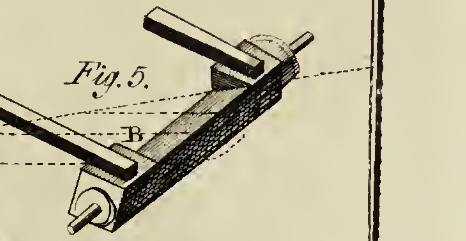
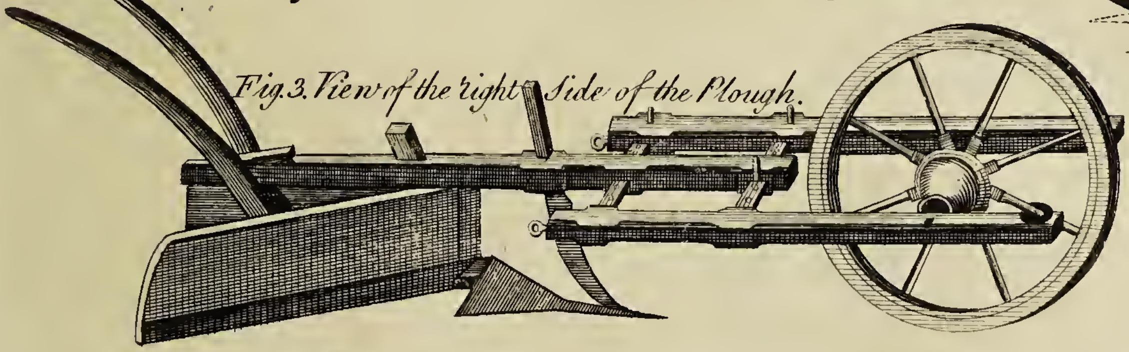


Fig. 3. View of the right Side of the Plough.



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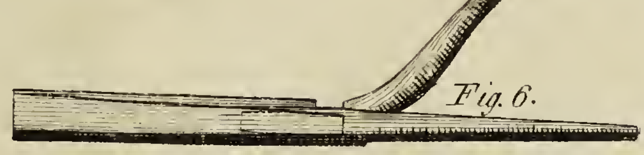


Fig. 7.

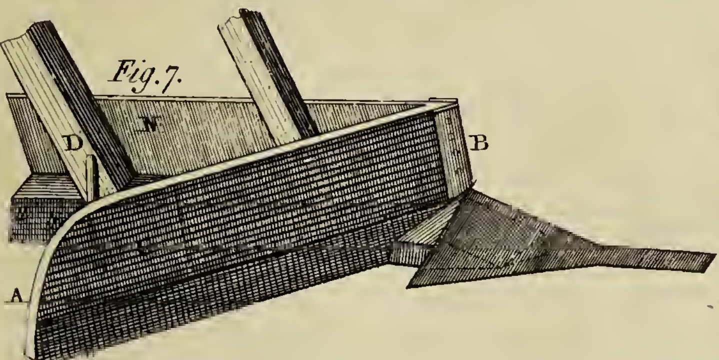


Fig. 8.

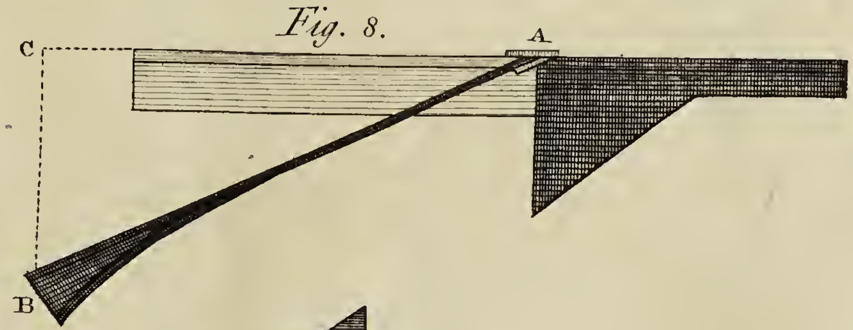
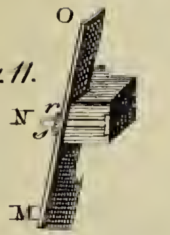


Fig. 11.



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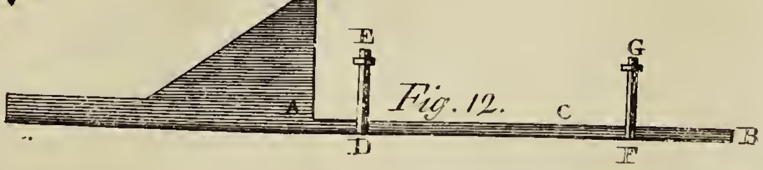


Fig. 14.

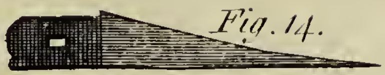
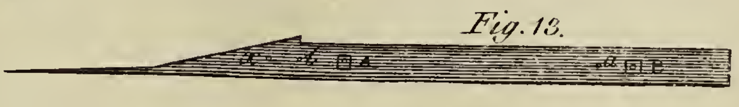


Fig. 13.



Scale of Feet for Fig 1 & 2.

Scale of Feet for Fig. 8. 12. 13. & 14.

PLATE XXIII. *Facing* Plough.

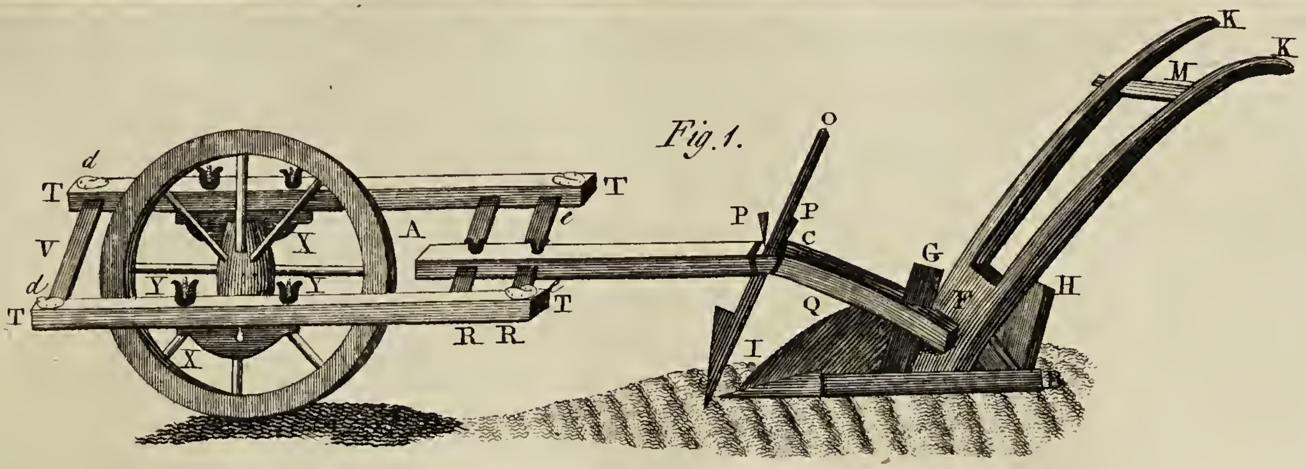


Fig. 1.

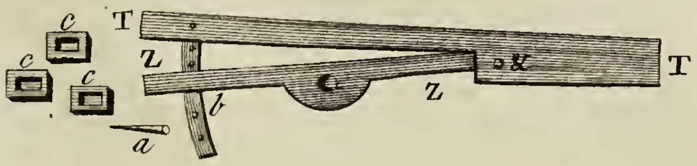


Fig. 5.

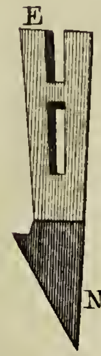


Fig. 3.

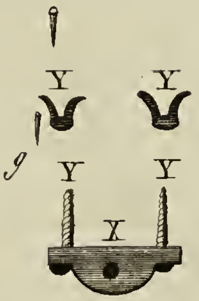


Fig. 4.

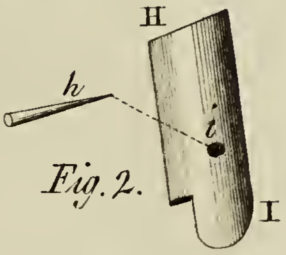
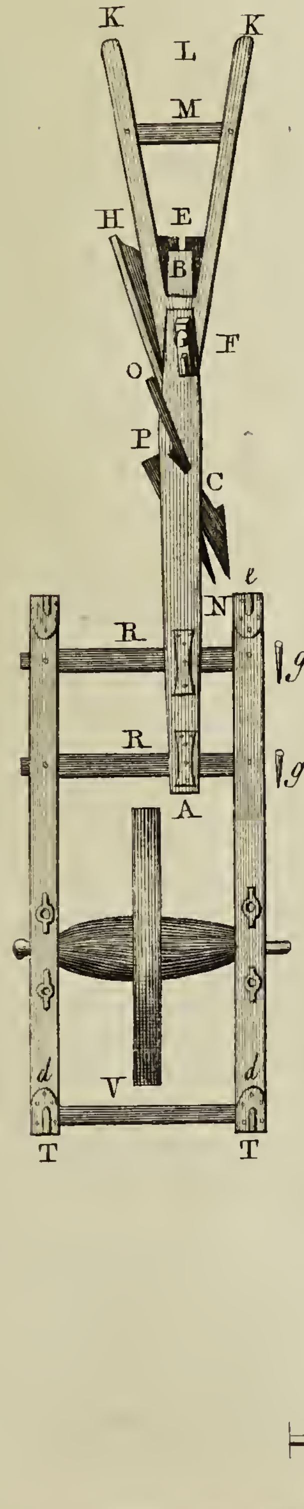
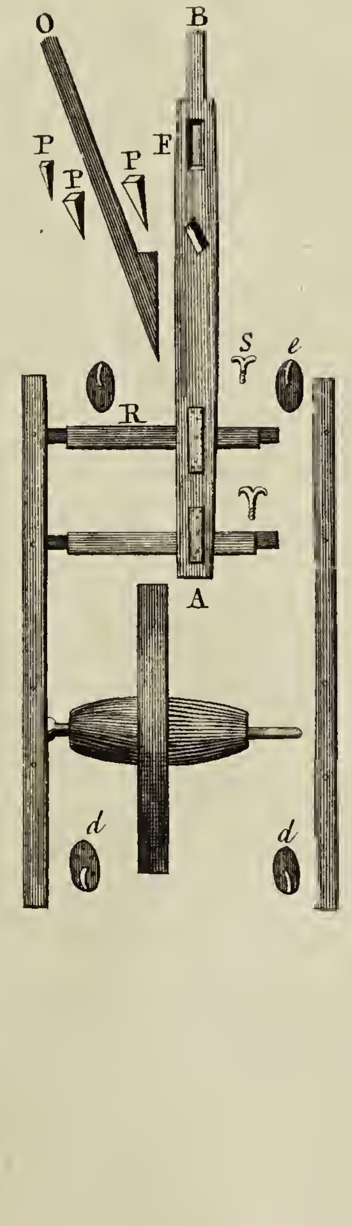
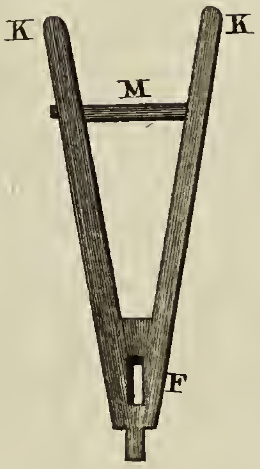
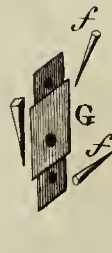


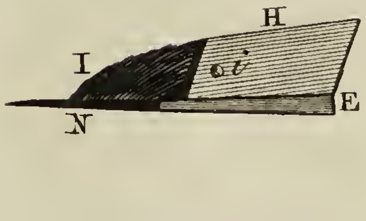
Fig. 2.











Scale of 6 Feet.

bend and be diſplaced, unleſs they were vaſtly heavy and clumſy. Aſh is the beſt wood to make the beam of, it being ſufficiently ſtrong, and yet light.

The ſheat in this plough is to be ſeven inches broad. The fixing of the ſhare in this, as well as in the common plough, is the niceſt part, and requires the utmoſt art of the maker; for the well going of the plough wholly depends upon the placing of this. Suppoſing the axis of the beam, and the left ſide of the ſhare, to be both horizontal, they muſt never be ſet parallel to each other; for, if they are, the tail of the ſhare, bearing againſt the trench as much as the point, would cauſe the point to incline to the right-hand, and it would be carried out of the ground into the furrow. If the point of the ſhare ſhould be ſet ſo, that its ſide ſhould make an angle on the right ſide of the axis of the beam, this inconvenience would be much greater; and if its points ſhould incline much to the left, and make too large an angle on that ſide with the axis of the beam, the plough would run quite to the left-hand; and, if the holder, to prevent its running quite out of the ground, turns the upper part of his plough toward the left-hand, the pin of the ſhare will riſe up, and cut the furrow diagonally, leaving it half unploughed. To avoid this and ſeveral other inconveniencies, the ſtraight ſide of the ſhare muſt make an angle upon the left ſide of the beam; but that muſt be ſo very acute a one, that the tail of the ſhare may only preſs leſs againſt the ſide of the trench than the point does.

The great thing to be taken care of, is the placing the four coulters; for on this the ſucceſs of the whole depends. Theſe muſt be ſo ſet, that the four imaginary planes deſcribed by their four edges, as the plough moves forward, may be all parallel to each other, or very nearly ſo; for if any one of them ſhould be very much inclined to, or ſhould recede much from either of the other, then they would not enter the ground together. In order to the placing them thus, the beam muſt be carefully pierced in a proper manner. The ſecond coulter-hole muſt be two inches and an half more on the right-hand than the firſt: the third muſt be as much more to the right of the ſecond, and the fourth the ſame meaſure to the right-hand of the third: and this two inches and an half muſt be carefully meaſured from the center of one hole to the center of the other. Each of theſe holes is a mortiſe of an anch and a quarter wide, and is three inches and an half long at the top, and three inches at the bottom. The two oppoſite ſides of this hole are parallel to the top and bottom, but the back is oblique, and determines the obliquity of the ſtanding of the coulter, which is wedged tight up to the poll. A perſpective view of this curious plough the reader will find in Plate XXI. Fig. 9.

The coulter is two feet eight inches long, before it is worn; the handle takes up ſixteen inches of this length, and is allowed thus long, that the coulter may be driven down as the point wears away. *Tull's Horſe-hoeing Huſbandry.*

Double PLOUGH, an inſtrument invented by Mr. Randal, which, by putting the ſhare point to the middle of the interval left by the horſe-hoe, throws the mould on each ſide of it, at the ſame time, towards the rows, and earths them up to what degree the ploughman pleaſes, in order to nouriſh them on to perfection. If a common plough, inſtead of the ſingle hough, was uſed, the furrows would be turned into the middle of the interval, and appear in the form of a ſingle ridge: and if the plough went twice in a place, to deepen the ſoil, the ridge in the middle would be proportionably higher, and the ground ſtrangely improved by ſuch operations, and the vegetables ſurpriſingly promoted in their growth. In either of theſe caſes, of the plough's going once or twice in a place, the double plough, by taking faſt hold of the mould, throws all back again; and if the vegetables are not effectually earthed up, which may be the caſe after double ſpitting the intervals; then running the double plough over again, compleats the buſineſs, and ſtrangely toſſes about and mellows the mould. This, in general, is the uſe of this plough in earthing up vegetables, that have three feet intervals.

But under the name of this double plough, we are to underſtand another of the ſame form, but much narrower in the tail, to perform what is called ridge-work, which is either ſingle, or double: if ſingle, this double plough works alone, throws up the ridges, and, at a proper time, ſplits them, and throws them back into the trenches; and this toſſes the mould backwards and forwards, which, by theſe agitations, and other operations, is made ready for cropping, as is particularly mentioned in my Treatiſe. If theſe ridges are to be double, that is, if there is to be double ſpitting, then the double plough performs as before, and goes as deep as is conſiſtent with the intereſt of the man's arms, and the horſe's eaſe. Here the worthy ploughman is requeſted to keep his hands even, that the plough may run flat upon its ſole, and clear the trench of mould, as far as neceſſary, which it is made to do in that poſture, to make way for the lifting-plough, of the ſame breadth in the tail. *See* Plate XXI. Fig 10.

Double Lifting-PLOUGH. My earneſt deſire, ſays Mr. Randal, to imitate gardeners, in preparing the ſoil, by their always going a good depth, and which, to be ſure, is the true biaſs of nature, in regard that vegetables, in general, require a looſer habitation, beneath the ſoil, to a greater depth than farmers will allow them: this deſire produced the lifting-plough, to raiſe the generous mould that lies far beneath the reach of common ploughing, into general uſe. This I have practiſed to very great effect, and never failed doing it, in all the going ground of the tenures of near a thouſand acres, where the ſtratum, below the uſual ſoil, would give me this deſireable and encouraging advantage. Hence it was, that I was always extremely fond of this lifting-plough, which never fails of ſucceſs in the hands of an honeſt, worthy ploughman; and, no doubt, there are many ſuch to be found. I was very imprudent, in my firſt conſtruction of this plough, in having it made too large, in order, through a covetous diſpoſition, to have much work done in a day. The draught was ſo fatiguing to the horſes and men, that the invention was under a good deal of diſrepute, and I was in danger of having all the ſervants leave the ſervice, and of killing the horſes: for theſe reaſons, I was obliged to ſit down with that loſs, great as it was, in the purchaſe of this plough, and contract all the proportions of it, to make the draught quite eaſy to the team and men; and then there was not the leaſt complaint heard, but only a backwardneſs to proceed, which uſe effectually removed.

Here, then, this lifting-plough is to go into all the trenches made by the double plough, as mentioned before; and as the ploughman deepens the trenches as far down as is conſiſtent with his own and horſes eaſe, the irons, running up on each ſide of the plough, will lift up the mould, which will be thrown, by the motion, upon the old ridges. The ground now lies in deep trenches, and high ridges, and this is what is called, in my Treatiſe, double ridges; and how the ſoil is to be afterwards reduced to a level, and receive farther management, is therein particularly mentioned. Now, from the conſtruction of theſe two ploughs, the ſoil beneath will, if the ploughman keeps his hands even, be cut level, inſtead of leaving there hills and dales, but too often practiſed, to the diſcouragement of the growth of the vegetables. *See* Plate XXI. Fig. 11. *Randal's Semi-virgilian Huſbandry.*

PLOUGHING, the action of breaking up, and looſening the ſoil.

“ The principle, ſays M. de Chateauvieux, of thoroughly dividing and looſening the ſoil, is ſo generally received, that there is not a farmer, who does not know, that one ploughing more than ordinary is of as much ſervice to his ground, as dunging it would be. Experience muſt have ſhewn them, that his crops are increaſed by this extraordinary ploughing: but he is not ſufficiently ſenſible, that of all the ways of improving his land, no one is more effectual, or leſs expenſive than this. Were its full value known, it would be more generally practiſed, and every huſbandman would give all his lands at leaſt one ploughing extraordinary.

“ To ſatiſfy myſelf of what might be done with the plough alone, I reſolved to make a trial on a ſpot of ground which I knew to be incapable of naturally producing any thing. Some years before, I had dug away the earth, three feet deep, from a ſpace of ſixty ſquare perches. Nothing remained in it but a white clay, like that which potters uſe. This ſpot, thus circumſtanced, ſeemed to me a proper one for my experiment. As the ſpace was too ſmall for a plough to work in, I had recourſe to the ſpade and hoe. The ground was laid out in beds, which were afterwards ſowed with wheat, and the ſpaces between them were frequently ſtirred. The firſt year, my plants were very poor, and branched into only two, three, or four ſtalks apiece. In the ſecond year, they did much better; and in the third, they were as large and fine as any my garden could have produced. This ſpot ſtill continues to produce equally well; the ſoil is now like fine mould; and, which is very remarkable, it has loſt its former white colour, and is become black. We have here a ſtrong inſtance of what may be done by pulverizing the earth. Let us but do the ſame with any of our bad lands, and perſevere in ploughing and ſtirring them a ſufficient time; the ſucceſs will not be doubtful.

" To be ſtill farther convinced of the truth of this important maxim in huſbandry, that the earth ſhould be thoroughly looſened by deep and frequent ploughings, I examined very carefully, whether my lands which had been prepared by repeated ploughing only, without the aſſiſtance of any dung or manure, were more looſened and rendered lighter, than thoſe which were under the common management. All my obſervations proved that they were. The firſt glance of my eye ſhewed me, that their ſurface was ſmoother; on ſounding the furrows, I found them deeper; and much leſs ſtrength was required to plough them; two horſes, or ſometimes only one, or a ſingle ox, doing here with eaſe, what would otherwiſe have employed double that number of cattle: a manifeſt proof that my grounds were in excellent tilth; whereas the common fields offered nothing pleaſing or ſatisfactory to the eye; the earth there was extremely hard, cloſe, and compact, and its ſurface almoſt as firm as that of a beaten road. The ground which had been well and often ploughed remained ſo light and ſoft, after its crop of wheat was taken off, that I thruſt a ſtick of green willow eight or ten inches deep into it without the leaſt difficulty, though I could not by any means puſh it at all into the land cultivated in the common way."

Camillo Tarello, a native of Lonato in the Venetian territories, concerned to ſee the neglected and dreadful miſmanaged ſtate of huſbandry in his country, wrote his ſmall, but highly valuable treatiſe of Agriculture, and preſented it to the ſenate of Venice under the title of *Ricordo d'Agricultura*. The ſenate, in juſtice to the excellency of this work and the patriotic intentions of its author, granted him, on the 29th of September 1566, not only the ſole right of vending his book, but alſo ordered at the ſame time that all ſuch as adopted his new method of huſbandry, ſhould pay to him, and afterwards to his deſcendants, four marchetti (about three halfpence of our money) for every acre of corn land, and two marchetti for every acre of other land, planted according to his direction. The Berne Society have favoured the public with the firſt part of Tarello's excellent treatiſe; and we ſhall take from thence the following extract as a farther proof of the neceſſity of thorough ploughing.

" When we conſider, ſays that good patriot and intelligent huſbandman, Camillo Tarello, that every ear of wheat yields fifty grains (we will ſuppoſe that to be the medium number), we may infer, that if all theſe were ſowed and grew, we ſhould reap fifty times as much as was ſown: but our crops are far from being ſo abundant. This failure cannot proceed from any other cauſe than that all theſe grains do not riſe and proſper; nor can any but one, or all, of the ſeven following reaſons be aſſigned for it, if we except bad ſeaſons and extraordinary accidents.

" The deficiency ariſes either 1, from the ſeed; or 2, from rain, when the corn is in bloom; 3, from winds, when its ſtalks are large; 4, from birds, which eat up the grains that have been ſown; 5, from worms and inſects; 6, from the earth; or, 7, from the cultivator himſelf.

" The cauſe of this defect is not in the ſeed: for, either the ſeed is good, or it is not: if it be not good, the grains will not riſe at all; but if it be good, as we ſuppoſe it to be, each grain may, and ſhould, produce at leaſt one ear. Another proof is, that if a parcel of ſeeds are planted at a proper depth, one by one, in holes made on purpoſe for them, and an equal number of the ſame kind of ſeeds are ſowed at random in the ſame ſort of ground, all the former will riſe, but not all the latter.

" Neither ought it to be aſcribed either to rain or winds, at the time of the bloſſoming of the corn: becauſe we do not reap fifty for one, even when the weather is then very fine; and even when each ear bears fifty grains, we do not reap fifty times the ſeed.

" Nor ought we to accuſe the birds of the air: it being well known that lupins, which they never touch on account of their bitterneſs, do not all riſe; for if they did, the crop would be ſtill more conſiderable, as each of theſe plants bears from fifty to ſixty ſeeds. Beſides, what the birds eat is not conſiderable.

" Worms and inſects are not the cauſe, for three reaſons, firſt, our crops are very little better even when neither worms nor inſects are to be ſeen; ſecondly, the caſe here is the ſame as that of the lupins; and, thirdly, the worms would ravage whole fields (as they ſometimes do) in ſo viſible a manner, that it would be eaſy to diſtinguiſh the cauſe of the miſchief. However, this is an extraordinary and pretty rare event.

" The ſame may be ſaid of fogs, cold, bad weather, reptiles, and other miſchievous creatures. Though theſe enemies do not injure our fields every year, we nevertheleſs conſtantly reap leſs corn than they might be made to produce.

" Laſtly, the earth is not in itſelf the cauſe of this ſcantineſs of increaſe: for the Creator has endowed it with perpetual youth and fruitfulneſs, as Columella juſtly and prettily obſerves in the firſt chapters of his firſt and ſecond books. The earth and nature are always the ſame.

" Now, if the uſual cauſe why we do not reap fifty for one cannot be imputed to either of the things above-mentioned, it muſt of neceſſity be ſought for in the ignorance, negligence, and indolence of the huſbandman: for our practiſe is diametrically contrary to that of the ancient Romans. They plowed often, and ſowed little; yet every family lived upon the produce of its ſmall farm: but we who plow little and ſow a great deal, are always diſappointed."

The Romans were not only extremely attentive to the thorough culture of their land, but alſo, even in the latter time of the republic, laid it down as a maxim to be followed by all good huſbandmen, " to ſow but little and plow much." This is ſtrictly enjoined by Virgil; and Pliny, who inſtances the huſbandry of Creſinus, as an example of the good effects of this practice, laments the deplorable condition of Italy, when rich men, with the help of their numerous ſlaves, farmed large diſtricts of land; becauſe it diminiſhed the number of Roman citizens, and rendered the country leſs fruitful: for, as both he and Columella obſerve, the Romans then became dependant on other nations for the means of ſubſiſtance.

May not this naturally lead us to caſt an eye upon our own country, where, of late years, gentlemen throw their eſtates, as much as poſſible, into large farms, which, in the language of Mago the Carthaginian, muſt, in general, render the farm ſtronger than the farmer, whereby it neceſſarily becomes leſs fruitful? This practice is attended with another moſt fatal conſequence to a manufacturing and trading people: it leſſens the number of inhabitants in the country, from whence only the ſupply of population ariſes; for cities and large towns are always an expence of men.

Whilſt we beſtow this due commendation on plowing, we do not mean to recommend it on Mr. Tull's principles, " that dividing and pulverizing the earth is all in all." When the earth is in fine tilth, ſo that the roots of plants can eaſily extend themſelves every way, an advantage ariſes, which is thus deſcribed by the ingenious M. J. J. Biberg, in his Œconomy of Nature.

" Plants, as well as living creatures, muſt ſubmit to death. They ſpring up, they grow, they flouriſh, they ripen their fruit, they wither, and at laſt, having finiſhed their courſe, they die, and return again to the duſt, from whence they firſt took their riſe. Thus the black mould which we ſee upon the ſurface of the earth, is chiefly owing to dead vegetables. For all roots deſcend into the earth by their branches, and after a plant has loſt its ſtem, the root remains; but this too rots at laſt, and changes into mould. By this means, this kind of mould is mixed with the earth, by the contrivance of nature; nearly in the ſame way as dung thrown upon fields is wrought into the earth by the induſtry of the huſbandman.

" The earth thus prepared offers again to plants from its boſom, what it had received from them. For when ſeeds are committed to the earth, they draw to themſelves, accommodate to their nature, and turn into plants, the more ſubtile parts of this mould, by the co-operation of the ſun, air, and moiſture ; ſo that the talleſt tree is, properly ſpeaking, nothing but mould wonderfully compounded and modified by a virtue communicated to a ſmall ſeed by the Creator. From theſe plants, when they die, juſt the ſame mould is formed, as give birth to them originally ; but in ſuch a manner, that it is in greater quantity than before, if the earth be kept looſe to admit of the free extenſion of the roots. Vegetables therefore increaſe the black mould ; whence fertility remains continually uninterrupted : whereas the earth would not make good its annual conſumption, if it were not conſtantly recruited by new ſupplies."

The illuſtrious M. Lullin de Chateauvieux, to whom the world in general is infinitely indebted for ſome of the moſt judicious and beſt executed experiments ever made in Agriculture, as is his native country in particular for his excellent adminiſtration in the high office of chief magiſtrate of the republic of Geneva, is the firſt writer who has attended to the advantages of ſtubble as a manure.

Towards the latter end of the year 1753, walking over his grounds after harveſt, he was ſtruck with the difference which he found in the ſtubble of his own experiments, and that of the corn which had been raiſed in the common way. This laſt was ſo poor and weak, that it ſcarcely oppoſed the motion of his feet, while the other reſiſted greatly. " I often felt it break, ſays he, under my feet, and frequently met with tufts of twenty, thirty, forty and ſometimes more ſtalks, which ſtopt me ſhort, like ſo many little buſhes. I am the more particular in my account of this ſtubble, becauſe it ſhews the great ſtrength of the plants, which they would not have had if the earth had not been well prepared. Beſides, it has its real uſe : for thorough plowing ſupplies the want of dung, not only by keeping the earth conſtantly in a looſe ſtate, but likewiſe by the quantity of ſtrong ſtubble which it produces, and which affords a moſt excellent manure attended with no expence. It lies ready upon the ſpot ; the plowing of the earth buries it ; and as it is a long time in rotting, it helps to keep the ſoil looſe and light, and is repeated every year. I have found ſtubble almoſt whole at a year's end, and have ſeen ſome not quite conſumed at the end of two years. From what I have ſeen of its effects, I will venture to ſay, that it contributes greatly to increaſe the productions of the earth. I have very often plucked up plants remarkable for their beauty, and have frequently found their roots interwoven with tufts of ſtubble, which ſhewed me the cauſe of their extraordinary growth."

" It is often, ſays Mr. Duhamel, more advantageous to increaſe the fertility of land by plowing, than by dung : 1, Becauſe, in general, only a certain quantity of dung can be had, the product of twenty acres being ſcarcely ſufficient to produce enough for four or five ; whereas the particles of the earth may be divided and ſubdivided almoſt to infinity. The help derived from dung is therefore limited ; whilſt no bounds can be ſet to the benefits that may accrue from plowing.

" 2, Few plants raiſed in dung ever have the fine flavour of thoſe which grow in a good ſoil moderately dunged. Our kitchen gardens and our other grounds afford daily inſtances of this truth. Pulſe, pot-herbs, and fruit, are ſeldom ſo good in the neighbourhood of great cities, where dung abounds, as in country gardens, where but little of it is uſed. The corn raiſed in thoſe exceſſively dunged lands, yields a great deal of bran, and not much fine flour, and is difficult to keep. Nice horſes will not eat oats of the growth of fields manured with human ordure. But nothing is ſo ſtriking as the difference between the wine of an undunged vineyard, and that of vines which have been greatly dunged.

" 3, Dung, which is ſuppoſed to act by fermentation, cauſes indeed an inward diviſion of the particles of the earth, which muſt be very uſeful, as well as the food which it furniſhes to plants: but the plough, beſides dividing thoſe particles, changes their ſituation, and turns the ground upſide down, ſo that the part which was expoſed to the influences of the air and dews, takes the place of another part, which is brought from within the earth, up to its ſurface. The conſequence of this is, that well-plowed land is not exhauſted by weeds, and that it admits the moiſture of rains and dews, together with the rays of the ſun, all of which contribute greatly to render it fertile, as has been proved by very many experiments.

" 4, Dung attracts inſects, and thoſe inſects gnaw plants. It is well known that the roots of trees planted in dunged ground, are very liable to be damaged by inſects ; and this is one of the chief reaſons why floriſts baniſh dung from their gardens. Worms, grubs, and other ſuch like vermin, make dreadful havock in their beds of flowers ; and I have ſeen meadows where the graſs has been entirely deſtroyed, by their eating its roots.

" I muſt add, that moſt ſorts of dung contain a great many ſeeds, which fill the land with weeds.

" 5, It is true that dung is equally ſerviceable to light lands, and to ſtrong ; but the ſame may be ſaid of plowing.

" Land is too ſtrong when its particles lie ſo cloſe together, that the roots of plants cannot extend between them, without great difficulty, in queſt of their neceſſary food, for want of which they will remain poor and ſickly. But when the ground has been well looſened by repeated plowings, and its particles are ſet at greater diſtances from each other, thoſe roots will be able to ſpread freely on all ſides, to pervade every minute chaſm, and to collect ſuch quantities of food, as will make the plants grow ſtrong and vigorous. The friendly influences of the atmoſphere will then penetrate to them. What plainly proves the good effects of looſening ſuch ſoils, is, that their fertility is ſometimes increaſed by a mixture of ſand, inſtead of dung. Now ſand does not afford any nutritive ſubſtance ; but only hinders the particles of the earth from re-uniting too cloſely.

" Plowing is equally beneficial to light lands, for the very contrary reaſon ; though theſe do not require ſo much of it as the other. There is no danger of their being exhauſted by any expoſure to the ſun ; but, on the contrary, they acquire an additional degree of fertility by the ſtirring and grinding of their particles, and are thereby the better fitted to receive the moiſture of rains and dews, and the ſalutary influences of the air and ſun ; whilſt their inward pores are at the ſame time better adapted to the proper extenſion of the roots of plants, by their being leſſened.

" But, let the benefits ariſing from dung be ever ſo great, let the means of obtaining enough of it be ever ſo eaſy, and let even its defects be corrected as much as can be ; ſtill it will not be the leſs true, that frequent plowing is of infinite ſervice to land.

" For this reaſon it is, that land intended for wheat is plowed three or four times before the grain is ſowed. Some farmers, who could not dung all their lands, plowed part of them double the uſual number of times, and reaped greater crops from theſe, than from thoſe which were dunged. The expence of three plowings extraordinary will be much leſs than the price of the dung neceſſary for the land, if the farmer is obliged to purchaſe it.

" In 1759, M. Delu gave three plowings to ſome of his fields intended for oats ; and though that year was very dry and unfavourable to ſpring-corn, his oats kept up well till they were perfectly ripe, and yielded a full crop of excellent grain.

" He gave five plowings to a piece of wheat-land, which had not been dunged, and, at harveſt, had taller and finer corn there, than in the neighbouring grounds which had been dunged and cultivated in the uſual way.

" In ſhort, the advantage of thorough tillage, while the plants are growing, is ſo great, that, in many places, it has been found amply to repay even the expence of digging between the rows of corn."

PLOUGH-WRIGHT, a perſon whoſe buſineſs it is to make ploughs, and other implements of huſbandry.

PLUM-TREES. All the ſpecies of plums have within their fruit a hard ſtone, within which there is contained a ſoft and tender kernel : this kernel contains the ſeminal plant, from which would be produced another tree of the ſame kind, if it were ſet in the ground ; and it is very natural to ſuppoſe, that the only uſe of the thick ſtone or huſk of this was only to preſerve its tender ſubſtance from rotting too ſoon in the earth, and to give it a proper time for developing its parts, to preſerve its natural oilineſs during that time, and to furniſh from its own ſubſtance a proper nouriſhment to the growing plant; for obſervation ſhews, that it finally breaks into a very fine powder.

There has not been found any ſpecies of plum which had not its kernel contained in a ſtony coat of this kind, from whatever grafts they have been propagated; nor is there any art known by which the kernel of this ſort of fruit can, while growing, be deprived of its coat.

Mr. Marchand, however, in the year 1735, ſhewed, before the academy of ſciences at Paris, certain plums, whoſe kernels had no ſtone or ſhell round them; and found that they grew upon a tree which never had produced any others, and which had been known to produce ſuch for twenty years. The kernel in theſe was covered with a reddiſh ſkin, which was rough to the touch; and, within that, with another, which was thinner and white. The kernel had nothing particular in it, except that it carried on one ſide of its outer ſurface, and that always in the ſame place, a little ſtony prominence, more or leſs dented on its convex part: this is uſually a twelfth of an inch broad, and two thirds of an inch long, and has no other appearance but that of a diſtempered part of the kernel, only that all the kernels have it.

The thick wrinkled ſkin which ſurrounds the kernel, ſeems in this caſe to ſupply the place of the ſtone or hard ſhell; and in this alſo it reſembles it, that the pulp of the fruit parts eaſily and readily form it: and the hard oblong body, which is placed on one ſide of the kernel, is by no means proper for this purpoſe. *Mem. Acad. Sciences, Par.* 1735.

All the ſorts of plums are propagated by budding, or grafting them upon ſtocks of the muſcle-plum, the white pear plum, the St. Julian, or the *bonum magnum.*

Budding is much properer than grafting for theſe trees, as they are apt to throw out a great deal of gum from the wound: and the trees ſhould be no more than one year's growth from the bud, when they are tranſplanted; for, if they are more, they ſeldom ſucceed well, being very ſubject to canker; and if they eſcape that, they uſually produce only two or three luxuriant branches. The whole management of planting and pruning them is the ſame with that of peaches. *See* PEACH.

If the walls againſt which they are planted are low, they ſhould be ſet eighteen feet aſunder; if they are higher, then fourteen or ſixteen.

Plums ſhould have a middling ſoil, for they ſeldom ſucceed well in too moiſt or too dry a one; and, when planted againſt walls, ſhould have an eaſt or a ſouth-eaſt proſpect. If they have one at full ſouth, they are apt to ſhrivel up, and become mealy. Plums in general ſucceed very well with proper care on eſpaliers; they will alſo bear very well as ſtandards, but the fruit will not be ſo well taſted. Plums do not only produce their fruit on the laſt year's wood, but alſo on ſpurs that come out of the wood at two or three years old. It is a common error to be too free with the knife in the winter pruning, cutting off the extremities of all the branches; the conſequence of which is, that there is an over quantity of young ſhoots produced, and the fruit is ſmall and poor. *Miller's Gard. Dict.*

POA, meadow graſs, or that common ſpecies of graſs, that principally forms the green covering of our fields.

POCKET, a large ſort of bag in which wool is packed up, in order to be ſent from one part of the kingdom to the other.

POD, a term uſed to expreſs a pericarpium, conſiſting of two valves, which open from the baſe to the point, and are ſeparated by a membranaceous partition from which the ſeeds hang by a kind of minute ſtalk.

POKE, a ſack, or bag.

Hop POLES, the upright poles, or pieces of wood, round which they bind, twiſt, and ſupport themſelves. *See the article* HOP.

POLLARD, or *Pollanger*, a tree that has been frequently polled or lopped, and its top taken off.

POLL-EVIL, an abſceſs near the poll of a horſe, formed in the ſinuſes between the noll bone, and the uppermoſt vertebræ of the neck.

If it proceeds from blows, bruiſes, or any external violence, at firſt bathe the ſwelling often with hot vinegar; and if the hair be fretted off with an oozing through the ſkin, make uſe of two parts of vinegar, and one of ſpirit of wine; but if there be an itching with heat and inflammation, the ſafeſt way is to bleed, and apply poultices with bread, milk, and elder flowers: this method, with the aſſiſtance of phyſic, will frequently diſperſe the ſwelling, and prevent this evil.

But when the tumor is critical, and has all the ſigns of matter, the beſt method then is to forward it by applying the ripening poultices already taken notice of, till it comes to maturity, and burſts of itſelf; or if opened with a knife, great care ſhould be taken to avoid the tendinous ligament, that runs along the neck under the mane: when matter is on both ſides, the opening muſt be made on each ſide, and the ligament remain undivided.

If the matter flows in great quantities, reſembles melted glue, and is of an oily conſiſtence, it will require a ſecond inciſion, eſpecially if any cavities are diſcovered by the finger or probe; theſe ſhould be opened by the knife, the orifices made depending, and the wound dreſſed with the common digeſtive of turpentine, honey, and tincture of myrrh, and after digeſtion with the precipitate ointment; or waſh the ſore with the following, made hot, and fill up the cavity with tow ſoaked in it.

> Take vinegar or ſpirit of wine, half a pint, white vitriol diſſolved in ſpring water, half an ounce, tincture of myrrh, four ounces.

This may be made ſharper by adding more vitriol; but if the fleſh is very luxuriant, it ſhould firſt be pared down with a knife before the application; with this waſh alone Mr. Gibſon has cured this diſorder without any other formality of dreſſing, waſhing with it twice a day, and laying over the part a quantity of tow ſoaked in vinegar and the white of eggs beat together. This laſt application will ſerve inſtead of a bandage, as it will adhere cloſe to the poll, and come off eaſy when there is occaſion to dreſs. Some waſh with the phagædenic water, and then fill up the abſceſs with looſe doſſils of tow ſoaked in Ægyptiacum and oil of turpentine made hot, and continue this method till the cure is effected.

But the moſt compendious method of cure, is found by obſervation to be by ſcalding, as the farriers term it, and is thus proſecuted when the ſore is foul, of a bad diſpoſition, and attended with a profuſion of matter.

> Take corroſive ſublimate, verdigreaſe in fine powder, and Roman vitriol, of each two drams; green copperas half an ounce; honey or Ægyptiacum two ounces, oil of turpentine and train oil, of each eight ounces; rectified ſpirit of wine four ounces: mix together in a bottle.

Some make their ſcalding mixture milder, uſing red precipitate inſtead of the ſublimate; and white vitriol inſtead of the blue; the following has been ſucceſsfully uſed for this purpoſe, viz. half an ounce of verdigreaſe, half a pint of train oil, four ounces of oil of turpentine, and two of oil of vitriol.

The manner of ſcalding is firſt to clean the abſceſs well with a piece of ſponge dipped in vinegar; then put a ſufficient quantity of the mixture in a ladle with a ſpout, and when it is made ſcalding hot, pour it into the abſceſs, and cloſe the lips together with one or more ſtitches. This is to remain in ſeveral days, and if good matter appears, and not in an over great quantity, it will do well without any other dreſſing, but bathing with ſpirit of wine; if the matter flows in great abundance, and of a thin conſiſtence, it muſt be ſcalded again, and repeated till the matter leſſens and thickens.

Theſe liquid corroſive dreſſings agree well with horſes, whoſe fibres are ſtiff and rigid, and whoſe juices are oily and viſcid; in this caſe they contract the veſſels of the tendons on the hind part of the head and upper part of the neck, which are continually ſpewing out a matter or ichor that can hardly be digeſted, or the profuſion abated without ſuch applications as theſe.

POND, a reſervoir or receptacle for collecting and preſerving water.

The neceſſity of water, in all paſtures, is ſelf-evident; as cattle cannot live without it, and the driving of them far for it is known to be prejudicial to their health, in hot weather, beſides being attended with great trouble, and a conſiderable loſs of time. This is ſo ſenſibly felt in many parts of England, that people are obliged to dig wells, even to ſuch a depth as, frequently, to require the aſſiſtance of a horſe to draw up the water. The means of rendering it eaſily come at, muſt therefore inhance the value of the land where it can be ſo procured, and are of very eſſential conſequence to the huſbandman.

Where the ſurface of the ground is ſand or gravel, there ſeldom is occaſion to dig deep for water; becauſe ſuch ſoils generally lie upon marle, or ſome other rich earth, through which the water cannot deſcend. Beds of clay are moſt commonly thicker than thoſe of ſand or gravel; and chalk is, too often, the thickeſt of all. But wherever water is wanting, the farmer ſhould bore through the incumbent earth, if he intends to fit his land for paſture: and if he finds the expence of obtaining it too great, his beſt way will be to convert the ground ſo circumſtanced into arable, or to plant it with timber-trees ſuited to the nature of the ſoil.

Wherever water ſtagnates in a ſandy or gravelly ſoil, the huſbandman ſees at once at what depth is the ſurface of the earth which retains it. But in other ſoils, and when this does not happen, Palladius, and the authors of the *Maiſon Ruſtique*, give the following directions how to ſeek for water, with the greateſt probability of ſucceſs.

Where ruſhes, reeds, flags, willows, or other aquatic plants grow ſpontaneouſly, or where frogs are obſerved to lie ſquatted down cloſe to the ground, in order to receive its moiſture, there generally is water underneath. Perſons who make it their buſineſs to find out ſprings for fountains, caſcades, &c. look upon it as an infallible ſign of ſubterranean water, when they ſee a vapour ariſe frequently from the ſame ſpot of ground. Others aſſure, that wherever ſwarms of little flies are ſeen conſtantly flying in the ſame place, and near to the ground, in the morning, after ſun-riſe, there certainly is water under that ſpot. Again, where water is wanted on land apparently dry, let a man, before ſun-riſe, lie down flat upon his belly, reſting his chin upon his fiſt placed cloſe to the ground, that his view may be directed quite horizontally, and not riſe too high, and in that ſituation let him look ſtedfaſtly toward the eaſt. If he then ſees a tremulous vapour ariſe from any particular ſpot, let him mark the place, by noticing ſome neighbouring tree, ſhrub, or other indication, and he will find water underneath it. But this experiment is to be made only on ground whoſe ſurface is dry; becauſe other exhalations, from a damp ſurface, would be apt, in this caſe, to miſlead the enquirer.

Another way is thus. Dig a hole three feet wide, and at leaſt five feet deep, and place at the bottom of it, when the ſun is about to ſet, a pan, or baſon, rubbed with oil on the inſide: let the bottom of this veſſel be uppermoſt; cover it with dry hay, fern, or ruſhes, and over that with earth; and if any drops of water are found ſtanding on its inſide the next day, a ſpring is probably not far off. Or, put a new, unbaked, but well dried, earthen veſſel into ſuch a hole, and cover it as before; and if there be water in that place, this veſſel will be found ſoft and wet the next day. Likewiſe if wool be left all night in a trench of this kind, and water can be ſqueezed out of it the next day, little doubt remains but that of plenty of water may be met with there.

The month of Auguſt is generally looked upon as the moſt proper time to ſearch for water; becauſe, we apprehend, as the heat of the preceding ſummer will have warmed the earth to a conſiderable depth, any ſteam ariſing from water reſting on an impervious ſoil underneath, and particularly in hollows on the ſurface of that impervious ſoil, will then be moſt exhaled by this warmth. Now it is this ſteam, or vapour, which produces the before-mentioned ſigns.

By whatever method water is found, the means of coming eaſily at it are the next conſideration. If it be on a plain, there is no other way than digging a well. In doing this, the ſubſtance under the ſand or light ſoil muſt be dug into, to form a reſervoir of water for occaſional wants; and this reſervoir ſhould be made deep and large, in proportion to the quantity wanted. If there were no ſuch reſervoir, the water, after having riſen a little above the impervious body underneath, would glide along its ſurface, as uſual, and very little of it could then be obtained, either by pumps, buckets, or any other way employed to raiſe it. If the well is made in a ſloping ground, and the declivity is ſufficient to give it an horizontal vent, it will be worth the huſbandman's while to dig ſuch a paſſage, and, by means of pipes, or any other conveyance, to carry the water acroſs the light ſoil, through which it would otherwiſe ſink. The greateſt quantity of water will be obtained in this manner, becauſe there will then be a continual ſtream.

If the ſoil is very deep, and its ſurface has inequalities in which rain water runs in any quantity; this may be collected in ponds made in the loweſt parts of ſuch grounds.

If a body of clay is found near the ſurface, it is worth the farmer's while to bore, that he may know at what depth a bed of ſand or gravel may be met with: for he will be ſure to find plenty of water in this laſt. If this be in a declivity, he need only cut an horizontal paſſage, and the water will flow ſo freely as even to double the value of his land.

Here again the farmer needs not ever to be at a loſs, becauſe it cannot be very difficult to make a pond in a clayey ſoil, which is, of itſelf, retentive of water. But it may, perhaps, be adviſable, even in this, to cover the bottom of the pond with a coat of gravel, in order to prevent its being poached by cattle, whoſe feet would otherwiſe be apt to ſink deep into clay. Some farmers judiciouſly pave the declivity by which the cattle enter into the pond, and this renders it much more laſting than it would otherwiſe be, and preſerves the water clean.

When ponds are made in a looſe ſoil, much more care is neceſſary. The bottom and ſides there muſt be covered with a thick coat of the tougheſt clay, from a foot to two feet thick, well rammed down. Some have added hair and loam to the outer part of this covering, with a view of rendering it leſs liable to chap: but a thick coat of gravel is more neceſſary here, that the feet of the cattle may not pierce through the clay. Perhaps the expence of paving the whole inſide of a pond, might, in the end, be money well laid out.

The greateſt difficulty of finding water is in chalky ſoils, becauſe theſe are not, of themſelves, very retentive of it, and generally lie in ſuch thick beds, that it is expenſive to dig through them. However, it ſhould be tried; and if ſand or gravel be found underneath, water may be depended on. Even here, ponds are eaſily made, by digging into the chalk, and lining them with a coat of clay, as before directed. If there is a ſupply of proper manure, ſuch as clay, or marle, this ſituation is well adapted to grain, which loves to ſtand dry; and as this kind of ground produces more forward crops than clayey or ſtrong ſoils, it may be ſowed early with corn, which will not, in that caſe, be ſo apt to be parched up as graſs is, by the ſummer's drought. If a good ſoil can be made here, a foot deep, it will yield plenty of various ſorts of paſture, either roots or graſſes, as the farmer ſhall judge moſt proper: or it may be planted with different kinds of timber-trees. For the method of making ponds in gardens, *ſee the article* GARDEN.

POPLAR, a genus of trees, of which botaniſts enumerate four ſpecies; viz. the common white poplar, with large leaves: the common white poplar, with ſmaller leaves: the common black poplar, and the poplar with trembling leaves, called the aſpen-tree. The poplar, whether black or white, may be eaſily propagated, either by layers, cuttings, or ſuckers, of which the white kind always produces a great many from the roots. The beſt ſeaſon for the tranſplanting theſe ſuckers is in October, when the leaves begin to decay; and they ſhould be removed into a nurſery for two or three years, at the end of which time they will have got ſtrength enough to be tranſplanted into the places where they are to remain.

When they are to be propagated by cuttings, it is beſt to do that in February, cutting off large truncheons of eight or ten feet long; which, being thruſt down a foot deep in the ground, will take root very quickly, and, if the ſoil be moiſt, will grow to a conſiderable ſize in a few years.

The black poplar is not ſo eaſily raiſed from theſe large truncheons, but ſhould be planted in cuttings, of about a foot and a half long, planting them a foot deep in the ground. This will grow on almoſt any ſoil, but does much better on a moiſt one than on any other. They are the fitteſt of all trees for raiſing a ſhade quickly, as they will grow fourteen feet in height ſometimes in one ſeaſon, and in four or five years will be large trees.

A conſiderable advantage may be obtained by planting theſe trees upon moiſt boggy ſoils, where few other trees will thrive: many ſuch places there are in England, which do not, at preſent, bring in much money to their owners; whereas, if they were planted with theſe trees, they would, in a very few years, over-purchaſe the ground, clear of all expence: but there are many perſons in England, who think nothing, except corn, worth cultivating: or, if they plant timber, it muſt be oak, aſh, or elm; and, if their land be not proper for either of theſe, it is deemed little worth; whereas, if the nature of the ſoil was examined, and proper ſorts of plants adapted to it, there might be a very great advantage made of ſeveral large tracts of lands, which at this time lie neglected.

The wood of theſe trees, eſpecially of the white, is very good to lay for floors, where it will laſt many years; and, for its exceeding whiteneſs, is, by many perſons, preferred to oak; but, being of a ſoft contexture, is very ſubject to take the impreſſion of nails, &c. which renders it leſs proper for this purpoſe: it is alſo very proper for wainſcotting of rooms, being leſs ſubject to ſwell or ſhrink, than moſt other ſorts of wood: but for turnery-ware, there is no wood equal to this for its exceeding whiteneſs, ſo that trays, bowls, and many other utenſils, are made of it; and the bellows-makers prefer it for their uſe; as do alſo the ſhoemakers, not only for heels, but alſo for the ſoles of ſhoes: it is alſo very good to make light carts; the poles are very proper to ſupport vines, hops, &c. and the lopping will afford good fuel, which in many countries, is much wanted. *Miller's Gard. Dict.*

POPPY, the name of a plant, of which ſeveral ſpecies are cultivated in gardens for the beauty of the flowers. They are all eaſily propagated by ſowing the ſeeds in autumn. When the young plants come up, they are to be cleared from weeds, and thinned to a proper diſtance by pulling ſome up, where they ſtand too thick; for they never thrive well, if they are to be tranſplanted. They are to be left, according to their ſizes, at ſix, eight, or ten inches diſtance.

They are very ſhowy flowers, and make a ſplendid appearance in gardens; but they are but of a ſhort duration, and are of an offenſive ſmell, which makes them leſs valued at preſent than they have been.

Some ſow theſe plants in ſpring, but it is not ſo well; becauſe they then have not time to get ſtrength before autumn, when they are to flower; and, for that reaſon, thoſe ſown in ſpring uſually flower weakly. *Miller's Gard. Dict.*

Red POPPY, or *Red-weed.* The common wild red poppy is one of the moſt miſchievous weeds the farmers are plagued with among their corn, and it is the moſt difficult to thoroughly deſtroy of almoſt any other. Its ſeed will lie a long time in land unploughed, without ever ſhooting; but they will be ſure to grow with every crop of corn. Mr. Tull gives an inſtance of the ſeeds of this plant being buried four and twenty years in a field of ſaintfoin, and at the end of that time, the land being ploughed for wheat, they all grew up among the corn, though they had lain dormant ſo long before. *Tull's Horſe-hoeing Huſbandry.*

POTATOE, or POTATO, the name of a well known plant, the roots of which make a very nouriſhing food.

Mr. Houghton deſcribes the potato to be a bacciferous herb, with eſculent roots, bearing winged leaves and a belled flower; and ſays, that, according to his information, which is allowed to be very right in this reſpect, it was firſt brought from Virginia, by Sir Walter Raleigh, who, ſtopping at Ireland, about the year 1623, gave away a number of theſe roots, which were planted there, and multiplied ſo exceedingly, that, in the wars which happened afterwards in that country, when all the corn above ground was deſtroyed, potatoes became the chief ſupport of the people: for the ſoldiers, unleſs they had dug up all the ground where they grew, and almoſt ſifted it, could not have extirpated them. The Philoſophical Tranſactions obſerve likewiſe, that the Iriſh were relieved from their laſt ſevere famine, which laſted two years, during which all their corn failed, merely by the help of this root. From Ireland it was brought to Lancaſhire, now famous for its potatoes: and the culture of this plant has, within theſe laſt thirty years, been extended to almoſt every part of England. The rich, who, at firſt, deemed them fit for none but the meaner ſort of people, now eſteem them ſo much, that Mr. Miller thinks the quantity of them which is cultivated around London only, exceeds that of any other part of Europe.

The red rooted potatoes have purpliſh flowers, and the white rooted (for Mr. Miller diſtinguiſhes only theſe two general varieties) bear white flowers.

The potatoe ſeldom perfects its ſeeds in England; and if it did, the raiſing of it from them would be much more tedious and uncertain than propagating it by its roots, as is the general and right method: for theſe multiply exceedingly, and may be made to yield vaſt crops, with little coſt or labour.

“ The Iriſh huſbandman, ſays Mr. Switzer, after blaming the Engliſh for planting this root uncut, becauſe it often contains five or ſix eyes, or perhaps more, from which the produce of the enſuing year is to ſpring; and alſo for not allowing that bulb, or rather the great number of ſhoots and bulbs that proceed from it, a ſpace of earth ſufficient for their nouriſhment, which is the reaſon why ſo many poor, ſtinted, unſerviceable potatoes are dug up in the autumn, relates the practice of his country, which is to chuſe middle ſized roots, for the largeſt are generally eaten, to ſingle out the eyes that ſeem ſtrongeſt and moſt vigorous, and to cut them out in ſquares of at leaſt half an inch every way: ſo that one root will ſometimes furniſh three or four good pieces to ſet.

“ The ground, prepared for planting, is marked out for beds four or five feet wide, with intermediate alleys of two or three feet. It is then trenched, only a ſingle ſpit deep, and the bottom of this trench, made as in common garden-trenching, is covered with dung, long and ſhort, taken out of a wheel-barrow which ſtands at the labourer's elbow. The potatoe-eyes cut as before directed, are placed upon this dung, at about five or ſix inches aſunder; and this trench is filled up with the mould taken out of the next, which is marked by a line at the diſtance of two or three feet. This trench is again filled with the mould of the next, and ſo on to the laſt, which is filled from the alley.

“ The uſe of the dung thus laid at the bottom of the trenches, is not only to make the roots grow ſingle, for not above one root, or at moſt two, will in this caſe be produced by each eye, and theſe will be large and well fed; but it is attended with the farther advantage of making the potatoes run, and ſpread themſelves to a certain determinate depth, which is no ſmall help to their growing large.

“ The laſt thing to be done to them is, in April or May (for they are planted in February or March,) as ſoon as they begin to riſe, to dig the earth out of the alleys, as is done for aſparagus, and to cover the potatoe bed with it, about five or ſix inches thick. This will give new life and vigour to the roots, will keep the green from running too much to haulm, and will make the bulbs grow much the larger. By this means the crop of fine large potatoes will be almoſt the double of what is obtained when they are planted promiſcuouſly in the common way: nor will any farther culture be requiſite till they are fit to be dug up; except the pulling out of ſome of the largeſt weeds.”

Mr. Miller's reaſons for diſapproving of the planting, either of the ſmall offſets entire, or the eyes cut out of larger roots, are, that though the former generally produce a greater number of roots, theſe roots are always ſmall; and that the cuttings of the larger roots are apt to rot, eſpecially if wet weather happens ſoon after they are planted. He therefore recommends, to make choice of the faireſt roots for ſetting, and to allow them a larger ſpace of ground, both between the rows, and between the plants in the rows; and he aſſures us that he has obſerved, when this method has been followed, that the roots, in general, have been large the following autumn. M. Duhamel, in his Elements of Agriculture, does not object at all to the planting of the cuttings.

The ſoil in which this plant thrives beſt, is a light ſandy loam, neither too dry nor over moiſt, but brought to a fine tilth, and ploughed very deep: for the deeper the earth is looſened, the finer and larger the roots will grow. In the ſpring, juſt before the laſt ploughing (according to Mr. Miller's method,) a good quantity of rotten dung ſhould be ſpread on the ground, and this ſhould be ploughed in early in March, if the ſeaſon be mild; otherwiſe it had better be deferred until the middle or latter end of that month; for if a hard froſt ſhould come on ſoon after the roots are planted, they may be greatly injured, if not deſtroyed, thereby; but if they can be planted in the ſpring, without that danger, the better it will be.

The laſt ploughing ſhould lay the ground even, and then furrows ſhould be drawn three feet aſunder, and ſeven or eight inches deep. The roots ſhould be laid at the bottom of theſe furrows, about a foot and a half aſunder, and they ſhould then be covered in with earth.

After all the ground intended for potatoes is planted in this manner, it muſt remain in the ſame ſtate till near the time when the ſhoots are expected to appear: then it ſhould be well harrowed both ways, as well to looſen the ſurface and render it ſmooth, as to tear up the young weeds which will have begun to grow by that time. If much wet has fallen after the planting, it may have caked the ſurface of the earth, ſo as to retard the ſprouting of the plants; and this harrowing will, in ſuch caſe, almoſt anſwer the intent of a firſt hoeing.

I have placed the rows of potatoes at three feet diſtance, continues Mr. Miller, in order to introduce the hoe-plough between them; becauſe that will greatly improve their roots: for by twice ſtirring and breaking of the ground between theſe plants, not only weeds will be deſtroyed, but the ſoil will be ſo looſened, that every ſhower of rain will penetrate to the roots, and greatly quicken their growth. But theſe operations ſhould be performed early in the ſeaſon, before the ſtems or branches of the plants begin to fall and trail upon the ground: for after that, it cannot be done without injuring the ſhoots.

If theſe hoe-ploughings are carefully performed, they will prevent the growth of weeds, till the haulm of the plants cover the ground; and after that there will be little danger of their growing ſo as to injure the crop; for the haulm will keep them under: but as the horſe-hoe can only go between the rows, it will be neceſſary to make uſe of a hand-hoe to ſtir the ground, and deſtroy the weeds in the rows, between the plants. If this is well done, in dry weather, immediately after each of the two horſe-hoeings, it will be ſufficient to keep the ground clean until the potatoes are fit to be taken up; which will be, very ſoon after the firſt froſt in the autumn has killed the haulm. They ſhould not remain much longer in the earth, leſt the roots themſelves be froſt-bitten, which ſpoils them. A four or five pronged fork is better to dig them up with, than a ſpade, becauſe it is leſs apt to cut them: but a principal thing to be conſidered here, is the clearing of the ground thoroughly of them: for if any are left, they will ſhoot up among the next crop, whatever it be, and do conſiderable damage, eſpecially if it be wheat, as is generally the caſe, ſown in the common broad-caſt way.

The beſt way of keeping theſe roots during the winter, is to lay them up in a dry place in very dry ſand, or in fine and perfectly dry earth.

The method of laying dung only at the bottom of the furrows in which the roots are planted, “ is a very poor one, ſays Mr. Miller, becauſe, where the potatoes begin to puſh out their roots, they are ſoon extended beyond the width of theſe furrows, and the new roots are commonly formed at a diſtance from the old: ſo will be out of the reach of this dung, and conſequently will receive little benefit from it.” But rather the contrary would ſeem to be the caſe, according to the Iriſh huſbandman, who, ſeems to ſpeak from experience, when he ſays, he had intended expreſsly to anſwer this very objection, that “ the dung is placed at the bottom of the furrows on purpoſe to make the roots grow ſingle; and that its being ſo placed is attended with the farther conveniency of making the potatoes run, and ſpread themſelves at a certain determinate depth, which is no ſmall help to their growing large.” Facts muſt here determine which is right: as they alſo muſt in regard to ſome parts of what Mr. Miller adds in the following words. “ As moſt farmers covet to have a crop of wheat after the potatoes are taken off the ground, ſo the land will not be ſo thoroughly dreſſed in every part, nor ſo proper for this crop, as when the dung is equally ſpread, and plowed in all over the land, nor will the crops of potatoes be ſo good. I have always obſerved, where this method of planting the potatoes has been practiſed, the land has produced a fine crop of wheat afterward, and there has ſcarce one ſhoot of the potatoe appeared among the wheat, which I attribute to the farmers planting only the largeſt roots: for when they have forked them out of the ground the following autumn, there have been ſix, eight, or ten large roots produced from each, and often many more, and ſcarce any very ſmall roots; whereas, in ſuch places where the ſmall roots have been planted, there has been a vaſt number of very ſmall roots produced, many of which were ſo ſmall, as not to be diſcovered when the roots were taken up; ſo have grown the following ſeaſon, and have greatly injured whatever crop was on the ground.”

Will not a thorough plowing and good harrowing, after the crop of potatoes has been taken off the ground, intermix the dung laid in the furrows, and the contiguous earth moſt impregnated thereby, with the reſt of the ſoil; perhaps almoſt as well as if the dung had been ſpread equally over the whole field, at the very firſt? If it will, the preſumption ſeems ſtrong in favour of the Iriſh method. For certain it is, that the land ought to be well plowed and harrowed after the potatoes are removed, before it is ſown with any other crop; unleſs the ſeed for that crop, which generally is wheat, be ſprinkled by hand between the rows, as they are dug up, and there covered with the earth then turned over. This is practiſed in ſome parts of France: but, as M. Duhamel obſerves, the grain is ſo apt to be diſtributed unequally in this method, that it is better to plow the ground, and ſow it, in the regular way.

If the farmer apprehends that his land has not been thoroughly cleared of the potatoes, and is therefore afraid of their damaging his enſuing crop; his beſt way will be to lay it up very rough againſt winter; becauſe the froſts of that ſeaſon are known to kill and rot all potatoes in the ground expoſed to them, and it will at the ſame time be thereby finely prepared for ſpring corn; eſpecially as it will have been well enriched by the haulm of the potatoes lying upon it.

Though potatoes delight moſt in a light ſandy loam, neither too dry, nor over moiſt, as was obſerved before; yet Mr. Maxwell ſays he has ſeen them thrive well on ground that ſeemed to be very bad; even in deep moſs, which could not bear horſes to plow it, but which is conſiderably bettered by them; and on coarſe heath, where they were ſucceeded by grain, without more dung than was laid on at firſt. Of ſo improving a nature are they, and ſo much is the land enriched by the rotting of their ſtalks among it, and the digging it gets in raiſing them.

Several experiments communicated to M. Duhamel concur to prove the extraordinary increaſe of potatoes cultivated with the horſe-hoe: but as this will always be the conſequence of the new huſbandry, wherever it is properly uſed, I ſhall only borrow from him, on this occaſion, M. de Villier's account of his method of practice, becauſe it is the cleareſt and moſt conciſe.

“ There are, ſays he, ſeveral ſorts of potatoes. That which I cultivate is the middle ſized. It is planted about the end of April, or the beginning of May, and it ripens in October. My beds are five feet wide. I give them two plowings in the ſpring; at the ſecond of which I half fill the main furrow. Before I plant, I cut a ſmall furrow with the ſingle cultivator, which likewiſe looſens the earth; but if it be moiſt, I put a double ſpring-tree bar to the cultivator, to avoid the poaching of the horſes. I then plant the potatoes a foot aſunder in the row; chooſing for this purpoſe ſuch as are about the ſize of a walnut. They are thruſt in by hand, two or three inches deep; and if the mould does not then cover them
ſufficiently

ſufficiently of its own accord, a little more is puſhed down upon them.

“ A ſlight hand-hoeing can hardly be avoided afterwards, to deſtroy the weeds which ſpring up at the ſame time as the potatoes: but this hoeing need not extend farther than three or four inches on each ſide of the row; becauſe the plow will do the reſt.

“ I give the firſt hoe-plowing in the ſpring, as for wheat; but earlier or later, according to the condition of the ground.

“ My ſecond hoe-plowing is given as ſoon as the plants are tall enough to be earthed up; that is to ſay, when they are eight or ten inches high. I then turn the earth up towards them as much as poſſible.

“ As this plant ſpreads greatly, and ſhoots out very faſt, it would be impoſſible to give more than two of theſe hoeings, if one ſhould neglect to take advantage of the time when its leaves and branches do not entirely cover the bed.

“ The roots are dug up in October or perhaps ſomewhat earlier or later, according to the ſeaſon, with a ſtrong iron prong; ſhaking and clearing them well from the mould. They are then left to dry for ſome hours, and are afterwards laid up in a place where the froſt cannot reach them.

“ This fruit, which yields ſurpriſingly, is of great ſervice to feed and fatten cattle, eſpecially when it has been boiled a little. They like it very well raw, after it has been kept a few months above ground: but it is beſt for them after it has been boiled.”

The reader is obliged to the ingenious Mr. Irwin for the following account of cultivating potatoes in Ireland, and which we ſhall give in his own words.

“ The potato, ſays he, is become a root of ſuch immenſe utility, eſpecially to the poorer ſort, within this century, that too much, methinks, cannot be ſaid towards improving, and extending the culture of it.

“ In Provence, Dauphiny, Switzerland, and ſeveral other parts of Europe, and even in America, it yields commodious, abundant relief to the more indigent, as being eaſily and plenteouſly propagated in almoſt every kind of ſoil.

“ In Ireland particularly it is the principal food of the poor during the greater part of the year, without which, ſince the late unproportionable riſe of lands in that kingdom, to the trade of it, they could not well ſubſiſt. And, indeed, it ſeems a particular favour of providence ſent to them on this account.

“ In times, not very remote, lands were cheap there, and the peaſantry, conſequently, lived on nouriſhment ſomewhat more luxurious, and diverſified: their labour alſo was leſs burthenſome. But now, being obliged to work hard at four-pence and ſix-pence a day, and their rents conſiderably augmented, it will not ſeem ſurpriſing that this root alone has become the ſtaple of their ſupport, and that they have been the firſt people in Europe, or, perhaps, in the world, that have led the example in an extenſive improvement of it. This may naturally be ſuppoſed to ariſe from cloſe-preſſing neceſſity, the moſt cogent and inſpiriting of all motives.

“ In truth with much reaſon; for a poor labourer, in that ill-fated country, is driven to ſeek his ſole refuge for ſubſiſtence in this root, from the inexorable impoſition of a hard-hearted landlord, (ſorry I am to have it to ſay, too many of them grind the poor; but hope it will not be long the caſe) who thinks he cannot get too much for his land out of the perſons, or purſes, of his dependents, and who hath ſo inverted the old cuſtoms, that a hewer of wood, and drawer of water, (and many of theſe perhaps deſcendants of former proprietors) can afford himſelf but a miſerable ſcanty platter of potatoes, ſeaſoned with a palatable grain of ſalt, and waſhed down with a draught from the next rivulet, to ſupport the fatigue of thirteen hours (ſtatute quantity) of unceaſing labour, about his ancient manſion-houſe, or in his elegant gardens, well-laid-out cloſes, or refreſhing bog-holes.

“ The potato is a root, a little of which is very filling, quickly appeaſing hunger; but by no means a laſting ſolid nouriſhment for a labourer, as evidently teſtify the ſqualid looks of numbers of the poorer Iriſh; though at the ſame time it is in general wholeſome, agreeing with moſt ſtomachs that can vary their food; but, like other productions of the earth, forbid in many caſes by the medicinal tribe.

“ There are ſeveral ways of breeding potatoes in Ireland, which partly ariſe from the difference in ſoil, and kinds of ſeed. The different ſoils for this purpoſe in uſe in my neighbourhood, for about twenty years paſt, and which, I believe, are pretty general, are the following, wherein they are abundantly propagated, viz.

“ Firſt, On rich clay land without any manure, vulgarly called graſs potatoes.

“ When a leaſe is near being expired, that is, during the laſt ſeven years of it, if there be no covenants grounded on the ſtatute againſt waſte, &c. the tenant, finding no hopes of a renewal, ſets conſiderable tracts in this way, where the ſoil will admit of it.

“ Secondly, On good ley land well gravelled, (otherwiſe ſanded) which ought to be done a year before planting. But the poorer ſort, who are the chief cultivators of this root, are obliged to ſand and plant at the ſame time, or nearly thereabouts; which is very deſtructive to themſelves, their potatoes not having the proper benefit of the manure; at leaſt one part in three of the return are on this account exceeding ſmall, and are from hence called poreens by them, being a diminutive expreſſion. Whole fields are ſet in this way, (commonly called ſpaddane, in which a conſiderable trade is driven; eſpecially in the provinces of Munſter and Connaught.

“ Had it been properly and moderately done, it would be a fine preparation for the encreaſe of corn, and the laying down and bringing in, or, in other terms, the reclaiming of land; but the poor do it ſo negligently, and mangle it ſo intolerably, having but a ſhort temporary uſe in it, beſides paying near double the worth for it, that this manufacture, which might otherwiſe be of conſiderable benefit to Ireland, is, as now carried on, rather the contrary.

“ Thirdly, On ground previouſly gravelled (that is, perhaps ſix months before) and dunged at ſetting time. There is but little done in this way, except by the gentry, and renters of land for their private uſe; it being as yet out of reach of the peaſantry, unleſs in a few inſtances.

“ Fourthly, On the ley with dung alone. Marle is not in uſe in my neighbourhood, though there is plenty of it in ſeveral parts of it; therefore cannot yet inform you how it would do for the potatoes in that diſtrict. As to potatoes ſet in the ley with dung alone, this manufacture alſo is done, as you may judge, moſtly by the more opulent. I have, however, often ſeen large fields ſet in this way to the public; but it is not of late years ſo much the cuſtom, this ſort of land being commonly kept for grazing: this hurts the land; and any preparation out of the ley for potatoes will, if not previouſly gravelled.

“ Fifthly, In arable or ſtubble land (vulgarly called ſticking or thruſting of potatoes, becauſe they are ſown with a ſtick, pointed at the end, about an inch diameter and two feet long, with the loy (otherwiſe the Iriſh ſpade.) In this method dung is alſo uſed, which ſhall be noticed in loco.

“ Theſe are the moſt general methods that now occur to me, or I believe that are in uſe. There are, however, ſome others ariſing from the quality of the ſeed, practiſed only by the curious, in which the plants are put down at nine or twelve inches aſunder every way, in little hillocks, (like the hop plant) as practiſed in ſeveral counties in England; and, if you land them at certain proper ſtated times while vegetation continues, you will have a handſome neſt of large oblong potatoes at every landing.

“ I made the experiment of one ſort in my garden; and out of half a dozen potatoes cut into ſeveral pieces, each having an eye, I had, to the beſt of my remembrance, without exaggeration, a quantity nearly equal to twelve Wincheſter buſhels.

“ This kind of potato is introduced into Ireland but of late years: it is however well known there.

“ A potato entirely black is alſo in uſe in Fingal, near Dublin, fructifies abundantly, and eats exceeding dry, which principally marks the goodneſs of this root in almoſt every inſtance.

“ There are ſeveral kinds of potatoes. Mr. Maxwell, of Arkland in Scotland, a very judicious gentleman, has particularly noticed ſix ſorts, viz. The long red, the round red ; the long white, the round white, or Spaniſh potato ; the blue, the leather-coat, and an early kind that comes in a month ſooner than the common ſort, though planted at the ſame time.

“ This root being greatly manufactured in Ireland, they mix moſt of the better ſorts promiſcuouſly, both for uſe and ſeed.

“ I remember, about twenty-five years ago, the large red potato, then called the Caſtonian, (perhaps from Caſtile) as alſo the oblong Spaniſh white potato, to be chiefly in uſe ; but now a leſſer ſort, ſuch as the Munſter or kidney potato, of a whitiſh or lightiſh yellow colour, the leather-coat, or round red Cronian potato, with a rough thick ſkin, and particularly that ſtiled the Spaniſh white potato, are moſtly in uſe.

“ All theſe ſorts are cut for ſeed, according to the number of eyes on them, and thrive generally well with very little care ; ſo that all ſorts being now ſo plenty, and anſwering ſo well, there are (as we may eaſily judge) no over nice diſtinction made about them there. The poorer Iriſh, who affect not to plant this root in bottom lands, or wet ſwampy grounds, unleſs hard preſſed for ſoil, are even in this caſe ſeldom attentive about the kind of potato they put down, the return being commonly wet, unfit for eating, and only proper for ſeed, which (from my little experience) I think makes but indifferent, though ſown in the beſt prepared upland ; for too much moiſture, as well as too much dung, makes a potato wet : and plant it when you will, I am apprehenſive it never loſes this quality, which is the worſt it can have, except being rotten, or froſt-bit : nor will any eat ſo well, raiſed from dung, as without.

“ As the potato thrives in different ſoils, ſo there are different methods of cultivating it : I will therefore now proceed to that moſt generally in uſe in my neighbourhood, (and indeed all over the kingdom) called graſs potatoes or ſpuddane, and by ſome (improperly) conacres, which ſeems to be the natural culture, but doubtleſs not ſo good to make the land ſtand long proof, (notwithſtanding the graveling) as if artificial manures were added, ſuch as dung, compoſt, lime, &c. for marle, lime-ſtone, gravel, ſea-ſand, ſhells, &c. I conſider in the claſs of natural manures and the beſt ; and providence hath kindly given them in every ſpot, (even in the unpromiſing deſerts of Zara, &c.) had we known how to come at them.

“ Land in the ley, (as I ſaid before) and that which requires no manure, the Iriſh ſeek moſt greedily after ; ſome of which has not been ploughed perhaps within this century : ſo that you can only juſt diſtinguiſh that it has been tilled, and the tilth generally curved, the old people inclining the plough with the caſual ſhape of the field, ſo as to let the water in the furrow have a drip or fall.

“ When a peaſant has the good luck to get a bit of ſuch choice ground, (for two or three of them will be concerned in an acre, and few take more than one) he follows the old ridge with his *loy*, or Iriſh ſpade, unleſs compelled by the poſſeſſor of the land to make his ridges ſtraight, which he moſt unwillingly does, and at beſt but aukwardly, with a rope made of hay or ſtraw, or ſome of his wife's worſt tow ; neither of which ſtretching right, and often breaking, ſeldom admit well-looking ridges : theſe he makes from one end of his ground to the other, the beds being about three, or at moſt four feet wide, and the furrows, or trenches, about two. When he depoſits the ſeed on his bed, at about four or ſix inches at moſt aſunder, he divides the turf of his furrow in two equal parts, which he turns alternately in ſods on the edge or verge of each bed, the green ſide on the potatoes, cutting the ſods on three ſides or angles, leaving that next the bed uncut. This laborious work the poor fellow does ſurprizingly quick : two more men follow him, one digging the under ſtratum, and throwing up on the middle of the bed as much of the earth as he conveniently can with his *loy :* the remainder the third man caſts on with his ſhovel, ſettling the bed in the form, or manner, in which it is to remain.

“ Some cover their potatoes at firſt (through want of time) with only the ſod, and about four or five inches of earth, and finiſh them perhaps, that is, caſt the laſt covering on them, not for a month, or ſix weeks after ; which poſſibly may greatly check their growth. Many account this the beſt way, and it is become common ; but I attribute the neglect of not finiſhing their potatoes, (as the term is) in due time, to no want of proper knowledge in the common Iriſh, but their inability to give the proper attention to their own little affairs, occaſioned by the greedy ſeverity of their maſters, as before obſerved.

“ Others there are (and many) who, making the furrows unproportionably narrow to the beds, throw up a third ſpit or ſtratum, and perhaps not until two months after the firſt ſetting.

“ This pernicious method may poſſibly deſtroy, or check the weeds ; but certain I am, it will not contribute to the increaſe or largeneſs of the root, in the unphyſical or over heavy manner in which I have ſeen it done ; becauſe this lower ſtratum, which is moſtly ſand, remains on the top of the richeſt part of the ſoil, and being thus unmixed with it, prevents it from receiving the proper benefits of the air, &c. beſides, too great a covering on the potato is highly prejudicial to it.

“ In other caſes, theſe ſtratums thrown up, and mixed into a good tilth, would anſwer wonderfully, mixing well, being the life of good tillage. I would therefore in this place recommend to our farmers (who are too penurious of their land) to make their potato trenches ſo wide, as not to require throwing up much of the third or ſandy ſtratum on the laſt covering, or landing, of their potatoes : and they will find a much greater return, and one half (or more) leſs of *poreens*, or ſmall potatoes : which is an object highly worthy of their notice. The experiments I have made, I purpoſe repeating on my return to Ireland, and hope to prove this ſimple method to exceed that in the hillock, or in the drill way.

“ In this manner all ley land is ſown with potatoes by the common people, and moſt others, whether manured or not. If dunged, the dung is laid out as the ridges are to be, but the ſand is ſpread all over the ſurface. Commonly little boys and girls precede the ſetters on the ridges, laying down the ſeedlings or potato eyes, which they do very quick, and tolerably well, at the appointed diſtance. This ſeems a giddy part of the buſineſs, and well ſuited to their years ; but cuſtom makes them perfect in it.

“ The next general method is planting potatoes in ſtubble ground, which is, in the common way above-mentioned, by dunging it well, and ſometimes by ploughing it in, and then ſhovelling up the ridges, a man going before, lightly digging them, that there may be a ſufficient quantity of mould to cover them ; but this the poorer ſort cannot well compaſs to do, and always avoid it when they can get a freſh or ley ſurface.

“ Nor do they ſow them to chuſe, the ſecond year, in the ſame ground, without dung or ſome other artificial manure, (for the natural, ſuch as ſand, marle, &c. would not do) unleſs it be exceeding good.

“ Lime, indeed, in this caſe would very probably anſwer, but it is rarely tried.

“ There is alſo a cuſtom a good deal in uſe, which is by ſticking or thruſting potatoes in ſtubble land freſh ploughed, which is done in this manner : a man (but ſeldom two) goes on the crown of a narrow ploughed ſet, and ſticks his *loy*, or *Iriſh ſpade*, in it, every here and there, with his right foot, holding it in his left hand, and with it puſhing the ſpade once, and ſometimes twice from him, to make an opening, (which I have ſeen done with a good deal of dexterity) and with the right hand, that contains the ſeed, (a convenient quantity of which he carries in an apron, or cloth, tied round his middle, ſo as to let the contents be eaſily come at) he throws one, and ſometimes two ſets, or eyes, into the opening which the *loy* makes behind ; and on his drawing it away, the looſened earth falls in and covers them. Soon after he dungs the ridges, and covers them up, as in the preceding method, with mould out of the furrows.

“ Sometimes alſo they do this work with a ſtick about eighteen inches long, and an inch or ſo diameter, pointed at one end, and ſomewhat curved at the other. By this eaſy means huſband, wife, children, and ſervants, (if they have any) and a friendly neighbour or two, (who may be helped in return) aſſiſt at it for greater expedition, eſpecially when the ſeaſon happens to be advanced.

"In Scotland they do this work ſomewhat differently.

"In Ireland alſo there are many, who ſow potatoes after the plough, the ploughman letting the ſets drop in as he goes along; and a harrow matched to the ſame plough, following him cloſe behind, covers them in. There is no great difficulty in this, the land being in tilth. Over all they put dung; but they ſhould mind to give it a light covering, that the ſubſtance of it might impregnate with the adjacent earth, which it would not do, but evaporate by being left expoſed to the air, &c. yet this precaution many are very negligent in.

"The other methods, as in the drill, or hillock, or horſe-hoeing way, &c. are little uſed there, except among the more curious; but they being well known in England, it is needleſs to mention them in this place.

"The next thing requiſite is the fencing, which ſhould be done, at fartheſt, before the ſtalk begins to appear; for, if the cattle, that are in that ſeaſon greedy for freſh vegetables, get at them, the roots of ſuch as they nip will never come to the ſize they otherwiſe would.

"This is well known in Ireland; and yet the poor, chiefly I believe from inability, and partly from a ſort of careleſſneſs, or rather lazineſs, they ſtill inherit (notwithſtanding the mixture of Engliſh and Norman blood, &c.) from their Spaniſh anceſtors, are very remiſs in this reſpect; eſpecially in the chiltern, or more fertile parts of the country; where, in moſt matters of huſbandry, they leave too much to chance, relying on the bounty of the ſoil.

"About me, and in many other parts, they very commonly do not put on the firſt covering till about the middle of May; and the ſecond, perhaps, not for a month after; ſo that it is often July before they fence them properly: and where many of them are concerned in a plantation (as is uſually the way) it is moſt troubleſome and difficult to get each man to do his part of the ditching, which commonly is but a ſorry mound of ſods, with ſome buſhes ſodded down on top, to keep out ſheep, that ſmell this plant when it riſes (as cattle do corn) and are very dexterous in getting at it.

"Some of theſe poor people are ſo heedleſs, they never can be brought to make their fences; and then the owner of the ground, in his own defence, is obliged to get it done at an advanced price, and they to pay for it, or their potatoes to remain.

"Many of them, eſpecially in cheap years, leave them on the landlord's hands; and, unleſs a farmer collects himſelf, or has a good ſervant to do it, the rent is not had without immenſe trouble, and ſome of it never. Notwithſtanding theſe difficulties, many farmers have made eaſy fortunes in this way.

"Thus it happens, at the time they are often finiſhing the fencing, they ought to be weeding their potatoes. The weed that moſtly annoys them is the Scotch thiſtle: this ſhould be cut away in June, and if the ſoil ſhould be ſo rich as to require a ſecond weeding (which is very often the caſe) it ſhould be done in Auguſt. There will be no other trouble with them till digging time.

"The beſt time for this work is in the latter end of October, or beginning of November, to avoid the early froſts, which are mortal to them: but if, by bad huſbandry, they have been planted late, they ſhould be left longer in the ground, and covered with litter, or haulm, to prevent being loſt in this way.

"About Michaelmas the cattle are let through them, the roots not being then affected by the nipping, or beating down, of the ſtalk: this the peaſants know by the colour of it, which becomes a dark brown, loſing its verdure; as alſo by the apple and root.

"The more needy begin to dig them for uſe in Auguſt, though they are not then near ſo long in ground as they are in England; which demonſtrates the excellence and ſtrength of the Iriſh ſoil.

"When gentlemen farmers dig their potatoes, they ſet on a great number of hands at once, two to a ridge: boys and girls gather them promiſcuouſly, big and little, into bags containing about two Wincheſter buſhels; and thus they are carried to the farm-houſe, and thrown into a room, in one heap, part of which is deſtroyed by the froſt, a great part by the kitchen, alſo by the hogs, who deſtroy them much while in ground, there being hardly any fencing againſt them; a great part are alſo ſtole by the followers, or hangers-on; and the remainder rarely ſuffices for ſeed, of ſo little value is this eſtimable root conſidered in thoſe parts: and yet I have often known them at a very high price, from ten to twenty ſhillings, and upwards, the big barrel, which is the uſual meaſure in the weſtern parts of Ireland; that is, above two barrels, or eight buſhels, Wincheſter meaſure.

"Had they ſuch places as Covent-Garden near them, the caſe would be far different: but where there are no convenient and briſk markets, the waſte in farms is always great.

"Though, as I remarked before, low or ſwampy grounds do not anſwer well for potatoes, yet they ſometimes thrive, and are large, the meat being generally ſcabby, cloſe, wet, and heavy, from the too great impregnation of the water, which renders them unpalatable, and not the beſt for ſeed; however, ſuch are chiefly uſed in this way: yet I have ſeen them planted in red bogs, which are the wetteſt and worſt; and the bog being previouſly ſanded and dunged, the ſtalk looked green and healthy, and ſome of the roots might perchance have eat dry; but thoſe planted in black, or drier bogs, have been found to ſucceed well.

"There is no culture perhaps, yet known, will better reclaim waſte and unprofitable lands, than that of the potato. Ireland can well prove the truth of this aſſertion in a numberleſs variety of inſtances.

"I have ſeen ſeveral tracts of woodland ſtubbed up, and brought into fine tilth, by means of the potato huſbandry. America, I believe, can ſay the ſame.

"Of late years the hard-hearted ſky-farmers, that is, the inferior ſort, and even ſome of our gentlemen-farmers, drive the poor into the mountains, moory grounds, wooded and ſtony lands, and even into the bogs; and when, by the culture of the potato principally, they have reclaimed them, ſo as to be fit to admit cattle, they are turned out without ceremony. I have in ſuch places ſeen as fine crops of potatoes, and afterwards flax, and different kinds of corn, as ever I met with any where.

"The mountain and other ſurfaces, except bog, ſeldom fail being bleſſed by nature with lime-ſtone, gravel, (which is the commoneſt) or ſome other manure, adapted to them; ſo that it is nothing but hands, money, and a proper limitation of the grazing-farming, that are wanting to make almoſt the whole kingdom look like a garden, or like England; I need go no higher with the compariſon.

"It is true, in ſome few counties of Ireland, in particular diſtricts, nature either has not been ſo bountiful, or the farmers have not found out the internal manures; being obliged to carry ſea-ſand, and other ſorts, many miles; in which however they find their account, notwithſtanding the impolitically too much limited trade of the kingdom.

"Before I diſmiſs this ſubject, it may be proper to obſerve, that a ſecond crop of potatoes is ſometimes taken out of the ſame land ſucceſſively; but this is not common, at leaſt about me, though I believe the land is as good as any in the province. On the contrary, the uſual way is, after the firſt crop of potatoes is taken off, if the ſoil is ſtrong, they immediately ſow bere in it, or keep it till the following ſpring for flax, which requires an equally ſtrong ſoil: or if the ground be but of a middling good ſort, they ſow it, juſt after the potatoes are taken out, with wheat; or keep it till the April following for barley.

"The ſky-farmer generally takes the land into his own hands after the firſt crop of potatoes, and ſows it with bere, wheat, or barley, for two or three ſeaſons; after which, if he refreſhes it with a ſummer, or a winter fallow, he ſows the ſaid kinds of grain in it for two or three ſeaſons more; then he takes two or three crops of oats; and when it is well impoveriſhed, or drawn (as they call it there) he lets it for ſeveral years together, in con-acres, to the poor people, for at leaſt one third more than the real value.

"From hence we may judge how much an alteration of method in huſbandry is wanting in thoſe parts."

Mr. Irwin is certainly right in ſaying, that lime would very probably anſwer; for in the Iſle of Man, though they are no farmers, yet they cultivate exceeding fine potatoes, as they are their principal food.

Some bring in different ſorts of land by the means of them: in moory ground, after the heath is burnt off it, they mark out the beds, upon which they ſpread out the lime in near about the ſame quantity that is required in liming ground, or rather more; upon which they lay the ſeed in the uſual manner, and, after cutting the turf in the furrow, lay it on the verge of the bed with the heathy ſide undermoſt, and cover them over with the mould out of the furrow in the common method.

After coming up, they weed, or give them a ſlight covering, to keep down the weeds.

When they raiſe them, it takes a little more labour; yet while they are digging a crop of very fine dry potatoes, they are gaining a piece of ground, which was before uſeleſs, and making it fit for ploughing and bearing corn the year following.

Lime is found alſo to be of excellent ſervice to potatoes in cold ſour land, which they manage after the ſame manner, and reap potatoes greatly excelling thoſe without lime, on the ſame ground.

Lime is certainly a very fine manure for potatoes: they uſe it in the iſle above-mentioned, without any other thing, on all ſorts of land, even upon a light, rich, limeſtone ſoil; and it betters the quality of the potatoe ſurpriſingly: beſides fermenting and meliorating the ſoil, it has the property of attracting and abſorbing any cold ſour matter which may be prejudicial to vegetation.

About Caſtletown, in the ſame iſle, they take a great deal of care in their culture of potatoes, and their product pays them very well for their trouble.

After marking out the bed with their ſpade, and ſpreading on the dung, or lime, they begin at one end, and dig acroſs the bed, making it a ſpadeful, all along, higher than the neighbouring ground.

Then they dig and caſt the mould out of the furrows upon the bed, in the common method; and after finiſhing it, they, with a kind of dibble, or ſhaft of a ſpade ſhod with iron, ſome round and ſharp, others ſquare, about three or four inches broad, plant in the ſeed, about ſix or more inches diſtance one from another; and when they come up above ground, they weed them as clean as a garden, and after they are ſtronger and higher, with a hoe earth up the mould about the ſtalks; by which they kill the weeds, and have exceeding fine potatoes.

PREGNANT, teeming, breeding, fruitful.

PRICKING, a term uſed by farriers, &c. to ſignify the driving a nail into the ſoft part of a horſe's foot.

If a lameneſs proceeds from pricking in ſhoeing, the foot ſhould be pared thin on the wound ſide; and after dreſſing with tar and turpentine, let it be ſtopped with two ounces of common turpentine, melted down with four of lard.

If the nail penetrates to the joint of the foot, where matter may be formed, and by its long continuance putrify, ſo as to erode the cartilages of the joint, the caſe is incurable.

If the nail has paſſed up to the nut-bone, it is incurable, becauſe this little bone cannot exfoliate; and becauſe the cartilaginous part of it is deſtroyed, as ſoon as injured.

If the nail has not paſſed to the tendon, the horſe will do well, without a neceſſity for drawing the ſole; but if the tendon is wounded, the ſole muſt be carefully drawn, becauſe a ſinovia and gleet is diſcharged.

When gravel is the cauſe, it for the moſt part follows the nail-holes, and if it gets to the quick, cannot return, unleſs it is ſcraped out; for the make of the hoof, which is ſpiral like an ear of corn, favours its aſcent, ſo that the gravel continues working upwards towards the coronet, and forms, what the farriers call a quittor-bone.

The nature of this diſorder points out the method of cure, which is to be as expeditious and careful as poſſible, in getting out the gravel: if it is found difficult to effect this let the ſole or hoof be pared thin, and if neceſſary, the wound inlarged to the bottom, and then dreſſed up as uſual. Should the coffin-bone be affected, remember always to bathe the hoof with vinegar, or repellers, in order to allay the heat and inflammation, which often happen on ſuch occaſions; and ſhould the pain and anguiſh affect the legs, treat them in the ſame manner, or charge the leg and paſtern with a mixture of wine lees and vinegar.

PRONG, an implement much uſed in huſbandry, conſiſting of two or three pieces of iron, inſerted into a handle, for taking up corn, ſtraw, dung, &c.

PRONG-*hoe*, a term uſed to expreſs an inſtrument uſed to hoe or break the ground near, and among the roots of plants.

The ordinary contrivance of the hoe in England is very bad, it being only made for ſcraping on the ſurface; but the great uſe of hoeing being to break and open the ground, beſides the killing the weeds, which the ancients, and many among us, have thought the only uſe of the hoe, this dull and blunt inſtrument is by no means calculated for the purpoſes it is to ſerve.

The prong-hoe conſiſts of two hooked points of ſix or ſeven inches long, and, when ſtruck into the ground, will ſtir and remove it the ſame depth as the plough does, and thus anſwer both the ends of cutting up the weeds and opening the land. The ancient Romans had an inſtrument of this kind, which they called the bidens; but they were afraid of its uſe in their fields and gardens, and only uſed it in their vineyards. The prong-hoe comes into excellent uſe, even in the horſe-hoeing huſbandry; in this the hoe-plough can only come within three or four inches of the rows of the corn, turneps, and the like; but this inſtrument may be uſed afterwards, and with it the land may be raiſed and ſtirred, even to the very ſtalk of the plant. *Tull's Huſbandry*

PROPAGATION, the continuance or diffuſion of ſucceſſive production.

The ingenious Mr. Barnes has given us the following method of propagating trees by the bud and branch.

" Every leaf, ſays he, upon the branch of a tree, or ſhrub, has uſually a young bud in its boſom; and it is certain each of theſe buds has in it the rudiment of a tree of the ſame kind: therefore it appeared reaſonable to think that every branch might afford as many new plants as there were leaves upon it; provided it were cut into ſo many pieces, and a proper dreſſing was found to prevent the raw ends of each piece from decay. The beſt mixture for this purpoſe, upon careful and repeated experience, I have found to be this.

" Melt together, in a large earthen veſſel, two pounds and a half of common pitch, and half a pound of turpentine. When they are melted, put in three quarters of an ounce of powder of aloes; ſtir them all together; and then ſet them on fire: when it has flamed a moment, cover it up cloſe, and it will go out: then melt it well, and fire it again in the ſame manner: this muſt be done three times. It muſt be in the open air, for it would fire a houſe; and there muſt be a cover for the veſſel ready. After it has burnt the laſt time, melt it again, and put in three ounces of yellow wax ſhred very thin, and ſix drachms of maſtich in powder. Let it all melt together till it is perfectly well mixed; then ſtrain it through a coarſe cloth in a pan, and ſet it by to cool.

" When this is to be uſed, a piece of it muſt be broke off, and ſet over a very gentle fire; it muſt ſtand till it is juſt ſoft enough to ſpread upon the part of the cutting where it is wanted; but it muſt not be very hot. It is the quality of this dreſſing, to keep out wet intirely: the part which is covered with it will never decay while there is any principle of life in the reſt; and, this being ſecured, nature will do the buſineſs of the growing.

" This I have found true in practice; and by repeated trials, in more kinds than one, I have found that I could raiſe from any piece of a branch as many good plants as there were leaves upon it."

PRUNIFEROUS *trees*, thoſe which bear a pretty large and fleſhy fruit, with a nucleus in the middle.

PRUNING, the operation of lopping off the ſuperfluous branches of trees, in order to make them bear better fruit, grow higher, or appear more regular.

There is not any part of gardening, which is of more general uſe than that of pruning; and yet it is very rare to ſee fruit-trees ſkilfully managed: and almoſt every gardener will pretend to be a maſter of this buſineſs, though there are but few who rightly underſtand it; nor is it to be learned by rote, but requires a ſtrict obſervation of the different manners of growth of the ſeveral ſorts of fruit-trees; ſome requiring to be managed one way, and others muſt be treated in a quite different method, which is only to be known from carefully obſerving how each kind is naturally diſpoſed to produce its fruit: for ſome ſorts produce their fruit on the ſame year's wood, as vines; others produce their fruits, for the moſt part, upon the former year's wood, as peaches, nectarines, &c. and others upon curſons or ſpurs, which are produced upon wood of three, four, or five, to fifteen or twenty years old, as pears, plums, cherries, &c. therefore, in order to the right management of fruit-trees, there ſhould always be proviſion made to have a ſufficient quantity of bearing wood in every part of the trees, and, at the ſame time, there ſhould not be a ſuperfluity of uſeleſs branches, which would exhauſt the ſtrength of the trees, and cauſe them to decay in a few years.

The reaſons which have been laid down for pruning of fruit-trees, are as follow: firſt, to preſerve trees longer in a vigorous bearing ſtate; the ſecond is, to render the trees more beautiful to the eye; and, thirdly, to cauſe the fruit to be larger, and better taſted.

1. It preſerves a tree longer in an healthy bearing ſtate; for by pruning off all ſuperfluous branches, ſo that there are no more left upon the tree than are neceſſary, or than the roots can nouriſh properly, the root is not exhauſted in ſupplying uſeleſs branches, which muſt afterwards be cut out; whereby much of the ſap will be uſeleſsly expended.

2. By ſkilful pruning of a tree, it is rendered much more pleaſing to the eye: but here I would not be underſtood to be an advocate for a ſort of pruning which I have ſeen too much practiſed of late; viz. the drawing a regular line againſt the wall, according to the ſhape or figure they would reduce the tree to, and cutting all the branches, ſtrong or weak, exactly to the chalked line; the abſurdity of which practice will ſoon appear to every one who will be at the pains of obſerving the difference of thoſe branches ſhooting the ſucceeding ſpring. All therefore that I mean by rendering a tree beautiful, is, that the branches are all pruned according to their ſeveral ſtrengths, and are nailed at equal diſtances in proportion to the different ſizes of their leaves and fruit; and that no part of the wall, ſo far as the trees are advanced, be left unfurniſhed with bearing wood. A tree well managed, though it does not repreſent any regular figure, yet will appear very beautiful to the ſight, when it is thus dreſſed, and nailed to the wall.

3. It is of great advantage to the fruit; for the cutting away all uſeleſs branches, and ſhortening all the bearing ſhoots, according to the ſtrength of the tree, will render the tree more capable to nouriſh thoſe which are left remaining, ſo that the fruit will be much larger, and better taſted. And this is the advantage which thoſe trees againſt walls or eſpaliers have to ſuch as are ſtandards, and are permitted to grow as they are naturally inclined; for it is not their being trained either to a wall or eſpalier which renders their fruit ſo much better than ſtandards, but becauſe they have a leſs quantity of branches and fruit for their roots to nouriſh; and, conſequently, their fruit will be larger, and better taſted.

There are many perſons who ſuppoſe, that if their fruit-trees are but kept up to the wall or eſpalier, during the ſummer-ſeaſon, ſo as not to hang in very great diſorder, and, in winter, to get a gardener to prune them, it is ſufficient: but this is a very great miſtake; for the greateſt care ought to be employed about them in the ſpring, when the trees are in vigorous growth; which is the only proper ſeaſon to procure a quantity of good wood in the different parts of the tree, and to diſplace all uſeleſs branches, as ſoon as they are produced, whereby the vigour of the tree will be intirely diſtributed to ſuch branches only, as are deſigned to remain; which will render them ſtrong, and more capable to produce good fruit; whereas, if all the branches are permitted to remain, which are produced, ſome of the more vigorous will attract the greateſt ſhare of the ſap from the tree, whereby they will be too luxuriant for producing fruit, and the greateſt part of the other ſhoots will be ſtarved, and rendered ſo weak, as not to be able to produce any thing elſe but bloſſoms and leaves, as hath been before mentioned; ſo that it is impoſſible for a perſon, let him be ever ſo well ſkilled in fruit-trees, to reduce them into any tolerable order by winter pruning only, if they are wholly neglected in the ſpring.

There are others, who do not intirely neglect their trees during the ſummer ſeaſon, as thoſe before mentioned; but yet do little more good to them by what they call ſummer pruning; for theſe perſons neglect their trees at the proper ſeaſon, which is in April and May, when their ſhoots are produced, and only about Midſummer go over them, nailing in all their branches, except ſuch as are produced fore-right from the wall, which they cut out; and at the ſame time often ſhorten moſt of the other branches; all which is intirely wrong practice; for thoſe branches which are intended for bearing the ſucceeding year, ſhould not be ſhortened during the time of their growth, which will cauſe them to produce two lateral ſhoots from the eyes, below the place where they were ſtopped, which ſhoots will draw much of the ſtrength from the buds of the firſt ſhoot, whereby they are often flat, and do not produce their bloſſoms; and if thoſe two lateral ſhoots are not intirely cut away at the winter pruning, they will prove injurious to the tree, as the ſhoots which theſe produce will be what the French call water-ſhoots: and in ſuffering thoſe luxuriant ſhoots to remain upon the tree until Midſummer, before they are diſplaced, they will exhauſt a great ſhare of the nouriſhment from the other branches, as was before obſerved; and by ſhading the fruit all the ſpring-ſeaſon, when they are cut away, and the other branches faſtened to the wall, the fruit, by being ſo ſuddenly expoſed, will receive a very great check, which will cauſe their ſkins to grow tough, and thereby render them leſs delicate. This is to be chiefly underſtood of ſtone-fruit and grapes; but pears and apples, being much harder, ſuffer not ſo much, though it is a great diſadvantage to thoſe alſo, to be thus managed.

It muſt alſo be remarked, that peaches, nectarines, apricots, cherries, and plums, are always in the greateſt vigour, when they are the leaſt maimed by the knife; for, where theſe trees have large amputations, they are very ſubject to gum and decay; ſo that it is certainly the moſt prudent method carefully to rub off all uſeleſs buds when they are firſt produced, and pinch others, where new ſhoots are wanted to ſupply the vacancies of the wall; by which management trees may be ſo ordered, as to want but little of the knife in winter pruning, which is the ſureſt way to preſerve theſe trees healthful, and is performed with leſs trouble than the common method.

The management of pears and apples is much the ſame with theſe trees in ſummer; but in winter they muſt be very differently pruned: for, as peaches and nectarines do, for the moſt part, produce their fruit upon the former year's wood, and therefore muſt have their branches ſhortened according to their ſtrength, in order to produce new ſhoots for the ſucceeding year; ſo pears, apples, plums, and cherries, on the contrary, producing their fruit upon curſons or ſpurs, which come out of the wood of five, ſix, or ſeven years old, ſhould not be ſhortened, becauſe thereby thoſe buds which were naturally diſpoſed to form theſe curſons or ſpurs, would produce wood-branches, whereby the trees would be filled with wood, but never produce much fruit; and as it often happens, that the bloſſom-buds are firſt produced at the extremity of the laſt year's ſhoot, ſo, by ſhortening the branches, the bloſſoms are cut away, which ſhould always be carefully avoided.

There are ſeveral authors who have written on the ſubject of pruning in ſuch a prolix manner, that it is impoſſible for a learner to underſtand their meaning: theſe have deſcribed the ſeveral ſorts of branches, which are produced on fruit-trees; as wood-branches, fruit-branches, irregular branches, falſe branches, and luxuriant branches; all which they aſſert, every perſon who pretends to pruning, ſhould diſtinguiſh well: whereas there is nothing more in all this but a parcel of words to amuſe the reader, without any real meaning; for all theſe are comprehended under the deſcription already given of luxuriant or uſeleſs branches, and ſuch as are termed uſeful for fruit-bearing branches: and, where due care is taken in the ſpring of the year, to diſplace theſe uſeleſs branches, as was before directed, there will be no ſuch thing as irregular, falſe, or luxuriant branches, at the winter pruning; therefore it is to no purpoſe to amuſe people with a cant of words, which, when fully underſtood, ſignify juſt nothing at all.

The following hints will be of great uſe in pruning ſtandard trees.

Firſt, you ſhould never ſhorten the branches of theſe trees, unleſs it be where they are very luxuriant, and grow irregular on one ſide of the tree, attracting a great part of the ſap of the tree, whereby the other parts are unfurniſhed with branches, or are rendered very weak; in which caſe the branch ſhould be ſhortened down as low as is neceſſary, in order to obtain more branches, to fill up the hollow of the tree: but this is only to be underſtood of pears and apples, which will produce ſhoots from wood of three, four, or more years old; whereas moſt ſorts of ſtone fruit will gum and decay, after ſuch amputations.

But from hence I would not have it underſtood, that I would direct the reducing of theſe trees into an exact ſpherical figure, ſince there is nothing more deteſtable than to ſee a tree, which ſhould be permitted to grow as it is naturally diſpoſed, with its branches produced at proportionable diſtances, according to the ſize of the fruit, by endeavouring to make it exactly regular at its head, ſo crouded with ſmall weak branches as to prevent the air from paſſing between them, which will render it incapable to produce fruit. All that I intend by this ſtopping of luxuriant branches, is only when one or two ſuch happen on a young tree, where they intirely draw all the ſap from their weaker branches, and ſtarve them: and then it is proper to uſe this method, which ſhould be done in time, before they have exhauſted the roots too much.

Whenever this happens to ſtone fruit, which ſuffer much more by cutting than the former ſorts, it ſhould be remedied by ſtopping or pinching thoſe fruits in the ſpring, before they have obtained too much vigour; which will cauſe them to puſh out ſide branches, whereby the ſap will be diverted from aſcending too faſt to the leading branch, as hath been directed for wall-trees; but this muſt be done with caution, as before.

You muſt alſo cut out all dead or decaying branches, which cauſe their head to look very ragged; eſpecially at a time when the leaves are upon the tree, theſe being deſtitute of them, have but a deſpicable appearance; beſides, theſe will attract noxious particles from the air, which are injurious to the trees; therefore the ſooner they are cut out the better: in doing of this you ſhould obſerve to cut them cloſe down to the place where they were produced, otherwiſe that part of the branch left will decay, and prove equally hurtful to the tree; for it ſeldom happens, when a branch begins to decay, that it does not die quite down to the place where it was produced, and, if permitted to remain long uncut, does often infect ſome of the other parts of the tree. If the branches are large which you cut off, it will be very proper, after having ſmoothed the cut part exactly even with a knife, chiſſel, or hatchet, to put on a plaſter of grafting clay, which will prevent the wet from ſoaking into the tree at the wounded part.

All ſuch branches as run acroſs each other, ſhould alſo be cut out; for theſe not only occaſion a confuſion in the head of the tree, but by lying over each other, rub off their bark by their motion, and very often occaſion them to canker, to the great injury of the tree; and on old trees, eſpecially apples, there are often young vigorous ſhoots from the old branches near the trunk, which grow upright into the head of the trees: theſe therefore ſhould carefully be cut out every year, leſt, by being permitted to grow, they fill the tree too full of wood; which ſhould always be guarded againſt, ſince it is impoſſible for ſuch trees to produce ſo much, or ſo good fruit, as thoſe trees whoſe branches grow at a farther diſtance; whereby the ſun and air freely paſs between them, in every part of the tree. *Miller's Gard. Dict.*

PUCKBALL, a ſpecies of muſhroom, full of duſt.

PUDDOCK, or PURROCK, a ſmall incloſure.

PULSE, a term applied to all leguminous plants, as tares, peaſe, &c.

All the ſpecies of pulſe afford great abundance of excellent manure, in the ſtate in which nature preſents them. The cuſtom of ploughing in green ſucculent plants, is very ancient. All the Roman writers commend it highly, and with much reaſon. Columella recommends particularly lupins, as a manure, which, if cut down and turned in while green, will have as good effect as the beſt and ſtrongeſt dunging whatever. They may be ſown upon poor land about the middle of September, and will enrich it greatly if ploughed in before they attain their full growth. In gravelly ſoils, they ſhould be cut down after they have put forth their ſecond flower; and in ſtrong lands, after the third. In the former of theſe grounds they are turned in while young and tender, that they may quickly rot; and in the latter, they are let ſtand till they grow ſtronger, that they may bare up the more ſolid and ſtiff clods of earth, and keep them the longer ſuſpended; by which means the air has freer acceſs to the ſoil, and theſe clods, being heated and dried with the ſummer ſuns, are the more eaſily opened, and reſolved into duſt. Thus ſays this judicious author, juſtly remarkable for his ſuperior ſkill in huſbandry. But Mr. Miller is of a contrary opinion.

The *Maiſon Ruſtique*, a work of very high repute, as is evident from the great number of editions it has gone through, ſtrongly and rightly recommends peaſe, beans, lupins, vetches, and other ſucculent plants, as excellent manures, eſpecially for ſandy ground. Theſe plants enrich the earth greatly if ploughed in, either green, or when in bloom. In ſtrong land, they ſhould not be turned down till the pods begin to harden.

In Piedmont and other places where they fatten their land with this manure, lupins are ſown upon the fallow ground towards the end of June, immediately after the ſecond ploughing, ſo that they are ſtill green when the third ploughing is given, and the corn is ſown. Experience ſhews the huſbandmen in thoſe countries, that this method of uſing theſe plants for manure makes them ample amends for the loſs of the pulſe or fodder they might otherwiſe reap from them: but thoſe who do not like to loſe any thing, plough in the huſks after they have taken out the grain.

Dr. Liſter likewiſe recommends for the improvement of ſandy, light ground, or any clay well ſanded, all plants of the pulſe or pea kind, and particularly, "upon experience, the wood vetch, which, beſides its being perennial (at leaſt with reſpect to its roots) and its thriving even in woods and among buſhes in almoſt every country, has theſe farther qualifications, that it ſhoots out a thouſand roots far and wide, and ſpreads itſelf under ground like quick-graſs; whilſt it is ſo rampant above ground, that it will climb a fathom and a half upon meaſure, and preſerve itſelf in ſpite of weeds or drought. It may be ſet, as well as ſown, in furrows. For the former of theſe purpoſes the roots may be dug up in September, which is alſo the time for gathering the ripe ſeed. The growth of the plants will be greatly advanced by ſetting their roots; for the older they are, the ſtronger, more numerous, and fuller of buds their ſhoots will be. I ſowed in the latter end of March the ſeeds which I had gathered in September, and had that year a very great increaſe, the bed being thick covered over with graſs above two feet high: but it did not flower that year. I reckoned that one pea had put forth above thirty ſhoots in Auguſt of the firſt year. In the ſecond year, it flowered by the middle of June, and bore a wonderful crop, the roots being innumerable. I have obſerved this pea very common in all the mountains, as well as plains of England, where buſhes or hedges are. Both the pea and graſs are very ſweet, and very agreeable to cattle, as I have tried."

Buck-wheat and vetches are the two plants moſt commonly ſown in England, for manure. The beſt time for ploughing them in, is when they are in bloom; being then in their moſt ſucculent ſtate. Some farmers turn down their ſecond crop of clover, to enrich the land for wheat in the autumn. This ſhould be done early enough to give the plants ſufficient time to putrefy thoroughly before the grain is ſowed: otherwiſe it might prove prejudicial, by bringing on a heat which would hurt the corn.

The reverend and ingenious Mr. Eliot, of New England, prefers millet to every other plant for green-dreſſing of land, on account of the cheapneſs of the ſeed, and the largeneſs of the ſtalks and leaves, which muſt afford a good coat to turn in when ploughed. An old farmer, who had long been in the practice of green-dreſſing, aſſured this gentleman, that he had increaſed the ſtrength of his land to a great degree, in a few years, by the following method. After his oats were harveſted, he added a little ſeed to the ſcattered grains, and then ploughed them in. Towards the end of September, he ploughed in the green oats, and ſowed rye; and the next ſummer, when the rye was well grown and full of ſap, he ploughed that in at the uſual ſowing ſeaſon, then ſowed wheat, and always had a large crop.

PURGING, the operation of evacuating the impurities of an animal body by ſtool.

Purging is often neceſſary in groſs full horſes, in ſome diſorders of the ſtomach, liver, &c. but ſhould be directed with caution. Before a purge is given to any horſe, it is neceſſary ſome preparation ſhould be made for it, in order to render the operation more ſafe and efficacious: thus a horſe that is full of fleſh ſhould firſt be bled, and at the ſame time have his diet lowered for a week, eſpecially thoſe that have been pampered for ſale; ſeveral maſhes of ſcalded bran ſhould alſo previouſly be given, in order to open the bowels, and unload them of any indurated excrement; which ſometimes proves an obſtacle to the working of the phyſic, by creating great ſickneſs and griping.

Let it be remembered, that a horſe is purged with difficulty; that the phyſic generally lies twenty-four hours in the guts before it works; and, that the tract of bowels it has to paſs through, is above thirty yards; and lying horizontally, conſequently reſinous and other improper drugs may, and often do, by their violent irritations, occaſion exceſſive gripings and cold ſweats, ſhave off the very mucus or lining of the guts, and bring on inflammations, which often terminate in mortifications, and death.

It is remarkable too, that the ſtomach and guts of a horſe are but thin, compared to ſome other animals of the ſame bulk, and therefore muſt be more liable to inflammation and irritation.

Horſes kept much in the ſtable, who have not the proper benefit of air and exerciſe, in proportion to their food, ſhould in ſpring have a mild purge or two, after a previous preparation by bleeding, lowering their diet, and ſcalded maſhes.

Horſes that fall off their ſtomach, whether it proceeds from too full feeding, or ingendering crudities and indigeſted matter, ſhould have a mild purge or two.

Horſes of a hot temperament, will not bear the common aloetic purges; their phyſic therefore ſhould be mild and cooling.

Purging is always found very beneficial in ſtubborn dry coughs; but mild mercurials joined with them, make them yet more efficacious.

Horſes that have thoſe ſorts of lameneſſes, that are ſaid to proceed from humours flying about (which are of the rheumatic kind, and in young horſes proceed from ſizy blood, and occaſion lameneſs in every limb) require frequent purging; and ſhould alſo have between whiles, medicines that attenuate and thin the fluids.

Horſes of a watry conſtitution, who are ſubject to ſwelled legs, that run a ſharp briny ichor, cannot have the cauſes removed any ways ſo effectually as by purging.

The firſt purge you give to a horſe ſhould be mild, in order to know his conſtitution.

It is a miſtaken notion, that if a proper prepared purge does not work to expectation, the horſe will be injured by it; for though it does not paſs by ſtool, its operation may be more efficacious, as an alterative to purify the blood, and it may paſs by urine, or other ſecretions.

Purging medicines are very ſucceſsfully given in ſmall quantities, mixed with others; and act then as alteratives.

If mercurial phyſick is given, care ſhould be taken that it be well prepared; and warmer cloathing, and greater circumſpection is then required.

Purges ſhould be given early in the morning upon an empty ſtomach; about three or four hours after the horſe has taken it, he ſhould have a feed of ſcalded bran; and a lock or two of hay may then be put in his rack. The ſame day give him two more maſhes; but ſhould he refuſe warm meat, he may be allowed raw bran.

All his water ſhould be milk warm, and have a handful of bran ſqueezed in it; but if he refuſes to drink white water, give it him without bran.

Early the next morning, give him another maſh; but if he refuſes to eat it, give him as much warm water as he will drink: let him be properly cloathed, and rode gently about. This ſhould be done two or three times a day, unleſs he purges violently, once or twice will then be ſufficient: at night give him a feed of oats mixed with bran.

During the working, a horſe ſhould drink plentifully; but, if he will not drink warm water, he muſt be indulged with cold, rather than not drink at all.

We ſhall here inſert ſome general forms of purges.

> Take ſuccotrine aloes ten drams, jallap and ſalt of tartar each two drams, grated ginger one dram, oil of cloves thirty drops; make them into a ball with ſyrup of buckthorn.

Or,

> Take aloes and cream of tartar each one ounce, jallap two drams, cloves powdered one dram, ſyrup of buckthorn a ſufficient quantity.

Or,

The following, which has an eſtabliſhed character among ſportſmen.

> Take aloes, from ten drams to an ounce and a half, myrrh and ginger powdered each half an ounce, ſaffron and oil of anniſeed each half a dram.

Mr. Gibſon recommends the following.

> Take ſuccotrine aloes ten drams, myrrh finely powdered half an ounce, ſaffron and freſh jallap in powder, of each a dram, make them into a ſtiff ball with ſyrup of roſes, then add a ſmall ſpoonful of rectified oil of amber.

The ſuccotrine aloes ſhould always be preferred to the Barbadoes, or plantation aloes, though the latter may be given to robuſt ſtrong horſes, but even then ſhould always be prepared with the ſalt, or cream of tartar; which by opening its parts, prevents its adheſion to the coats of the ſtomach, and bowels; from whence horrid gripings, and even death itſelf has often enſued. This caution is well worth remaking, as many a horſe hath fell a ſacrifice to the neglect of it.

Half an ounce of Caſtile ſoap, to a horſe of a groſs conſtitution, may be added to any of the above; and the proportions may be increaſed for ſtrong horſes.

When mercurial phyſick is intended, give two drams of calomel over night, mixed up with half an ounce of diapente and a little honey, and the purging ball the next morning.

The following, when it can be afforded, is a very gentle and effectual purge, particularly for fine delicate horſes; and if prepared with the Indian rhubarb, will not be expenſive.

> Take of the fineſt ſuccotrine aloes one ounce, rhubarb powdered half an ounce or ſix drams, ginger grated one dram; make into a ball, with ſyrup of roſes.

The following purging drink may be given with the utmoſt ſafety; it may be quickened, or made ſtronger, by adding an ounce more ſenna, or two drams of jallap.

> Take ſenna two ounces, infuſe it in a pint of boiling water two hours, with three drams of ſalt of tartar; pour off, and diſſolve in it four ounces of glauber ſalts, and two or three of cream of tartar.

This laſt phyſick is cooling, eaſy, and quick in its operation; and greatly preferable in all inflammatory caſes to any other purge, as it paſſes into the blood, and operates alſo by urine.

When horſes loſe their appetites after purging, it is neceſſary to give them a warm ſtomach drink, made of an infuſion of chamomile flowers, anniſeeds and ſaffron: or the cordial ball may be given for that purpoſe.

Should the purging continue too long, give an ounce of diaſcordium in a pint of Port wine, and repeat it once in twelve hours, if the purging continues. Plenty of gum arabic water ſhould alſo be given, and in caſe of violent gripes, fat broth glyſters, or tripe liquor, ſhould be often thrown up, with an hundred drops of laudanum in each.

The arabic ſolution may be thus prepared.

> Take of gum arabic and tragacanth of each four ounces, juniper berries and carraway ſeeds of each an ounce, cloves bruiſed half an ounce; ſimmer gently in a gallon of water, till the gums are diſſolved: give a quart at a time in half a pail of water; but if he will not take it freely this way, give it often in a horn.

When a purge does not work, but makes the horſe ſwell, and refuſe his food and water, which is ſometimes the effect of bad drugs, or catching cold, warm diureticks are the only remedy; of which the following are recommended

> Take a pint of white wine, nitre one ounce, mix with it a dram of camphor diſſolved in a little rectified ſpirit of wine; then add two drams of oil of juniper, and the ſame quantity of unrectified oil of amber, and four ounces of honey, or ſyrup of marſhmallows.

Or,

> Take Venice turpentine one ounce, incorporate with the yolk of an egg; nitre one ounce, then add juniper berries, and freſh anniſeeds pounded, each half an ounce, unrectified oil of amber two drams; make into a ball with ſyrup of marſhmallows.

PURSLANE, the name of an herb, commonly propagated in the kitchen-garden.

Purſlane is raiſed upon a hot bed by thoſe who would have it among their early ſallets; for it is too tender a plant to be ſown in the open air before the month of April, and even then it muſt be placed in a warm ſituation: but it is of ſo very cold a nature, that it cannot be ſafely eaten in this country, except in the heat of ſummer, during which a ſupply may be eaſily had by ſowing it upon common beds of light rich earth, at three or four different times, about a fortnight or three weeks diſtant from each other; ſay, by ſowing it upon theſe beds, becauſe its ſeeds, which are very ſmall, ſhould be ſprinkled extremely thin over the ground, and then only patted down gently with the back of a ſhovel, ſo as juſt to prevent their being blown away. The plants, which will riſe in a few days, will require no other culture than keeping them free from weeds, and watering them two or three times a week in dry weather; for purſlane delights in ſomewhat more than ordinary moiſture. In about ſix weeks after ſowing, they will be fit for uſe.

The green leaved, and the red or yellow leaved, commonly called golden purſlane, are but varieties of the broad leaved, or garden purſlane, which is the only ſpecies cultivated in our kitchen gardens.

The ſeeds of purſlane are ſaved from ſome of the earlieſt and fineſt plants, which are left for this purpoſe, whilſt all the weak or ſmall leaved ones about them are rooted out. When they are ripe, the ſtalks which bear them ſhould be cut down, ſpread upon cloths, and dried in the ſun during three or four days, houſing them each night. They ſhould then be beaten out, ſifted, cleaned, and laid up in a dry place. Some are of opinion, that the ſeeds of purſlane are beſt when they are about three years old; but that ſeems to be a miſtake.

Q.

QUEEN-BEE, a name given by late writers to what uſed to be called the king-bee, or king of the bees ; a large and long-bodied bee, of which kind there is only one found in every ſwarm, and which is always treated with the greateſt reſpect by the reſt. *See the article* BEE.

This is, indeed, the parent of the ſwarm, and from the fœcundity of this one female, a whole hive is eaſily and ſoon repeopled.

It is to be obſerved, that the autumn and winter ſeaſons deſtroy a great number of the bees ; ſo that a hive, which was full in the ſummer, is often found ſo thinly peopled before the end of winter, that the bees ſeem only a few inhabitants in a very large city : by Midſummer again this ſame hive ſhall, however, be found ſo well filled with inhabitants, that there ſhall be a neceſſity of ſending out a colony in the name of a new ſwarm, and yet the hive will remain as full as it can well hold. This increaſe might well appear very amazing, if all the remaining bees of the hive were ſuppoſed to be females, and to join in it ; but how much more ſo when it muſt be acknowledged, that it is all owing to one female, and that this queen-bee, or bee-mother, alone, has given origin to ſuch an immenſe progeny ?

The form of this bee, and there being only one ſuch in a hive, naturally led all who ſaw it into an opinion of ſomething ſingular in its nature, and the antients determined that it muſt be the king over the reſt : they made it an abſolute monarch, and have ſuppoſed that all the buſineſs of the hive was done by its immediate orders ; and that the ſeveral parties of bees allotted to work in the making the combs, in the filling their cells, in the ſtopping the crevices of the hives, and in carrying away the filth, &c. had all their ſeveral ſtations allotted them by this wiſe and provident monarch. This was giving great talents to the monarch-bee ; but this was mere fancy, and it is plain, that, if this creature rules, it is over a people who all perfectly well know their ſeveral buſineſs : but it rather appears, that there is no ſovereignty at all, but that this creature is reſpected in a very high degree by the reſt, as the common parent of the whole nation.

There were not wanting among the antients, however, ſome who believed this large bee to be a female, and theſe pretend that ſhe brought forth only females like herſelf, which ſucceeded her in her reign. They had a very different opinion as to the origin of the common bees, not ſuppoſing them generated of animal parents like themſelves, but produced out of corruption, and born of the fleſh of a bull or cow. Among the later writers this opinion, notwithſtanding the ſanction of the poet Virgil, has been laughed out of the world ; yet it was long before the true origin of bees, even after this, was known. The author of the Female Monarchy, though well apprized of this great bee being of the female ſex, yet ſuppoſed that ſhe only produced young ones like herſelf ; and pretended that the common bees copulated together for the production of other bees like themſelves : this, however, has been ſince found to be wholly erroneous, the female, or queen-bee, giving birth to all, and theſe common bees being of no ſex at all. Many of the authors who have not given into the idle opinion of the bees being bred of putrid fleſh, have yet given them an origin not leſs idle and ridiculous. They pretend that the bees are exempted from the pain of producing either eggs or young ; and that their offspring are formed of the juices of flowers, the different kinds, as the drones, females, &c. owing their riſe to juices of different kinds. Theſe, and a number of other falſe notions, have been propagated in regard to bees ; but their true origin could not well be found till we were in a condition to ſee what paſſes at certain times within the receſſes of the hive, which is done by the uſe of that excellent invention, the glaſs hive. By this, and by the help of diſſections, we may eaſily inform ourſelves perfectly of the true ſtate of the caſe. The parts of generation are the ſubjects of our enquiry for this purpoſe, and, though the bodies of theſe animals are ſo ſmall, theſe are uſually ſufficiently large to be diſtinguiſhed, often taking up more room in the abdomen than all the other parts together. Thus, if the large long-bodied bee be opened, the abdomen will be found to contain vaſt numbers of oblong bodies, which any one acquainted with inſects will eaſily diſtinguiſh to be eggs : vaſt numbers of theſe are large enough to be obſervable by the naked eye, but, when the aſſiſtance of glaſſes is called in, there are diſcerned a vaſt number of other ſmaller eggs, which exceed all computation. It is eaſy to determine from this, that this creature, ſo long eſteemed a male, is in reality, a female, and is in condition to give birth to a very numerous poſterity.

In order to diſtinguiſh this, however, a proper time muſt be choſen for the diſſection, and the moſt proper of all is when the creature is juſt ready to depoſit her eggs. This is in the months of April and May, and the moſt certain time of all is when ſhe is in a hive where a new ſwarm have been received about ten days before : if ſhe be diſſected at other times, the eggs are leſs viſible ; and, particularly in winter, there requires a good glaſs to ſhew the rudiments of them. This is a diſagreeable experiment, indeed, becauſe it is always the deſtruction of a future ſwarm ; all the eggs we ſee in the diſſected female being what would have produced bees to labour for our benefit.

When the body of one of the drones is opened, there is found, inſtead of theſe vaſt numbers of eggs, a part ſeeming proper for a male organ of generation : and in the abdomen a number of veſſels running in ſeveral windings and contortions, and filled with a milky humour. Theſe ſeem deſtined for the important uſe of impregnating the eggs in the belly of the female, and it is very natural to determine from this that theſe are the males.

The common bees, when diſſected, at whatever time of the year never ſhew the leaſt marks of any ſex at all. The inteſtines of theſe bees are found at times to be more or leſs diſtended with honey, and with rough wax; but there are never diſcovered any eggs, nor any of the winding ſeminal veſſels, ſo that it is plain they have no ſhare in propagating the ſpecies: and the obſervation of the ſwarms from time to time, with the aſſiſtance of glaſs hives, gives proof to what the diſſections ſeem to make ſufficiently certain without this evidence.

The female bee reſides within the center of the hive, always living in one of the ſpaces between the combs; if ſhe occaſionally comes out to the ſurface, and is ſeen walking over the edge of a comb, ſhe is to be well obſerved at thoſe times; for her only buſineſs is the laying her eggs in ſome of the empty cells of that part of the comb, which done, ſhe always retires again.

In order to ſee the female, or mother bee, employed in this operation, we are to obſerve in the morning hours, between ſeven and ten, what paſſes in a glaſs-hive into which a ſwarm have been received a few days before. The ſpeed with which the common bees labour in making their combs on this occaſion is almoſt incredible, and they ſeem not only to labour to have cells to depoſit their honey in, but to know that the parent bee is at this time loaded with eggs for the production of a numerous progeny, and that ſhe has an immediate neceſſity of cells for the depoſiting them in. This neceſſity is ſo urgent, that ſhe is often forced to depoſit them in cells not yet finiſhed; though the bees labour ſo vigorouſly, that they often will erect a whole large comb in one day. If the hive be narrowly watched at theſe times in the morning hours, the female bee will be ſoon found employed in her work, and will be ſeen dropping her tail by turns into ſeveral cells every day. If the combs be examined a day or two after this, they will alſo be found to contain the eggs; one of theſe is placed in each cell, and appears in form of an oblong white body, fixed either to the ſolid angle of the baſe, or to one of the angles compoſed by the rhombs which form the triangular baſe of the cell, and is always attached in ſuch a manner, that it lies nearly in an horizontal poſition.

The flat glaſs hives are the moſt favourable for the making theſe obſervations, ſince in thoſe the combs are ſo narrow and ſo numerous, that the whole is taken in view at a time, from one ſide or the other; and there are always ſeveral combs to be made choice of for the operation; in the morning hours of April and May, the female mother-bee will be uſually ſeen walking very ſoberly over one or other of theſe combs, attended by a guard of about twenty of the common bees, all placing themſelves in ſuch a manner, that their faces are turned towards her, and all paying her the greateſt marks of homage and adoration. As ſhe walks along in this ſtate, ſhe examines every cell as ſhe paſſes over, and ſuch as ſhe finds yet empty, and fit for her purpoſe, ſhe reſts at: and, introducing the hinder part of her body at the top, plunges it ſo deep in that her tail touches the bottom. Then ſhe depoſits one egg and no more, and this is at that time covered with a glutinous matter, which faſtens it to the place where it is laid: from this cell the female paſſes to ſeveral others, where ſhe depoſits her eggs in the ſame manner.

Some authors who have written of the polity of bees, have repreſented the time of the female bee's laying her eggs as a ſeaſon of feſtivity and rejoicing in the hive; but this does not at all appear to be the caſe; the few bees which attend her on this occaſion ſeem the only ones that know any thing of the matter, and their behaviour ſavours more of homage and reſpect than of joy: they are continually ſtroking and bruſhing her clean with their legs and with their trunks, and offer her from their own mouths the fineſt honey, when ſhe has occaſion for food. The reſt are all employed in their proper offices, and the work of the hive goes on as uſual; and, indeed, it is well that it does ſo, for this time of rejoicing would be of very bad conſequence to the affairs of the hive, if carried on as ſuppoſed, ſince the female bee is thus employed, more or leſs, during the whole ſummer months.

When the female bee has laid ſix or ſeven eggs, ſhe always takes a time of reſpite or repoſe; and, during this time, the bees which form her levee are doubly buſy in their careſſes, ſome bruſhing her head and breaſt with their trunk, but ſeveral being always employed together to cleanſe the hinder rings of the body, which have been fouled by being thruſt into the cells. When this is done, ſhe begins again; but Mr. Reaumur obſerves, that he never could ſee a female lay more than ten or twelve eggs at one time: he ſuppoſes that his preſence diſturbed the creature, and finally drove her into the inner parts of the hive, where ſhe might continue her works in cells leſs expoſed. It is not difficult to compute the number of eggs which the female lays every day, from the ſwarm which is ready to leave the hive at the end of May: this ſwarm uſually amounts to at leaſt twelve thouſand, and as the hive out of which theſe depart is not leſs peopled by the their loſs, it is evident that they were all the produce of the eggs depoſited by the female in the preceding months of April, with a part of March, and a few of the firſt days of May. On a moderate computation, on theſe principles it will appear, that the female bee cannot lay leſs than two hundred eggs every day, for a long ſpace of time together; and this, though ſeemingly a monſtrous increaſe, is yet much leſs than that of ſome other of the winged inſects, in one of which, a two-winged fly, that author counted no leſs than twenty thouſand living worms, all ready to be depoſited by the parent, and to become flies of the ſame kind.

It has been ſtrongly objected againſt this ſyſtem, that, though the female bee lays eggs, ſhe is not the only one that lays; and many will not give up the opinion of the common bees alſo laying ſome eggs, though but a few in number; obſerving, that, if each of theſe lay only four or five eggs, it would be enough to give birth to a whole ſwarm, without ſuppoſing that this prodigious fœcundity belonged to the female bee alone: but this is running into the old error of the female producing only females like herſelf; whereas, if we obſerve the cells in which we ſee the female depoſit her eggs, we ſhall in the ſequel find the common bees produced from theſe eggs, and iſſuing out of theſe cells: this is a ſufficient proof to any fair reaſoner, ſince it appears very plain, that, if the female produces them, they do not produce one another. It is alſo evident, that not only theſe common or working bees, but alſo the drones, or male bees, are produced from the eggs of this ſame female; and there is this remarkable forecaſt in the female, that ſhe always depoſits the eggs which are to give origin to theſe, in peculiar cells, proper for the reception of the worms which are to be hatched from them. It is obſerved, in examining a hive, that there are always ſome combs, or ſome parts at leaſt of combs, the cells of which are much larger than thoſe of the other parts or combs: theſe large cells are deſtined for the reſidence of the larger worms, which are to produce the drones or male bees. It has been obſerved as a miraculous ſingularity by ſome, that the female bee always knows before-hand, whether the egg ſhe is going to lay will produce a male or a common bee; and that, according to this knowledge, ſhe never depoſits the eggs for a male in a ſmaller cell, nor that of a common bee in a large one; but there is, in reality, leſs wonder in this than is ſuppoſed, for the eggs of which the drones are to be hatched are much larger while in the body of the female than thoſe of which the common bees are to be produced, and the whole occaſion of this choice in regard to the placing of them is, that, when the creature finds a large egg coming forth, ſhe ſeeks one of the large cells to depoſit it in; and when the common ſmall eggs are coming, ſhe contents herſelf with the common cells.

It is very natural to believe, that the female bee lays a third kind of eggs; and that, beſides producing many thouſand common, or working bees, and many hundreds of the males or drones, ſhe ought to lay one egg at leaſt capable of producing a female like herſelf, which is to be the mother of a future progeny, and the queen of the preſent race; ſince, without ſuch a one for their leader, the young brood would never leave the hive in the nature of a colony, and ſettle themſelves elſewhere. What we thus perceive ought to be the caſe, is alſo found in reality to be ſo, and the female, beſides the other kinds of eggs, is found by a ſtrict obſervation to lay alſo eggs of this kind. We might perhaps only expect one female bee to be produced for each ſwarm, but, as nature has ſeemed every where prodigal in the manner of the increaſe of her works, ſo it is in this caſe alſo. What millions of ſeeds are produced on a common elm-tree, for one that ſtrikes and ſucceeds ſo well as to grow up to be a tree? And, of the number of young produced from the ſpawn of a carp, how few live to the ſize of a parent? Thus it alſo is in regard to the female bees: nature, though it has allotted only one of this kind, as abſolutely neceſſary to the new ſwarm, yet has given abundance of chances for that one to ſucceed, by the female's uſually laying at leaſt ten eggs for the production of the female offspring, and often not leſs than twenty: there are, indeed, ſome ſeaſons when not one female is produced; but in theſe ſeaſons there is no ſwarm going out from the old hive, the creatures being informed by nature, that they have no buſineſs for combs and cells when they can have no offspring to rear in them.

The working bees are not only very obedient to, and very careful of their queen, or female parent; but they are alſo very ſollicitous about her progeny. This is very evident in the ſtructure of the cells, which they prepare for the reception of thoſe eggs which are to be hatched into females. It has been before obſerved, that they prepare larger cells for the eggs which are to become drones, or male bees, than for thoſe which are to produce workers like themſelves. The large cells deſtined for the drones are, however, of the ſame ſhape and figure with the others, differing only in ſize; but this is not the caſe with thoſe deſtined for the female offspring: theſe are not only very large, but very clumſily contrived, for the ſake of ſtrength; their ſides being much thicker than thoſe of the reſt, and their figure oval. The bees are extremely ſparing of their wax on all other occaſions, but for the conſtruction of theſe royal cells, as they may not improperly be called, they are as remarkably profuſe: one of the royal cells will weigh more than an hundred and fifty of the common kind. The bees are no more ſparing of the room than of the materials in the conſtruction of theſe royal habitations: they are often placed near the center of a comb, and a vaſt number of other cells are deſtroyed for their baſe; often alſo they hang down from the reſt of the comb, in form of ſtalactitæ from the roofs of ſubterraneous caverns.

A cell of this kind, when firſt formed, repreſents an acorn cup; but it is ſoon lengthened beyond the poſſibility of retaining that figure, and it remains thus till the creature is hatched from the chryſalis or nympth ſtate, and comes out of it; after which the bees, to loſe no room in the hive, form other common cells upon it, and the only remaining mark of the female cell, is the appearance of a knot in the place where it once ſtood.

The number of cells deſtined to receive the eggs which are to produce female bees are ſo few, and they are commonly placed in ſuch cloſe parts of the hive, that there is no great probability of ſeeing the female employed in laying her eggs in them: there is no reaſon to doubt the fact, however, ſince, when we know that ſhe lays eggs for the production of the male and the working bees, there is no wonder that ſhe ſhould alſo lay ſome for the production of females like herſelf.

It might ſeem much harder to conceive how ſo vaſt a number of bees ſhould be produced from this one, as we know are produced from her; but, when one of the females is opened, the vaſt number of eggs diſcovered in each of her ovaries makes the prodigious increaſe no way wonderful.

Swammerdam obſerved, that the number of veſicles in the ovary of the female bee was aſtoniſhingly great; he eaſily counted an hundred and fifty in each ovary, and could count about ſeventeen eggs in each veſicle large enough to be diſtinctly viſible; each ovary contains, therefore, two thouſand five hundred and fifty eggs, and both ovaries five thouſand one hundred. When we find ſo many eggs at once diſtinguiſhable by their ſize, it will be eaſy to conceive, according to the common courſe of nature in the propagation of inſects, that there may be more than as many too ſmall to be yet diſtinguiſhable; and, at that rate, the number of twelve thouſand bees; which is the quantity that compoſes a moderate ſwarm, is not wonderful for the product of the eggs of one female for one ſeaſon. *Reaumur's Hiſt. Inſ.*

QUICK, or *Quickſet-hedge*, a general name for all hedges, of whatever ſorts of plants they are compoſed, to diſtinguiſh them from dead hedges; but, in a more confined ſenſe of the word, it is applied to the white or hawthorn, the ſets or young plants of which are raiſed by the nurſery gardeners for ſale. *See the article* FENCE.

QUICKSILVER, a very ponderous fluid mineral, generally called mercury.

In the year 1765, a diſcovery was made (or rather revived, for it is mentioned by Mr. Bradley) that quickſilver was a ſovereign remedy for deſtroying inſects on trees.

The narrative of this diſcovery was contained in a letter written by Dr. R———, to Dr. P———, in which the former begs the aſſiſtance of the latter "in laying before the learned world an account of ſome experiments, that have been tried with ſucceſs, and which, when fully known, will, he believes, be of very great ſervice to the vegetable part of the creation, by totally deſtroying thoſe pernicious inſects, that are apt to infect the tender leaves and young ſhoots of our choice fruit-trees: and for which, no remedy, that he had ever heard, or read of, has been as yet propoſed, that is either adequate to the diſeaſe, or effectual to the cure." Dr. R———, therefore, in the following part of the letter, deſires Dr. P——— "to lay before the Society for the Encouragement of Arts, &c. the following experiment, that was tried laſt ſpring, with ſucceſs, by one George Bradford, a clothier in the city of Hereford, and a very ingenious young man: in order, after the experiment has been fully tried, they may reward him in proportion as he may ſeem intitled to it." But Dr. R——— adds, that "whether he may be thought worthy of any recompence, or not, he very chearfully ſubmits it to the trial of the curious; and hopes, they may reap the ſame advantages, he did laſt year, by clearing their trees of theſe pernicious inſects." The doctor then proceeds as follows, to give the relation of Mr. Bradford's invention and ſucceſs. "The firſt tree he tried the experiment upon, was a favourite plum-tree: I think a green gage. He was afraid of trying it on the whole body of the tree at firſt: as he did not know, but that it might kill it at once: and therefore he ſelected out a particular branch, that was deſigned to be cut quite away, at the winter pruning, for the ſubject of his firſt eſſay. The method of the experiment is this: he took a ſmall awl, and pierced, ſloping, through the rind, and into part of the wood of the branch, but not to the heart or pith of it; and poured in a ſmall drop or two of quickſilver; and ſtopt it up with a ſmall wooden plug made to fit the orifice: and the reſult of this experiment was, that the inſects all dropt off, from that very branch, the next day; and, in a day or two more, from off the other branches of the tree, without any other puncture: and the tree continued in full vigour; and throve well all the ſummer after. Encouraged by this ſucceſs of the firſt eſſay, he next tried it upon a honey-ſuckle; the leaves of which were quite covered with them: and here he ſcraped away the top of the ground with a trowel; and run his awl, in the ſame ſloping manner, into the main ſtem juſt above the roots; but, with the ſame caution as above, not quite to the inner pith; and the ſucceſs was the ſame as before. The inſects all dropt off dead the next day after the experiment was made. The above facts you may ſafely depend upon: and I ſaw both the trees, on which the experiments were made, ſince Chriſtmas laſt; and they then ſeemed to be both very healthy and well. I did not, indeed, ſee the operation performed, as I was at that time on my reſidence at L———; but the method, manner, and ſucceſs, as above related, I had from Mr. Bradford's own mouth."

This letter from Dr. R———, was dated March 11, 1765, though the delivery of it to the ſociety was deferred from accident till February laſt. But Dr. P———, in his letter to the preſident, deſiring him to lay the other before the ſociety, remarks, that experiments have been ſince made, which confirms the firſt obſervations. He ſays, "the advantage, however, hath ariſen from this delay, that Dr. R——— hath had fuller proof of the ſucceſs of this diſcovery."

We ſhall only add, that this method has ſince been tried by ſeveral members of the ſociety, and found fully to anſwer the intended purpoſe.

QUINCUNX, a diſpoſition of trees originally formed into a ſquare, conſiſting of five trees, one at each corner, and a fifth in the middle; which diſpoſition often repeated forms a regular grove, and then viewed by an angle of the ſquare or parallelogram, repreſents equal and parallel alleys.

QUINCE-TREE, a fruit-tree well known, and of which there are ſeveral kinds, as the pear-quince, the apple-quince, and the Portugal quince, &c.

Quince-trees are eaſily propagated, either by ſuckers, or cuttings, planted in a moiſt ſoil. Suckers are the worſt to raiſe them from; and cuttings are generally preferred to layers, becauſe they are of more ſpeedy growth. Theſe cuttings ſhould be ſet early in the autumn, and ſhould be watered often, to encourage their rooting. In the ſecond year after planting, they will be fit to remove into the nurſery, where, after being ſet a foot aſunder in rows three feet diſtant from each other, they ſhould be managed as before directed for apples. After two or three years growth in the nurſery, they will be large enough to tranſplant into the places where they are to remain. A moiſt ſituation, ſuch, for example, as the ſide of a river, pond, or ditch, will make them produce the moſt, and the largeſt, fruit: but that which grows on a dry ſoil will be better taſted, and earlier ripe. Theſe trees require no other pruning, than keeping their ſtems clear from ſuckers, cutting away all croſs branches, and diſplacing all upright luxuriant ſhoots from the middle of the tree, that its head may not be too much crowded with wood: for that is of bad conſequence to all fruit-trees. A ſure way to have the beſt ſorts, is to graft or bud them upon ſtocks of their own kind raiſed from cuttings. The trees ſo managed will bear fruit much ſooner, and more plentifully, than thoſe which are raiſed from ſuckers or layers. The Portugal quince is the moſt valuable.

QUIT-RENT, a ſmall rent payable by the tenants of moſt manors, whereby the tenant is quit, or free, from all other ſervices; and is ſaid to be an acknowledgement of their ſubjection to the lord of the manor.

QUITTOR, an ulcer formed between the hair and hoof, uſually on the inſide quarter of a horſe's foot; it often ariſes from treads and bruiſes, ſometimes from gravel, which by working its way upwards, lodges about the coronet: if it is only ſuperficial, it may be cured with cleanſing dreſſings, bathing the coronet every day with ſpirit of wine, and dreſſing the ſore with precipitate medicine.

But if the matter forms itſelf a lodgment under the hoof, there is no way then to come at the ulcer, but by taking off part of the hoof; and if this be done artfully and well, the cure may be effected without danger.

When the matter happens to be lodged near the quarter, the farrier is ſometimes obliged to take off the quarter of the hoof, and the cure is then for the moſt part but palliative; for when the quarter grows up it leaves a pretty large ſeam, which weakens the foot: this is what is called a falſe-quarter, and a horſe with this defect, ſeldom gets quite ſound.

If the matter, by its confinement, has rotted the coffin-bone, which is of ſo ſoft and ſpongy a nature, that it ſoon becomes ſo, you muſt enlarge the opening, cut away the rotten fleſh, and apply the actual cautery, or hot iron pointed pyramidically, and dreſs the bone with doſſils of lint, dipped in tincture of myrrh, and the wound, with the green, or precipitate ointment. When the ſore is not enlarged by the knife, which is the beſt, and leaſt painful method, pieces of ſublimate are generally applied, which bring out with them cores, or lumps of fleſh: blue vitriol powdered, and mixed with a few drops of the oil, is uſed alſo for this purpoſe, and is ſaid to act as effectually, and with leſs pain and danger. *Bartlet's Farriery, page* 303.

R.

RABBIT, a well known animal of the hare kind, with a very ſhort tail.

The female or doe rabbit goes with young thirty days, and then ſhe kindles; and if ſhe take not buck preſently ſhe loſes her month, or at leaſt a fortnight, and often kills her young and eats them.

In England they begin to breed at a year old, but in ſome places much ſooner; and they continue breeding very faſt from the time when they begin, four, five, ſix, or ſeven times a year being common with them. They have uſually from four to ſeven in a litter, and hence its is that a ſmall number at firſt will ſoon ſtock a whole warren, if left to breed a little while undiſturbed. The does cannot ſuckle their young till they have been at buck again: this therefore is to be done preſently, elſe there is a fortnight loſt of the time for the next brood, and the preſent brood alſo probably loſt. When the buck goes to the doe, he always beats and ſtamps very hard with his feet, and, when he has copulated with her, he falls backwards, and lies as it were in a trance; in this ſtate it is eaſy to take him, but he ſoon recovers from it.

The buck rabbits, like our boar-cats, will kill the young ones, if they can get at them; and the does in the warrens prevent this, by covering their ſtocks, or neſts, with gravel or earth, which they cloſe ſo artificially up with the hinder part of their bodies, that it is hard to find them out. They never ſuckle the young ones at any other time than early in the morning, and late at night, and always, for eight or ten days, cloſe up the hole at the mouth of the neſt, in this careful manner, when they go out. After this, they begin to leave a ſmall opening, which they increaſe by degrees, till at length, when they are about three weeks old, the mouth of the hole is left wholly open, that they may go out: for they are at that time grown big enough to take care of themſelves, and to feed on graſs.

People who keep rabbits tame for profit, breed them in hutches, but theſe muſt be kept very neat and clean, otherwiſe they will be always ſubject to diſeaſes. Care muſt be taken alſo to keep the buck and does apart till the latter have juſt kindled, then they are to be turned to the bucks again, and to remain with them till they ſhun and run from them.

The general direction for the chooſing of tame rabbits is, to pick the largeſt and faireſt; but the breeder ſhould remember, that the ſkins of the ſilver-haired ones ſell better than any other. The food of the tame rabbits may be colewort and cabbage leaves, carrots, parſnips, apple-rinds, green corn, and vetches, in the time of the year; alſo vine leaves, graſs, fruit, oats, and oatmeal, milk-thiſtles, ſow-thiſtles, and the like; but with theſe moiſt foods they muſt always have a proportionable quantity of the dry foods, as hay, bread, oats, bran, and the like, otherwiſe they will grow pot-bellied, and die. Bran and grains mixed together have been alſo found to be very good food. In winter they will eat hay, oats, and chaff, and theſe may be given them three times a day; but when they eat green things, it muſt be obſerved that they are not to drink at all, for it throws them into a dropſy. At all other times a very little drink ſerves their turn, but that muſt always be freſh. When any green herbs or graſs are cut for their food, care muſt be taken that there is no hemlock among it, for, though they will eat this greedily among other things, when offered to them, yet it is ſudden poiſon to them.

Rabbits are ſubject to two principal infirmities. Firſt, the rot, which is cauſed by the giving them too large a quantity of greens, or from the giving them freſh gathered, with the dew or rain hanging in drops upon them. It is over moiſture that always cauſes this diſeaſe; the greens therefore are always to be given dry, and a ſufficient quantity of hay, or other dry food, intermixed with them, to take up the abundant moiſture of their juices. On this account the very beſt food that can be given them, is the ſhorteſt and ſweeteſt hay that can be got, of which one load will ſerve two hundred couples a year; and out of this ſtock of two hundred, two hundred more may be eat in the family, two hundred ſold to the markets, and a ſufficient number kept in caſe of accidents.

The other general diſeaſe of theſe creatures is a ſort of madneſs: this may be known by their wallowing and tumbling about with their heels upwards, and hopping in an odd manner into their boxes. This diſtemper is ſuppoſed to be owing to the rankneſs of their feeding; and the general cure is the keeping them low, and giving them the prickly herb, called tare thiſtle, to eat.

The general computation of males and females is, that one buck rabbit will ſerve for nine does; ſome allow ten to one buck, but thoſe who go beyond this always ſuffer for it in their breed.

The wild rabbits are to be taken either by ſmall cur dogs, or by ſpaniels bred up to the ſport; and the place of hunting thoſe who ſtraggle from their burrows is under cloſe hedges, or buſhes, or among corn-fields and freſh paſtures. The owners uſe to courſe them with ſmall greyhounds, and, though they are ſeldom killed this way, yet they are driven back to their burrows, and are prevented from being a prey to others. The common method is by nets, called purſe-nets, and ferrets. The ferret is ſent into a hole to force them out, and the purſe-net, being ſpread over the hole, takes them, as they come out. The ferret's mouth muſt be muffled, and then the rabbit gets no harm. For the more certain taking of them, it may not be improper to pitch up a hay net or two, at a ſmall diſtance from the burrows that are intended to be hunted: thus very few of the number that are attempted will eſcape.

Some who have not ferrets ſmoak the rabbits out of their holes with burning brimſtone and orpiment. This certainly brings them out into the nets; but then it is a very troubleſome and offenſive method, and is very detrimental to the place, as no rabbit will, of a long time, afterwards come near the burrows which have been fumed with theſe ſtinking ingredients.

RACK, a wooden frame made to hold hay or ſodder for cattle.

RADIATED *Flowers*, ſuch as have ſeveral ſemi-floſcules round a diſk, in form of a radiant ſtar: thoſe which have no ſuch rays, are called diſcous flowers.

RADICLE, that part of the ſeeds of plants, which upon vegitating becomes its root, and is diſcoverable by the microſcope.

RADISH, the name of a well known vegetable, and which is commonly cultivated in the kitchen-garden for its root.

Radiſhes are ſown in different ſeaſons, according to the time when they are deſired for uſe. Thoſe ſown in September will be fit to eat at Chriſtmas, if they are not deſtroyed by froſt: but they muſt be uſed whilſt very young, for they ſoon grow hot and ſticky. If ſown towards the end of October, which is commonly the time of ſowing for the earlieſt crops, they will be fit for the table in the beginning of March. Thoſe ſown at Chriſtmas, if the ſeaſon is mild, and the ground in good order, will, if they eſcape the froſt, be fit for eating about the end of March or beginning of April; and by continuing the ſowing once a fortnight, from the middle of January till the beginning of April, always obſerving to ſow the earlieſt crop in the warmeſt and beſt ſheltered ſituations, and the later ones in a moiſt ſoil and open ſituation, without which they will run up, and grow ſticky, before they are fit for uſe, a regular ſucceſſion of theſe roots may be had throughout the ſeaſon. The tendereſt, and mildeſt to the taſte, are thoſe which have been raiſed in deep, rich, and light mould.

When the radiſhes are come up, and have got five or ſix leaves, they muſt be thinned wherever they ſtand too cloſe; for otherwiſe they will run up in tops, and not increaſe in their roots. Some thin them by hand: but it is much better to uſe a ſmall hoe, which will ſtir the ground, deſtroy the weeds, and promote the growth of the young plants. They may be left about three inches aſunder, if they are intended for drawing up ſmall; but ſix inches will be little enough, if they are to ſtand till they are pretty large.

The kitchen gardeners about London, who pay great prices for their ground, and therefore are obliged to make it produce as many crops as poſſible in the year, ſow carrot ſeed with their early radiſhes, in order that if the radiſhes are killed ſoon after their coming up, as they ſometimes are, the carrots may remain, for the ſeeds of theſe laſt generally lie in the ground five or ſix weeks before they grow, while thoſe of the radiſhes ſprout in about a fortnight: but when both crops ſucceed, the radiſhes muſt be pulled up while very young; or they will weaken the carrots, ſo that theſe laſt will not be able to ſupport themſelves after the former are gone.

It is alſo the conſtant practice of theſe induſtrious and intelligent men, to ſow ſpinage with their latter crop of radiſhes: for after the radiſhes are taken off, and the ground has been cleared between the plants of ſpinage, theſe laſt will grow up ſo prodigiouſly as to cover the whole ſpace in a fortnight's time: and if this ſpinage is of the broad leaved kind, it will be larger and fairer than it uſually is when ſown alone; becauſe moſt people are apt to ſow it too thick, when they do not mix it with any other crop.

The ſmall topped, the deep red, the ſcarlet, and the long topped ſtriped radiſh, are the varieties generally cultivated in kitchen gardens. The ſmall topped is moſt commonly preferred, becauſe it takes up the leaſt room: but a ſmall ſpot of ground will furniſh, from each ſowing, as many radiſhes of any kind as can be ſpent in a family while they are good.

The Naples radiſh, which has a very white, round, ſmall, and ſweet root, may be propagated in the ſame manner as the common ſort, excepting that it ſhould not be ſown till the beginning of March, and the plants ſhould be allowed a greater diſtance. It is not very common in this country; and, indeed, its ſeeds are apt to degenerate here.

The white and the black Spaniſh radiſhes will be fit for the table by the end of Auguſt, or the beginning of September, if they are ſown about the middle of July, or a little earlier, and will continue good till the froſt ſpoils them. Theſe ſhould be thinned to a much greater diſtance than any other ſort: for their roots will grow as big as common turneps. If they are drawn out of the ground before a hard froſt comes on, and laid up in dry ſand, in the ſame manner as is practiſed for carrots, they will keep good all the winter.

To ſave the ſeeds of radiſhes, ſome of the ſtraiteſt and beſt coloured roots ſhould be planted in rows three feet aſunder, and at the diſtance of two feet from each other in the rows, in deep and well dug ground. If the ſeaſon is dry, they muſt be watered from time to time till they have taken root, after which they require no farther care but keeping them clear from weeds; nor need theſe be feared after the branching ſeed-ſtalks of the radiſhes have over-ſpread the ground, as they will ſoon do, in ſuch manner as to prevent their farther growth.

In this tranſplanting of the radiſhes, an allowance ſhould always be made for bad ſeaſons; becauſe the very ſame plants will not yield a fourth part of the quantity of ſeeds in dry ſeaſons, that they would do in a moiſt ſeaſon.

When the ſeed begins to ripen, it ſhould be carefully guarded from birds; and when it is ripe (which is known by the pods turning brown), it ſhould be cut, dried in the ſun, threſhed out, and laid up in a place where mice cannot come at it.

Horſe-RADISH, a well known plant, cultivated in kitchen-gardens.

Horſe-radiſh is propagated by cuttings or buds from the ſides of the old roots. The beſt ſeaſon for this work is in October or February; the former for dry lands, and the latter for moiſt. The manner of doing it is as follows: provide yourſelf with a good quantity of off-ſets, which ſhould have a bud upon their crowns; but it matters not how ſhort they are: therefore, the upper part of the roots which are taken up for uſe, ſhould be cut off about two inches long with the bud to it, which is eſteemed the beſt for planting. Then make a trench ten inches deep, in which you ſhould place the off-ſets at about four or five inches diſtance each way, with the bud upward, covering them up with the mould that was taken out of the trench: then proceed to a ſecond trench in like manner, and continue the ſame until the whole ſpot of ground is planted. After this, level the ſurface of the ground even, obſerving to keep it clear from weeds, until the plants are ſo far advanced, as to be ſtrong enough to over-bear and keep them down. With this management, the roots of the horſe-radiſh will be long and ſtraight, and free from ſmall lateral roots; and the ſecond year after planting will be fit for uſe. It is true, they may be taken up the firſt year, but then the roots will be but ſlender; therefore it is the better way to let them remain until the ſecond year. The ground in which this is planted ought to be very rich, otherwiſe the roots will make but a ſmall progreſs.

Woollen RAGS, and the nippings of the pitch-marks upon ſheep, are a ſingularly good manure. The rags ſhould be chopped ſmall, about an inch or two ſquare, and ſcattered on the earth at the ſecond ploughing; for being thereby covered, they will begin to rot by ſeed-time. They imbibe the moiſture of dews and rain, retain it long, and, as Dr. Home obſerves, thereby keep looſe ſoils in a moiſt ſtate. They coſt about four-pence a buſhel at London, from whence many loads are ſent every year to Dunſtable, which is thirty-three miles, where they are laid even on ſtiff-lands, juſt after the ſowing of the corn, allowing to the acre four ſacks of ſix buſhels each.

RAG-WORT, or as it is called in Yorkſhire, *ſeagrim*, is a very pernicious weed.

The reverend Mr. Camber, of Eaſt-Newton, has obliged the public with the following obſervations on the growth and deſtruction of ragwort, or ſeagrim.

“ This plant, ſays he, has a ſtalk, in its early ſtate, green, but, as it advances in age, inclining to violet or purple, eſpecially downwards. Its flowers are yellow, and thick-ſet, and compoſed each of a number of ſmall-pointed leaves. It runs to ſeed in the latter end of ſummer. The ſmell, both of the ſtalk and leaves, which are jagged, (whence probably it obtains one name) and the flower itſelf, are offenſive to all animals, I think; for I have obſerved that hardly any creatures feed upon it, except almoſt hungered or ſtarved. I have not indeed obſerved whether or no aſſes reject it.

“ Like moſt other weeds, it thrives beſt in the beſt ſoils, either natural or artificial; and I took up a plant of it in my orchard, about two years ago, (with the root) which, when in flower, touched my chin, (my height is about five feet eight or nine inches) and its root, which is round, and thick ſet with taws, was much larger than a new-born child's head: but the uſual dimenſions are much leſs than theſe.

“ About four years ago, I obſerved the ſpreading of this weed in that part of this eſtate which was in our own hands. I took notice, that neither cows nor horſes eat it; and when I ſmelled it, I ceaſed to wonder that they did not. It was obvious to remark, that a weed ſo bulky as this, and ſo groſs, muſt extract much nouriſhment from the earth, and that it was adviſable to get rid of it as faſt as poſſible. The moſt eaſy method was mowing. I therefore ordered a ſervant to mow theſe weeds in the paſtures as near to the ground as he could; and I hoped that the common mowing in the meadows would be ſufficient to deſtroy them: but I ſoon found my miſtake; for in a very few weeks theſe offenſive ſtrangers ſhot up again into a ſtalk and leaf, and even flower, though all in much ſmaller ſize than before, but with this diſagreeable circumſtance, that the root was ſo far from being injured with the ſcythe, that for one ſtalk ſeveral aroſe, and the root ſeemed to have gained new vigour from the wound.

“ I now applied myſelf to plucking up by the roots of theſe odious inmates, and found new difficulties; for while the ground was dry, as it uſually is in the latter end of ſummer, I found the ſtalks of ſuch of the ſeagrims as were longeſt, and afforded the tighteſt graſp, either break in plucking, and leave the root in the ground entirely, or at beſt bring with it only a ſmall part of the root; and when the wet weather came on, and looſened the ground, and made it poſſible, or even eaſy, to bring away the whole ball of the root, yet the ſeaſon of feeding was come on alſo, and the earlieſt ripe ſeeds had diſperſed themſelves, and produced an aſſurance of a larger crop for ſucceeding years than the moſt careful plucking of the preſent crop could deſtroy.

“ But if theſe were the difficulties which attended my attempts to eradicate thoſe ſeagrims, which had happened not to be mowed, I was much more embarraſſed by thoſe which had been; for here it was impoſſible to get any ſuch faſt hold, as to pluck them up with much, or even any root.

“ I now applied myſelf to enquire what gentlemen or farmers were plagued with this weed, and what methods they had tried with ſucceſs to deſtroy it.

“ I was told by a gentleman in my own neighbourhood, that Sir G. Cayley, of Brompton, near Scarborough, baronet, had been plagued with this weed, and had purſued the method of plucking with ſucceſs.

“ Animated by this aſſurance, I reſolved to purſue this method with great attention; and as it ſeemed to be a work which required great care, both in the choice of ſeaſon and manner of plucking, I reſolved not to depute the work to others, but to endeavour to clear a ſpot in my cow-paſture with my own hands, that, if my labour ſucceeded, I might employ others to follow the ſame method under my own eye in the reſt of this paſture.

“ Accordingly, in the evenings of the ſummer, or rather autumn, of 1762, after ſhowers, I applied myſelf to this work; and by help of a pair of ſtrong gloves, and a tight graſp, I brought up almoſt every root, in a ſpace of about two hundred yards ſquare, whole; ſo that I had good hopes I ſhould ſee this ſpot clear in the ſucceeding ſummer. It is true, I ſaw leaves of the ſpecies of this weed, and of a very vivid green too, around the plants which I pulled up: but as I reaſonably concluded theſe to be fed by the taws which ſpread themſelves from the main root, ſo I (methought reaſonably) concluded alſo, that this main root being deſtroyed, the ſide taws would die, and conſequently theſe young leaves.

“ But how was I diſappointed, when, in the ſummer of 1763, I ſaw this ſpot of ground as much over-run with ſeagrims as any part elſe of the paſture which had been unpulled!

“ Converſing, however, with G. Watſon, of New Malton, Eſq; towards the latter end of ſummer, on this ſubject, I was aſſured by him, that by a repetition of this labour of plucking for ſome years, he thought he had leſſened the number of his ſeagrims, though they were ſtill numerous. Urged by this example, I have gone through the whole of my paſture, which is about ten acres, and keeps five cows, at the latter end of laſt ſummer, of 1763, with the ſame care as was uſed to a ſmall part of it in 1762; yet am I not elated with much hope of ſucceſs; for a little plot before my garden (in which my horſes run, and which was managed with ſtill more accuracy on account of the odious appearance of the ſeagrims from my windows) ſeems to threaten another conſiderable crop.

“ As I did not confine my enquiries about the method of deſtroying this hateful weed to any one rank of men, I was told by an honeſt quaker, a farmer in my neighbourhood, that he had found turning of ſheep in winter into his cow-paſture the only effectual method of deſtroying this hateful weed.

“ I thought this method very likely to ſucceed; for ſheep are ſuch cloſe eaters, that I have known them deſtroy whole beds of the rankeſt docks, which could not be killed by any other means.

“ I have not been able to try this experiment conſiderably; for, as I am raiſing quick fences, both in my meadow and paſture, I keep no ſheep. I have, however, occaſionally admitted ſome of my tenants ſheep into the ſmall plot before my garden this winter; and, upon an accurate examination this morning, I do not entertain any ſanguine hopes of great ſucceſs from this method. I find that many of the young leaves of this weed, now level with the ſurface of the ground, are untouched by the ſheep; and that ſuch others as appear bitten by them, do not ſeem in a dying condition.

“ The truth ſeems to me, that ſheep, though they may not have the ſame averſion to this weed as horſes and cows, yet are far from being fond of it; and if any great ſucceſs is to be hoped for from their bite, (which may prepare beds for the water, and ſo decay the root) the ſheep ſhould be folded pretty cloſe upon it, and obliged to eat it near, and at ſuch a ſeaſon that the winter-rains may have time to work its deſtruction. And ſuch a method, if carefully purſued, ſeems to be moſt probable for the extirpation of this pernicious weed.

“ If the method of plucking is followed, I would ſubjoin ſome cautions.

“ Firſt, In order to prevent the large plants from feeding, I would adviſe to cut off all the tops, and the tops only, when the flowers begin to die, that then good hold of the ſtalk may be gotten.

“ Secondly, I would defer the plucking till the rains have moiſtened the ground ſufficiently to bring up the whole main root.

“ Thirdly, I recommend ſtriking the root ſo brought up againſt the ground, in order to diſperſe the earth which adheres to it, by way of manure.

“ Fourthly, I always pile the plants thus pulled up and cleanſed from earth, that, if the ſeaſon prove favourable, they may be burnt, and the aſhes ariſing from them ſpread on the ground; or if this cannot be conveniently done, (though it is much the better method, and may, with a ſufficient fire, be done when they are ever ſo green) left to rot and manure the ſoil.

“ The groſſneſs, and even ſtench, of this weed, is a proof of the great quantity of ſalts it contains; and in the ſame proportion as any plant exhauſts the ground of its ſalts, it repays when reduced to manure. There can, however, be no queſtion, but whilſt weeds are left to rot, a great quantity of the ſalts, which by burning would mingle with the ſoil, are carried into the air.

" I ſuppoſe your readers will be curious to know in what manner I account for the ſudden appearance of ſeagrims in vaſt abundance, in this eſtate, where they were hardly ever known before.

" I will give you an account, which, I dare ſay, you will eſteem perfectly ſatisfactory. About eight years ago I undertook to improve a piece of ground of about fourteen acres, which was over-run with thorns of both ſorts, brambles, broom, and furze.

" When I had got it cleared of all this traſh, my next buſineſs was to pare the hills off, and pile them, and, after a winter's mellowing, to break and ſpread them with a mixture of lime, and all other kinds of manure which I could collect. As the ſoil was very poor, having been exhauſted by the great quantity of traſh it had nouriſhed for many years, I was not yet ſatisfied, but reſolved to take the advantage of the firſt dry ſummer, to lead out the riches of a pond of about thirty yards long and half as many broad, which had been occupied by a great number of geeſe, &c. and never thoroughly cleaned during near thirty years. I got through this work, though at a great expence, being obliged to employ a conſiderable number of draughts, leſt the rains ſhould make the mud too thin, or the heat bake it too much, the mud being for a conſiderable ſpace a yard perpendicular.

" All this mud I laid on my newly-improved ground, except a few cart-loads, which were brought and laid by the wall of a kitchen-garden, to be mingled with the other ſoil.

" I had divided my improved ground, reſerving about four acres for meadow.

" Behold! the ſucceeding year gave me a crop of ſeagrims both in my new meadow, my new cow-paſture, and the plot of ground in which the mud for my garden had been ſcattered; and more particularly in thoſe parts where the ground had been broke, either to ſtub the thorns, &c. or to take away the hills, while the adjoining ground on every ſide was free from this pernicious weed.

" As I knew little or nothing of this weed, I ſuffered it to ſeed before I took any neceſſary precautions for its deſtruction. The ſucceeding year preſented me with a much larger crop, and I have been ever ſince ſtruggling for its extirpation, and have the mortification to ſee its encroachments on adjoining grounds by the ſeeds which winds have carried.

" This fact, and another of the ſame kind, in a piece of ground which I improved ſince, at ſome diſtance from the former, have confirmed me in an opinion, which I before thought very probable, viz. " That all ſoils are originally impregnated with the ſeeds of almoſt all graſſes and weeds, (though of ſome in greater quantities) which only want a proper ſtirring and manure to awaken them to vegetation, though at the expence of one another, ſome being ſuffocated by that proceſs which gives life to the others."

" I will add another ſtriking inſtance in confirmation of this ſentiment, notorious in this neighbourhood.

" A conſiderable quantity of the park at Gilling was over-run with brakes and moſs, and that wretched graſs which grows in ſuch company. Lord Fairfax, the owner, finding that he could not have his veniſon fat as it ought to be, deſtroyed his park, and applied himſelf ſeriouſly to the improvement of it at a vaſt expence. In courſe of time by due tillage he brought this worſt part of it to be not only good corn-land, but even tolerable, though coarſiſh, meadow and paſture; yet both of them thick ſet with ſeagrims, a weed never ſeen there till the quantity of lime which his lordſhip put into that poor ſoil had warmed it ſufficiently.

" I have only to add, on this ſubject, that I am perſuaded ſeagrim does more harm in meadow than paſture land; for in the latter it only exhauſts the ground, on which it ſtands, to no good purpoſe; but in the former it communicates its diſagreeable ſtench in the ſweat to the good hay, and deſtroys its ſweetneſs. I adviſe, therefore, that hay-makers be ordered to throw it with their rake-ſhafts out of the ſwathe whenever they meet with it." *Muſeum Ruſticum, vol.* V. *page* 117.

RAM, the male of the ſheep kind. *See the article* Sheep.

A correſpondent of the editors of the Muſeum Ruſticum has obliged the world with the following method of gelding rams.

" It was, ſays he, a long time before I came into a proper method of gelding my rams: I uſed, like my neighbours, always to employ a common gelder, who cut and ſeared them; however, I obſerved that this not only put the animal to great pain, but was a conſiderable time before it healed, and the ſheep or lamb always loſt fleſh in no ſlight degree.

" Whilſt I was muſing how to improve this practice, a friend of mine, a farmer, who came accidentally to ſee me, out of Bedfordſhire, adviſed me to leave off gelding my rams in the manner I had practiſed, and, inſtead of it, to have them knitted.

" The method of doing this he deſcribed as follows: Firſt take ſome ſmall, yet ſtrong, twine, not too hard twiſted; add three of theſe together, and ſlightly twiſt them on your knee, as the ſhoemakers do their thread; than wax it well with ſhoemakers wax, and it is ready for uſe.

" When you are thus prepared, take a proper length of this twine; tie each end of it to a ſhort bit of ſtick, as thick as a walking-cane; then put it round the cod, and tying a ſingle knot, do you take hold of one ſtick and draw it, whilſt another man draws the other, as tight as you well both can; for on the tightneſs of the drawing depends the ſucceſs of the operation.

" The animal immediately loſes all ſenſe of feeling in the cod; the circulation of the blood thither is ſtopped; and if it was to be let alone, it would rot off; but this is a bad, as well as a naſty and dangerous practice, for the ſheep ſometimes die of the ſtench.

" The beſt way is, at the end of nine days, to cut off the cod; but then you muſt take a great deal of care you do not cut it too cloſe to the tying; if you do, the ſtring may chance to ſlip off, and the conſequence be dangerous, as by ſuch a neglect many ſheep may be loſt in a ſeaſon.

" Many farmers, I am informed, when they knit their rams, truſt to the ſtrength of one man's arms; and this may ſometimes be well enough, when your workman is ſtrong, attentive, and willing; but if he is failing in any of theſe points, ten to one but an accident happens: I therefore always chuſe to employ two men at this work.

" The ſeaſon I chuſe is the ſpring of the year, though ſome prefer November, after the ramming ſeaſon is over: I have many reaſons for this preference, and, particularly, I think that the warm weather coming on, hinders them from pining, or falling off their fleſh, and ſoon re-eſtabliſhes them in their perfect health. When this operation is performed in November, and the winter is either wet or froſty, the ſheep are pinched by the cold, and pine away conſiderably, not having that heartening food, to keep them in ſpirits, as they meet with in the ſpring of the year.

" I have obſerved, that if the rams are not in good fleſh, or have not been pretty well fed, they do not undergo this operation ſo well: I therefore always take care to keep them particularly well ſome time before, and alſo ſome time after the buſineſs is done. This is an attention by no means thrown away, for without it ſome miſcarriages may happen, which would otherwiſe be avoided.

" When I ſay I prefer knitting my rams in the ſpring, I mean before the hot weather comes on; as to the particular time, I am governed by the ſeaſon: if it is deferred till ſummer, the flies will ſurely be troubleſome." *Muſeum Ruſticum, vol.* IV. *page* 159.

In a ſucceeding number of the ſame work, another correſpondent has laid down the following method, which he thinks preferable to the former. He declares he has practiſed it for ten years, and in that time had not loſt a ſingle one by gelding, out of ſeveral hundreds; neither do they loſe fleſh: on the contrary, ſome of them, that did not thrive before, rather fatten better after, if the paſture does not fail. The ſucceſs he imputes to the evacuation of the humours, by cutting the ſcrotum, &c. may be the occaſion of it.

" What, ſays he, is neceſſary to be obſerved, by way of caution, is as follows. When I am about to have my lambs gelt, I take dry freſh weather to do it in; for which purpoſe I defer it until they are about two months old, which brings, at leaſt, the middle of May for that work to be performed in; but, in order to have a ſettled ſtate of weather, and the moon in decreaſe, I do it either a little ſooner, or a fortnight later, when I judge the work may be done with ſafety, according to the above caution.

" I have the lambs put into a fold that has a good wall, or dyke, about it, by ſeven or eight o'clock in the morning, or as ſoon as the dew is off. A man is appointed to ſtand within the fold, with his back againſt the wall or dyke, who may be called the holder: another is appointed to take the lambs, one at a time, taking care not to heat them either in folding or taking them.

" When he has taken a lamb, he brings it to the holder, who takes it by the hinder houghs, and preſſes its back againſt his breaſt, with its head over his ſhoulder: the operator then, who generally is the ſhepherd, takes his knife, and cuts about an inch from the lower end of the cod quite off: he then puts one of his hands cloſe up to the creature's belly, while he preſſes back the cod with the other; and by that means he cauſes the bare ſtones to put out, ſo that he can eaſily gripe them one at a time with his teeth, and pulls them ſlowly out.

" He then takes a little ſalt water, which is prepared on purpoſe, and ſet near him, into his mouth, and warms it a little; then he ſquirts it up the cod, and all is done; the holder handing the lamb over the wall, or dyke, to one that ſets it on its feet on the other ſide, pulling its tail pretty hard when he lets it go, which makes it ſtretch itſelf out.

" Thus, in half a minute, a lamb is gelt; and in three or four days all danger is over, if kept from lying on nettles, and the like.

" It is proper to walk the lambs gently about three or four hours after they have been half a day gelt.

" If old rams are to be gelt, I do it about the ſame ſeaſon; and the operator takes no other method than that uſed with the lambs, only putting a bit of ſalt and butter up the cod inſtead of ſquirting up a little ſalt water: the holder, indeed, muſt not now ſtand, but ſit on the ground, griping the ram by the houghs, while he lies on his back, with his head over one of the holder's thighs, &c.

" My reaſons for letting the lambs be about two months old before they are gelt, beſides the reaſon before given, are, that at that age they are better able to bear the pain of the operation than when they are young and weakly; and the ſtrings, as they are called, are ſo ſtrong that they do not break, but come entirely out along with the ſtones, which makes a free paſſage for matter to iſſue out by the cod; whereas, when they are gelt very young, as is the practice with ſome, the *tunica albuginea*, or ſtrings as they are vulgarly called, being but weak, they often break, probably occaſioning inflammations, &c. which certainly ought to be avoided, if poſſible. This occaſions more to die, when they are gelt young, by the operation, than when cut at two months old.

" I mentioned having the moon in decreaſe when I have my lambs, &c. gelt, which by ſome, perhaps, will be thought a circumſtance not worth notice: but let ſuch only attend to the wonderful effects the luminaries have on fluids, as well the juices of the animal œconomy, as others, when they are in the poſitions that conſtitute new and full moon; and they will, I dare ſay, be diſpoſed to think the hint is not quite impertinent.

" The reaſonableneſs of my concluſion is not deduced from argument only, but has the authority of experiment, as follows:

" I attempted to geld my lambs, one year, juſt at full moon: the firſt lamb that was cut bled very ſorely; the next did the ſame. I tried as far as half a dozen, and none of them were otherwiſe. I then apprehended there was danger, ſo deferred cutting any more for five days, when there was a great abatement in the bleeding: beſides, one of the ſix gelt at full moon dropt, and none of the others that were gelt five days after did, although they were above twenty times the number of the former (the weather and uſage were nearly the ſame.) This, I own, carried conviction enough for me. Thoſe that will not be convinced by my relation of this fact, I, notwithſtanding, do heartily wiſh them no worſe luck than I have had in that way; but withal they had as good uſe circumſpection. *Muſeum Ruſticum, vol.* IV. *page* 331.

RAMPION, the name of a beautiful flower cultivated in curious gardens.

The crimſon rampion is greatly prized by the curious, for the beauty of its rich crimſon flowers, which exceed all the flowers I have yet ſeen, in the deepneſs of its colour: and theſe commonly, when their roots are ſtrong, produce large ſpikes of theſe flowers, which continue a long time in beauty, and make a moſt magnificent ſhew amongſt other flowers. The time of their flowering is commonly in July and Auguſt; and if the autumn prove very favourable, they will ſometimes produce good ſeeds in England. Theſe plants are natives of Virginia and Carolina, where they grow by the ſides of rivulets, and make a moſt beautiful appearance; from whence the ſeeds are often ſent into England. Theſe ſeeds commonly arrive here in the ſpring; at which time they ſhould be ſown in pots filled with light earth, and but juſt covered over; for, if the ſeeds are buried deep, they will not grow. Theſe pots ſhould be placed under a frame, to defend them from cold, until the ſeaſon is a little advanced; but they ſhould not be placed on an hot-bed, which will alſo deſtroy the ſeeds.

When the weather is warm, towards the middle of April, theſe pots ſhould be placed in the open air, in a ſituation where they may have the morning ſun till twelve o'clock, obſerving to water them conſtantly in dry weather; and, when the plants are come up, and are grown pretty ſtrong, they ſhould be tranſplanted each into a ſmall pot filled with freſh light earth, and placed in the ſame ſituation, obſerving to water them in dry weather; and, in winter, they ſhould be placed under an hot-bed frame, where they may be ſheltered from ſevere froſts; but, in mild weather, they ſhould be as much expoſed to the open air as poſſible.

The March following theſe plants ſhould be put into larger pots filled with the ſame freſh earth, and placed, as before, to the morning ſun; obſerving to water them in dry weather, which will cauſe them to flower ſtrong the autumn following.

Theſe plants are alſo propagated by parting of their roots: the beſt ſeaſon for which is, either ſoon after they are paſt flower, or in March; obſerving to water and manage them, as hath been directed for the ſeedling plants both in winter and ſummer. *Miller's Gard. Dict.*

RANUNCULUS, or *Crowfoot*, the name of a very beautiful flower, greatly cultivated, and much admired.

There are a great variety or ſpecies of ranunculus; but that called the Perſian ranunculus being univerſally admired, we ſhall only give the method of cultivating it.

The beds in which the Perſian ranunculus roots are planted, ſhould be made with freſh light ſandy earth, at leaſt three feet deep; the beſt ſoil for them may be compoſed in this manner, viz. take a quantity of freſh earth from a rich upland paſture, about ſix inches deep, together with the green ſward: this ſhould be laid in heaps to rot, for twelve months before it is mixed, obſerving to turn it over very often, to ſweeten it, and break the clods: to this you ſhould add a fourth part of very rotten neat's dung, and a proportionable quantity of ſea or drift ſand, according as the earth is lighter or ſtiffer; if it be light, and inclining to a ſand, there ſhould be no ſand added; but if it be an hazel loam, one load of ſand will be ſufficient for eight loads of earth: but if the earth is ſtrong and heavy, the ſand ſhould be added in a greater proportion: this ſhould be mixed ſix or eight months before it is uſed; and you ſhould often turn it over, in order to unite their parts well together, before it is put into the beds.

The depth which this ſhould be laid in the beds, muſt be about three feet; this ſhould be below the ſurface, in proportion to the dryneſs or moiſture of the place where they are ſituated; which, in dry ground, ſhould be two feet eight inches below the ſurface, and the beds raiſed four inches above; but in a moiſt place they ſhould be two feet four inches below, and eight above the ground; and, in this caſe, it will be very proper to lay ſome rubbiſh and ſtones at the bottom of each bed, to drain off the moiſture; and if, upon this, at the bottom of the beds, ſome very rotten neat's dung is laid two or three inches thick, the roots will reach this in the ſpring, and the flowers will be the fairer. This earth I would by no means adviſe to be ſkreened very fine: only, in turning it over each time, you ſhould be careful to break the clods, and throw out all large ſtones, which will be ſufficient; for if it is made very fine, when the great rains in winter come on, it will cauſe the earth to bind into one ſolid lump, whereby the moiſture will be detained, and the roots, not being able to extend their tender fibres, will rot.

The beds, being thus prepared, ſhould lie a fortnight to ſettle, before the roots are planted, that there may be no danger of the earth ſettling unequally after they are planted; which would prejudice the roots, by having hollow places in ſome parts of the bed, to which the water would run and lodge, and ſo rot the roots in ſuch places. Then having levelled the earth, laying the ſurface a little rounding, you ſhould mark out the rows by a line, at about ſix inches diſtance each way, ſo that roots may be planted every way in ſtraight lines; then you ſhould open the earth with your fingers at each croſs, where the roots are to be planted, about two inches deep; placing the roots exactly in the middle, with their crowns upright; then with the head of a rake, you ſhould draw the earth upon the ſurface of the bed level, whereby the top of the roots will be about an inch covered with earth, which will be ſufficient at firſt. This work ſhould be done in dry weather, becauſe the earth will then work better than if it were wet; but the ſooner after planting there happens to be rain, the better it will be for the roots, for if it ſhould prove dry weather long after, and the earth of the beds be very dry, the roots will be ſubject to mould and decay; therefore, in ſuch a caſe, it will be proper to give a little water to the beds, if there ſhould no rain happen in a fortnight's time, which is very rare at that ſeaſon of the year; ſo that they will ſeldom be in danger of ſuffering that way.

When the roots are thus planted, there will no more be required until towards the end of November; by which time they will begin to heave the ground, and their beds appear; when you ſhould lay a little of the ſame freſh earth, of which the beds were compoſed, about half an inch thick all over the beds, which will greatly defend the crown of the root from froſt: and when you perceive the buds to break through this ſecond covering, if it ſhould prove a very hard froſt, it will be very proper to arch the beds over with hoops, and cover them with mats, eſpecially in the ſpring, when the flower buds will begin to appear; for if they are expoſed to too much froſt, or blighting winds, at that ſeaſon, their flowers ſeldom open fairly, and many times their roots are deſtroyed: but this happens more frequently to the Perſian kinds, which are tenderer, than to thoſe ſorts which are pretty hardy; for which reaſon they are commonly planted in open borders, intermixed with other flowers, though in very hard winters theſe are apt to ſuffer, where care is not taken to guard off the froſt.

In the beginning of March the flower ſtems will begin to riſe, at which time you ſhould carefully clear the beds from weeds, and ſtir the earth with your fingers between the roots, being very careful not to injure them; this will not only make the beds appear handſome, but alſo greatly ſtrengthen their flowers. When the flowers are paſt, and the leaves are withered, you ſhould take up the roots, and carefully clear them from the earth; then ſpread them upon a mat to dry, in a ſhady place; after which they may be put up in bags or boxes, in a dry room, until the October following, which is the ſeaſon for planting them again. *Miller's Gard. Dict.*

RAPE, the name of a plant much cultivated for its ſeed, and alſo as a food for cattle. *See the article* COLE.

RASPBERRIES, the name of a ſhrub, of which there are three different kinds; the common, or wild; the large red garden raſpberry; and the white. They all ripen about the beginning of July.

Theſe plants are generally propagated by ſlips, or ſuckers, but layers are far preferable, becauſe they will be much better rooted. Their fibres ſhould be ſhortened when they are tranſplanted; but the buds, which are placed at a ſmall diſtance from the ſtem of the plant, muſt not be cut off, becauſe they produce new ſhoots the following ſummer. A freſh ſtrong loam in a ſhady ſituation is that in which they thrive beſt, and produce the faireſt fruit, eſpecially if they are planted two feet aſunder every way, in borders of a moderate breadth: for if there be not room for the air to paſs freely between them, they never produce their fruit in ſo great a quantity, nor does it grow ſo large, or ripen ſo kindly, as when they ſtand at ſufficient diſtances from each other. To promote this they muſt be kept clear from weeds; and to let the ſun in among them to ripen their fruits, their heads ſhould be cut off juſt above the bearing part, a fortnight or three weeks before the fruit begins to ripen. It is upon this principle that Mr. Miller adviſes ſetting them about two feet aſunder in the rows, and leaving a ſpace of four or five feet between row and row. March is the uſual time for planting them.

When they are dreſſed, the ſeaſon for which is in October, all the old wood, which produced fruit the preceding ſummer, ſhould be cut down below the ſurface of the ground, and the young ſhoots of the ſame year muſt be ſhortened to the length of about two feet. The intervals between the rows ſhould then be well dug, to lay freſh earth to the roots; and if a very little rotten dung is buried therein, the plants will ſhoot the more vigorouſly in the following ſummer, and produce the finer fruit. During the ſummer, they will require no other culture than keeping them clear from weeds.

Theſe plantations ſhould be renewed every third or fourth year; after that their fruit dwindles greatly, both in quality and in quantity.

RAT, the name of a well known animal, very troubleſome to the farmer, &c.

We ſhall here give the two following receipts, as they are ſaid to be effectual, for deſtroying rats.

The firſt has the ſanction of the Dublin ſociety, who on the 19th of November 1762, ordered a premium of five guineas to one Laurence O'Hara, for this diſcovery; which is "one quart of oat-meal, four drops of rhodium, one grain of muſk, and two nuts of nux vomica finely raſped." This mixture is to be made up in pellets, and laid in the holes and places which the rats frequent.

The other receipt is thus: "Take of the ſeeds of ſtaves-acre, or louſe-worth, powdered, one fourth part, and of oatmeal three parts; mix them well and make them up into a paſte with honey. Lay pieces of it in the holes, and on the places frequented by rats or mice, and it will kill ſuch of thoſe vermin as eat thereof." *Gent. Mag. March* 1763.

The firſt ſtep taken by rat-catchers, in order to clear a houſe, &c. of thoſe vermin, is to allure them all together to one proper place, before they attempt to deſtroy them; for there is ſuch an inſtinctive caution in theſe animals, accompanied with a ſurpriſing ſagacity in diſcovering any cauſe of danger, that, if any of them be hurt, or purſued, in an unuſual manner, the reſt take the alarm, and become ſo ſhy and wary, that they elude all the devices and ſtratagems of their purſuers for ſome time after. This place, where the rats are to be aſſembled, ſhould be ſome cloſet, or ſmall room, into which all the openings, but one or two, may be ſecured: and this place ſhould be, as near as may be, in the middle of the houſe, or buildings. It is the practice, therefore, to attempt to bring them all together to ſome ſuch place, before any attempt be made to take them; and, even then, to avoid any violence, hurt, or fright to them, before the whole be in the power of the operator.

The means uſed to allure them to one place are various: one of thoſe moſt eaſily and efficaciouſly practiſed is, the trailing ſome piece of their moſt favourite food, which ſhould be of the kind that has the ſtrongeſt ſcent, ſuch as toaſted cheeſe, or broiled red-herring, from the holes or entrances to their receſſes in every part of the houſe, or contiguous buildings, whence it is intended to allure them. At the extremities, and in different parts of the courſe of this trailed tract, ſmall quantities of meal, or any other kind of their food, ſhould be laid, to bring the greater number into the tracks, and to encourage them to purſue it to the center place, where they are intended to be taken: at that place, where time admits of it, a more plentiful repaſt is laid for them, and the trailing repeated for two or three nights.

Beſides this trailing, and way-baiting, ſome of the moſt expert of the rat-catchers have a ſhorter, and perhaps more effectual, method of bringing them together; which is, the calling them, by making ſuch a kind of whiſtling noiſe as reſembles their own call; and by this means, with the aſſiſtance of the way-baits, they call them out of their holes, and lead them to the repaſt prepared for them at the place deſigned for taking them. But this is much more difficult to be practiſed than the art of trailing; for the learning the exact notes, or cries, of any kind of beaſts or birds, ſo as to deceive them, is a peculiar talent, not eaſily attained to in other caſes.

In the practiſing either of theſe methods, of trailing or calling, great caution muſt be uſed, by the operator, to ſuppreſs and prevent the ſcent of his feet and body from being perceived; which is done by overpowering that ſcent by others of a ſtronger nature. In order to this, the feet are to be covered with cloths rubbed over with aſſa fœtida, or other ſtrong ſmelling ſubſtances; and even oil of rhodium is ſometims uſed for this purpoſe, but ſparingly on account of its dearneſs, though it has a very alluring, as well as diſguiſing effect, as will be obſerved below. If this caution of avoiding the ſcent of the operators feet, near the track, and in the place where the rats are propoſed to be collected, be not properly obſerved, it will very much obſtruct the ſucceſs of the attempt to take them; for they are very ſhy of coming where the ſcent of human feet lies very freſh, and intimates, to their ſagacious inſtinct, the preſence of human creatures, whom they naturally dread. To the above-mentioned means of alluring by trailing, way-baiting, and calling, is added another of very material efficacy, which is, the uſe of oil of rhodium, which, like the marum lyriacum in the caſe of cats, has a very extraordinary faſcinating power on theſe animals. This oil is extremely dear, and therefore ſparingly uſed. It is exhaled in a ſmall quantity in the place, and at the entrance of it, where the rats are intended to be taken, particularly at the time when they are to be laſt brought together, in order to their deſtruction; and it is uſed alſo, by ſmearing it on the ſurface of ſome of the implements uſed in taking them by the method below deſcribed: and the effect it has in taking off their caution and dread, by the delight they appear to have in it, is very extraordinary.

It is uſual, likewiſe, for the operator to diſguiſe his figure as well as ſcent; which is done by putting on a ſort of gown or cloak, of one colour, that hides the natural form, and makes him appear like a poſt, or ſuch inanimate thing; which habit muſt likewiſe be ſcented as above, to overpower the ſmell of his perſon: and beſides this, he is to avoid all motion, till he has ſecured his point of having all the rats in his power.

When the rats are thus enticed and collected, where time is afforded, and the whole in any houſe and out-buildings are intended to be cleared away, they are ſuffered to regale on what they moſt like, which is ready prepared for them, and then to go away quietly for two or three nights; by which means thoſe, which are not allured the firſt night, are brought afterwards, either by their fellows, or the effects of the trailing, &c. and will not fail to come duly again, if they are not diſturbed or moleſted. But many of the rat-catchers make ſhorter work, and content themſelves with what can be brought together in one night or two; but this is never effectual, unleſs where the building is ſmall and entire, and the rats but few in number.

The means of taking them, when they are brought together, are various. Some entice them into a very large bag, the mouth of which is ſufficiently capacious to cover nearly the whole floor of the place where they are collected: which is done by ſmearing ſome veſſel, placed in the middle of the bag, with oil of rhodium, and laying in the bag baits of food. This bag, which before lay flat on the ground with the mouth ſpread open, is to be ſuddenly cloſed when the rats are all in it. Others drive, or fright them, by ſlight noiſes or motions, into a bag of a long form, the mouth of which, after all the rats are come in, is drawn up to the opening of the place by which they entered, all other ways of retreat being ſecured. Others, again, intoxicate or poiſon them, by mixing with the repaſt prepared for them, the coculus Indicus, or the nux vomica. A receipt for this purpoſe has appeared, which directed four ounces of the coculus Indicus, with twelve ounces of oatmeal, and two ounces of treacle or honey, made up into a moiſt paſte with ſtrong beer; but if the nux vomica be uſed, a much leſs proportion will ſerve than is here given of the coculus. Any ſimilar compoſition of theſe drugs, with that kind of food the rats are moſt fond of, and which has a ſtrong flavour, to hide that of the drugs, will equally well anſwer the end. If, indeed, the coculus Indicus be well powdered, and infuſed in the ſtrong beer for ſome time, at leaſt half the quantity here directed will ſerve as well as the quantity before-mentioned. When the rats appear to be thoroughly intoxicated with the coculus, or ſick with the nux vomica, they may be taken with the hand, and put into a bag or cage, the door of the place being firſt drawn to, leſt thoſe which have ſtrength and ſenſe remaining eſcape.

By theſe methods, well conducted, a very conſiderable part of the rats in any farm, or other houſe, and the contiguous buildings, may be taken. *Muſeum Ruſticum, vol.* I. *page* 395.

RAT-TAILS, excreſcences which creep from the paſtern to the middle of the ſhanks of a horſe, and are ſo called from the reſemblance they bear to the tail of a rat. Some are moiſt, others dry; the former may be treated with drying ointment and waſhes, the latter with mercurial ointment. If the hardneſs does not ſubmit to the laſt medicine, it ſhould be pared off with a knife, and dreſſed with turpentine, tar, and honey, to which verdigreaſe or white vitriol may occaſionally be added; but before the uſe of the knife you may apply this ointment.

> Take black ſope, four ounces, quick-lime, two ounces, vinegar enough to make an ointment. *Bartlet's Fariery, page* 296.

RED-CLOVER. *See the article* CLOVER.

RED-GAME, an Engliſh name of a bird, common in the mountainous parts of Yorkſhire, and ſome other of our northern counties. It is of the ſhape of a partridge, but much larger, and of a mixed colour of red and black, and is feathered down to the ends of the toes.

RED-LAND, a term much uſed by huſbandmen to expreſs a ſandy ſoil of a reddiſh hue, interſperſed for the moſt part with pieces of ſand-ſtone of the ſame colour, or ſomewhat deeper.

There are ſeveral varieties of this ſoil, one of which is almoſt entirely made up of ſand; another with an admixture of clay with the ſand, the whole making a looſe loamy earth; and a third, full of fragments, of a poor ſandy iron ore, and often containing ſhining ſpecks of ſelenitæ. *Moreton's Northamptonſhire.*

RED-WORM, the name of an inſect very deſtructive to young corn.

" I have often (ſays Mr. Baker, in his report to the Dublin Society) heard of the havock which red-worms make in young wheat, barley, and oats; and in ſome few writers upon huſbandry have read of them: but never ſaw them till May 1764; when to my great mortification, in a few days, they deſtroyed, almoſt totally, nine acres of my wheat, for I did not reap above half a barrel per acre. This misfortune induced me to propoſe to the conſideration of the Dublin Society, whether the offer of a premium might not probably produce a diſcovery of ſome effectual method for deſtroying ſo injurious an inſect, to the infinite advantage of the public: and the ſociety were pleaſed to offer a premium accordingly.

" I now have the honour to lay before them, what has occurred to me upon that ſubject.

" The moſt ingenious M. de Chateauvieux ſpeaks of an inſect, which is certainly the ſame kind, if it be not the very inſect which I have now under conſideration. This gentleman, after ſaying, " our wheat, in the month of May, 1755, ſuſtained a loſs, which even that cultivated according to the New Huſbandry did not eſcape, deſcribes the worm thus: we found in it many little white worms, which afterwards became of a cheſtnut colour. They poſt themſelves between the blades, and eat the ſtems. They are uſually found between the firſt joint and the roots; every ſtalk, which they attacked, grew no more, but became yellow, and withered. The ſame misfortune happened to us in the year 1732. The inſects appeared about the middle of May, and made ſuch havock, that the crops were almoſt deſtroyed.”

“ It perhaps might be expected, that this great man ſhould have made the very enquiry which we are now upon, as the loſs appears to have been very great in Geneva, at the two periods which he mentions: but when we conſider, how much the high office, which he held in the city and republic of Geneva, muſt have engaged his attention, it is rather aſtoniſhing, that he could oblige the world ſo much as he hath done, by his repeated experiments in huſbandry, and his judicious obſervations upon them: it is therefore leſs to be wondered at, that this circumſtance eſcaped him.

“ The ingenious Mr. Benjamin Stillingfleet alſo, in the ſecond edition of his Miſcellaneous Tracts, in a note, p. 175-6, ſpeaks of an inſect, which is probably the ſame as that which we are ſeeking to deſtroy. His words are,

“ Thus in Suffolk, and in ſome parts of Norfolk, the farmers find it their intereſt to encourage the breed of rooks, as the only means to free their grounds from the grub, from which the tree or blind-beetle comes, and which in its grub ſtate deſtroys the roots of corn and graſs, to ſuch a degree, that I myſelf have ſeen a piece of paſture-land, where you might turn up the turf with your feet.

“ Mr. Matthews, a very obſerving and excellent farmer, of Wargrove in Berkſhire, told me, that the rooks one year, whilſt his men were houghing a turnep field, ſate down in part of it, where they were not at work, and that the crop was very fine in that part, whereas in the other part there were no turneps that year.

“ We ſee, that M. de Chateauvieux deſcribes this worm as being firſt white, and afterwards becoming of a cheſtnut colour. I have carefully ſought them at different periods during the paſt year, but always found them of the ſame cheſtnut colour, never varying in any particular, except that of ſize, which I find to be the caſe at all ſeaſons, in which I have ſeen them.

“ The inſect which Mr. Stillingfleet ſpeaks of, he calls a grub, which, he ſays, deſtroys corn and graſs: this induces me to believe, that it is the ſame inſect (though the report which he relates from Mr. Matthews ſeems to contradict it) becauſe I have obſerved, that the red or cheſtnut worm, never appears voluntarily upon the ſurface; but, when the earth is turned up, either with plough or ſpade, the rooks and crows are very bold in their approach to pick them up; a circumſtance, which I own has in ſome degree abated my enmity to theſe birds: I therefore never deſtroy nor frighten them off my land whilſt I am ploughing it; but when I ſow, when the corn riſes, and when it is ripe, I deſtroy or baniſh them as well as I can, becauſe the miſchief which they do at thoſe times is intolerable.

“ A member of the Dublin Society informed me laſt ſummer, that ſome of his turneps were deſtroyed by a worm; I had ſome few which decayed in their leaves, and became of a lemon colour, preceding the putrefaction which followed, and deſtroyed the turneps: I examined their roots, but could not diſcover any inſect which had injured them, and therefore I cannot pronounce that it is the red-worm which deſtroyed this gentleman's turneps; but I ſhall be very watchful with reſpect to this circumſtance, upon every opportunity which may preſent itſelf.

“ I have obſerved my lucerne to decay in its tops, ſoon after it has been up; and upon examining the roots, I have found the red-worm, which had cut them off.

“ This inſect ſeems to be every where in Ireland called the red-worm; by ſome of the Engliſh writers who have ſpoken of an inſect, which deſtroys corn in the manner already mentioned; which I think is undoubtedly the ſame: it is called a grub, by others the large maggot, and the rook worm, becauſe the rooks eat it; but as none of the writers have given any other deſcription of it, than the name by which they reſpectively call it, I ſhall endeavour to deſcribe it.

“ Red-worms are about half an inch long, and about one tenth of an inch in diameter: they are jointed in their ſkins, and are of a very firm texture: they have many ſhort legs, two ſmall black ſpecks, which appear to be their eyes; and two ſmall points ſpringing from their heads, with which I believe they cut the corn; and which, in that work, I apprehend, act like forceps: and all that I have ſeen of this ſpecies, are of a bright cheſtnut colour. For this reaſon, I ſhould conceive it would be more deſcriptive to call them the cheſtnut worms.

“ When they are expoſed to the air, by turning up the earth which is infeſted with them, they will very ſoon cover themſelves again in the ſoil, which they are very capable of doing, by the ſtrength which their make gives them, although they appear to be a ſluggiſh inſect, and have not the advantage of a ſliminess upon their ſkins, which the common large creeping worm has, which enables that inoffenſive worm to penetrate the earth, and get under timber and ſtones with eaſe.

“ The red-worm, immediately endeavouring to cover itſelf from the air, is certainly from natural inſtinct, as it will ſoon die, when expoſed to the air; as will appear by the experiment, Numb. 10, hereafter mentioned.

“ Theſe worms deſtroy wheat, barley, oats, and lucerne, whilſt in an infant ſtate, in the months of March, April, and May. Late-ſown barley and oats, they will deſtroy as late as June. I have not yet experienced, that they deſtroy any other crops.

“ The miſchief done by them is in dry weather. Rain ſufficient to penetrate the ground, makes them deſiſt from deſtroying the corn; and, I ſuppoſe, every thing elſe which they at any time injure.

“ They cut wheat off, juſt above the crown of the roots; barley and oats in the ſame place, and alſo higher up, upon any part of the ſtem, which is below the ſurface of the earth.

“ Theſe worms ſeem to abound more in ground which is lightly tilled, than in ſuch as hath been well tilled; but, in lay ground, they ſeem to be more numerous than any where elſe: and the fields upon my farm, in which I have found them, are wetter than other fields where they are not; whether that circumſtance contributes to their increaſe, I cannot ſay; but the following experiments prove, that they will live longer in water than they can, when expoſed to the open air.

“ *Experiments on Red-worms.*

“ Numb. 1. I put ten red-worms into a wine-glaſs with common ſalt in it. They were all dead in four hours.

“ Numb. 2. Into a glaſs with brine in it I put ten red-worms. They were all dead in ſix hours.

“ Numb. 3. Into a glaſs with lime in it, which had been ſlaked for a long time, and expoſed to the weather, I put the like number. They were all dead in forty-four hours.

“ Numb. 4. Into a glaſs with the above lime, and ſome water in it, I put the like number. They were dead in twenty hours.

“ Numb. 5. Into a glaſs with lime newly ſlaked, and when cold, I put the like number. They were dead in fourteen hours.

“ Numb. 6. Into lime-water, made with cold water, I put the like number. They were dead in ten hours.

“ Numb. 7. Into a glaſs with ſoot in it, I put the like number. They were dead in four hours.

“ Numb. 8. Into ſoot and water, I put the like number. They were dead in four hours.

“ Numb. 9. Into fair water, I put the like number. They were dead in fifty-two hours.

“ Numb. 10. Into a glaſs, without any thing in it, I put the like number. They were dead in thirty-two hours.

“ By theſe experiments we ſee all the articles uſed will kill this inſect in a ſhort time, particularly the ſalt and ſoot. I thought it neceſſary to conſider different articles, the better to ſuit different parts of the kingdom.

“ Where lime can be conveniently had, and that it is uſed as a manure, I am apt to believe, from the experiments, that no injury can be ſuſtained from theſe worms; but I am afraid a ſmall quantity will not effectually deſtroy them; beſides, I ſhould fear, if it were not put on before the ſowing of the corn, that it might ſinge the blades of the corn; for, from the experiments, it appears, that lime newly ſlaked, is more ſuddenly deſtructive to them than old lime, and therefore it is to be preferred.

"Where lime is uſed for no other purpoſe than to deſtroy this worm, I ſhould conceive, that about eight barrels, regularly ſown by hand on an acre of ground, might be ſufficient: it muſt be firſt ſlaked and cold before a man can poſſibly caſt it upon the ground with his hand, lime being a very ſtrong cauſtic; and, even when it is cold, the man ſhould have a thick glove upon his hand.

"Where ſalt ſhall be uſed to deſtroy this worm, it muſt always be ſown upon the ground, before the intended crop; for, although corn will vegetate, and receive benefit from ſalt as a manure, when it is uſed antecedent to the ſowing the corn, yet, if it be added after the corn is growing, it will certainly deſtroy it: and therefore, it ſhould never be uſed for this purpoſe, but before the corn is ſown, or at leaſt before it vegetates.

"I conceive that where ſalt is uſed for this purpoſe only, about four hundred and a half to an acre will anſwer the purpoſe, which is a trifle more than one ounce to every ſquare yard.

"We ſee by the experiment, that ſoot kills this worm as ſoon as ſalt; and, as in moſt places it is to be had at a much leſs price than ſalt, I think there can be no doubt about preferring of it; beſides which, it may be ſafely uſed after the corn is up.

"I had ſome ſmall parcels of barley under experiments, which theſe worms began to deſtroy; and in order to convey the ſoot as ſoon as poſſible to the roots of the plants, I mixed a little of it in water, and poured it on the plants with a garden watering-pot; the conſequence was, that I did not loſe one plant afterwards.

"It will hardly be imagined, that I mean that the ſame method is to be purſued upon a whole farm: no; the method I would recommend to the practice of the farmer is this, to ſpread or caſt by hand, as he ſows his corn, about ſix or eight barrels of ſoot on an acre, and let him be careful to chooſe a calm day for the work, otherwiſe the wind will carry away great part of it: and as what remains cannot be regularly diſpoſed, let him be careful to do it early enough in the ſpring, that the rain may waſh the ſoot and convey it to the roots of the plants, before the worm begins the miſchief; if he does this, I am perſuaded his crop will be preſerved.

"We ſee by the experiments, that this worm will live longer in water, by twenty hours, than when expoſed to the open air; but at length, i. e. in fifty-two hours, they died in the water; perhaps this might be from the effect of drowning; but if ſo, I might have expected they would have been totally deſtroyed in my two fields in the winter of 1763 and 1764, by the immoderate rains which fell at that ſeaſon for a long continuance, by which the land was often flooded. But they ſurvived that winter, as appeared by the great loſs I afterwards ſuſtained, by their deſtroying my wheat; and therefore, whether water be an enemy to them or not, it ſeems not eaſy to determine: but if theſe which died in the glaſs of water were really drowned; yet, I think we may conclude, that water is neceſſary to their exiſtence in the earth, and propably aids them in getting their food from it: and what ſeems to confirm this notion is, that when the land is wet, they do not touch the corn, but as ſoon as ever the land is dry, they begin their miſchief. However, this ſpeculation I muſt ſubmit to the conſideration of perſons more capable of diſcuſſing it than I am.

"We ſee by the experiment, Numb. 10, that they cannot live in the open air; which ſeems to prove, that, where they abound in land, the oftener it is ploughed, particularly in the ſummer, when they cannot penetrate the ground ſo eaſily as when it is moiſt, they muſt be, by ſuch ploughing, greatly diminiſhed; beſides which, the frequent ploughing gives the crows more opportunities of picking them up, in which, as I before ſaid, they are very watchful.

"Frequent ploughing has been recommended by ſome writers, as the only means of deſtroying this worm; and they have recommended the ploughs being ſtuck with nails, urging, that by thoſe nails the worms are cut to pieces; others have recommended walnut leaves being ſoaked in water, to ſprinkle the land; and ſteeping ſeed-corn in various liquors, as infallible remedies: but ſuch methods as theſe are founded upon miſtaken principles; they only miſlead the farmer, and muſt diſappoint him.

"Worlidge recommends a ſtrong lye made of fixed ſalts, but that would be impracticable. Mortimer recommends ſea-water, for ſuch lands as are near the ſea-coaſt, which I believe would anſwer very well. He ſays he uſed ſoot once with ſucceſs, but that it did not ſucceed with him afterwards. I am perſuaded he did not uſe the ſoot early enough to have it waſhed into the ground by rain, or perhaps he uſed too ſmall a quantity.

"I would not be thought to arrogate any merit to myſelf, on account of what I have here offered, on this ſubject, ſince it appears, that other perſons have uſed the articles which I have recommended, againſt this common enemy; but many perſons have been diſappointed in their expectations from theſe remedies, which muſt have ariſen from their either having uſed too ſmall a quantity, or not having obſerved the neceſſary precautions; if thoſe, which I have recommended, ſhall be put in practice, and found to anſwer, I ſhall think myſelf amply rewarded."

REEK. *See the article* STACK.

REEK-STAVEL, *or* REEK-STAFFOLD, a frame of wood placed on ſtones, on which the mow or ſtack is raiſed.

REED, the name of an aquatic plant, infeſting low paſture lands.

The beſt method of deſtroying reeds, is by draining the land; for if the drains be cut deeper than their roots, it will take away their nouriſhment, and, conſequently, deſtroy them. Aſhes, or ſoot, will likewiſe kill them; and ſo will ploughing up the land, and laying it in high ridges. They always indicate a good ſoil, for a bad one will not nouriſh them.

RESERVOIR, a baſon, or receptacle for water. *See the article* BASON.

REY-*graſs*, a hardy ſort of graſs, much eſteemed among the farmers for that quality. It will grow on any land, and therefore produces crops where nothing elſe will. It thrives beſt of all on ſour, clayey, and weeping grounds, and equally endures the ſevereſt droughts of ſummer, and froſts of winter, ſuffering no damage from either. It is the beſt of all winter foods for cattle, the ſhorter it is eaten the better, and it ſprings the earlieſt of any. There is no danger of over-ſtocking it, for, if it be left to grow too much, the ſtalk becomes hard and ſticky. It is beſt for horſes and for ſheep, and very much prevents the rotting of the latter. The beſt way of ſowing it is with clover. The common quantity of ſeed is two buſhels to an acre, but three buſhels is much better; though in ſome lands, where the clover is likely to ſucceed very well, they ſow eight pounds of clover ſeed and one buſhel of rey-ſeed to an acre, and this makes a crop that will laſt ſeven or eight years.

Some mow it as hay, and thraſh it for the ſeed, which, about London, ſells from half-a-crown a buſhel to three ſhillings. Four or five quarters of this ſeed will be ſometimes produced from an acre of the graſs. If at any time a field of this graſs is found to grow thin, it is only neceſſary to ſtrew on a buſhel of the ſeed, and roll it with a wooden roller, and the plants riſing from this addition will make the whole crop ſufficiently thick. Rey graſs has this great advantage, that it kills weeds without any other ſown plant; even thiſtles cannot grow among it. When the rey-graſs is cut for hay before perfectly ripe, the hay is the better; but the ſeed will not grow ſo well. When the ſeed is newly thraſhed, it muſt not be laid too thick, for it is very apt to heat and ferment, and the whole will be ſpoiled. *Mortimer's Huſbandry*, *vol.* I. *pag.* 40.

RICE, the name of a plant cultivated in many parts of the eaſt, in South-Carolina, and alſo in Spain, Italy, and Piedmont.

The plant grows to the height of about two feet and a half, with a ſtalk not unlike that of wheat, but fuller of joints, and with leaves reſembling thoſe of a leek. It branches out into ſeveral ſtems, at the top of which the grains grow in cluſters, and each of them is terminated with an arum or beard, and incloſed in a yellow rough huſk. When ſtripped of this they appear to be of an oval ſhape, of a ſhining white colour, and almoſt tranſparent.

The following account of the culture of rice in China, is taken from M. Duhamel's Huſbandry.

"1. To haſten the ſprouting of the rice, it is put into baſkets, and ſoaked for ſome days in a ſtanding water.

"2. When their rice grounds are ſo ſoaked with water as to be quite like mud, they plow them with a buffalo yoked to a plough very ſimple in its make, having but one ſhare, one handle, and no wheels.

"3. After a gentle rain, they break the clods with a kind of large hurdle, drawn by a buffalo; the driver ſitting upon it, to increaſe the weight.

"4. The ground is cleared of all ſtones, and whatever roots are in it are pulled up by a ſtrong harrow, with great iron teeth. This inſtrument is drawn by a buffalo, and a man guides it with the help of two handles, like thoſe of a plough, upon which he leans hard. The earth is like mud, and partly covered with water during all this operation.

"5. The earth is afterwards ſmoothed with a harrow, which has ſeveral rows of teeth. A man guides this harrow by its two handles, whilſt a buffalo draws it; and as faſt as its teeth form little channels in the ground, the water runs in, and fills them up.

"6. When the rice that was laid to ſoak has ſprouted, the ſeed is known to be good; and it is then ſown by hand, very thick, and as equally as poſſible. Only part of the ground is ſown in this manner, to furniſh plants for the reſt.

"The day after it has been ſown, the points of the plants appear above the ſurface of the water: for the ground is overflowed all this time with juſt enough water to cover it.

"7. When the plants have acquired a little ſtrength, they are ſprinkled with lime water, to deſtroy the inſects and ſome of the weeds that would hurt them. For this purpoſe a ſmall baſket is faſtened to the end of a long handle, and dipt in the lime-water, which runs through it, as it is conveyed over the plants.

"The Chineſe have a great veneration for the firſt inventor of this method, which anſwers to our cuſtom of ſteeping wheat in lime-water, or manuring land with quick-lime.

"8. Towards April, when the plants are grown ſtrong enough to cover the whole field, and look very green and even, the greateſt part of them is pulled up by handfuls, all the mud is carefully waſhed off their roots, and, being held all this time as even as poſſible with one another, they are planted in tufts, pretty far aſunder, and in a quincunx form, in fields prepared on purpoſe for them. A ſerene day is choſen for this operation, which muſt be performed as quick as poſſible.

"This practice of the Chineſe is with reſpect to the common culture of rice, what the new huſbandry is with reſpect to the common culture of wheat.

"9. The rice muſt be watered: which is always done in China, by overflowing it. To this end, the rice grounds are always near a rivulet, pond, or great pool of water, from which they are ſeparated only by a bank or cauſey.

"If the water was higher than the rice ground, a trench cut through the cauſey would overflow it at once: but as it is generally lower, or on a level with the rice ground, the neceſſary quantity is conveyed in pails or buckets, which are worked chiefly by the help of ropes.

"10. Though a man cannot ſtep in theſe rice grounds without being up to his knees, the Chineſe weed them three times in a ſummer; and that with ſuch care, that they pull up even the roots of every weed.

"11. When the rice is ripe, which is known by its turning yellow like wheat, it is cut down with a ſickle, made into ſheaves, and carried to a barn, where it is threſhed with flails pretty much like ours: the ſtraw is removed with pitch-forks and ſhovels, and the outer huſk of the grain is taken off by beating it with great wooden peſtles, or a kind of mallet, after which it is ſifted and winnowed: and, laſtly, to get off the under huſk, the grain is put between two mill-ſtones, which are worked by a lever faſtened to the upper one.

"The two moſt remarkable circumſtances of this culture are, 1. The care which the Chineſe take not to let their plants be too cloſe together, leſt they ſhould rob one another of their food. 2. Their weeding their rice grounds three times in a ſummer, which anſwers the end of the hoeings recommended for the alleys between the beds of other grain, cultivated according to the new huſbandry." *Culture des Terres, Tom. II. p.* 180.

RICK, a pile of corn, hay, ſtraw, &c. regularly heaped up in the open air, and ſheltered from wet. *See* STACK.

A practical farmer has given the following account of the benefits ariſing to the farmer from keeping his wheat-ſtraw in ricks, to be uſed when occaſion requires it.

"Experience will, they ſay, make a fool wiſe: I took the hint, and have ever ſince guarded againſt a misfortune of the like nature.

"I conſtantly, ſays he, every year make a rick of wheat ſtraw, unleſs it happens to be very ſhort, when I keep my rick two years, inſtead of making a new one the ſecond year.

"This may, and doubtleſs will, by ſome of your readers, be thought an unneceſſary expence; yet, as I find it anſwer, I am determined to continue the practice. I not only rick the ſtraw, but I alſo ſlightly thatch the rick to keep out the weather; yet, after all, I ſave by it.

"As I keep a very regular account of my farming expences, I find that in the ſpace of ten years I am a gainer of fifty-three pounds, by ſaving in this manner a rick of ſtraw for thatching, beſides what I ſaved by not threſhing my wheat at an improper ſeaſon. When I ſay I am a gainer of ſo much money in the time, I mean a clear gain: after deducting the expences of making up the rick, thatching it, &c. my expences in thatching for the laſt ten years have been fifty-three pounds leſs than they were the ten preceding years; and this I can eaſily account for, and will, for the ſatisfaction of your readers, at leaſt in part, do it.

"I now always do my thatching work at the moſt convenient ſeaſon, being never in want of ſtraw; and, for the ſame reaſon, as ſoon as any part of my thatching is deficient, I have it immediately repaired, which is a great ſaving.

"My thatching now laſts longer than it uſed to do, for I never thatch with ſhort ſtraw, having always, as I obſerved before, long ſtraw to uſe; for in the years when the ſtraw is long, I ſave the largeſt rick, which I have ſometimes kept two or three years, till the wheat ſtraw has been again long.

"In the ſpace of the laſt ten years I had two accidents happened, which would have proved very expenſive to me, if I could not have reſorted to my ſtraw rick.

"The firſt was, that one of my ſons (a boy about ten years of age at the time) ſet fire to the thatch of a large barn, by means of a ſquib. It burnt furiouſly for ſome time, and ſo far damaged the roof, that I was obliged to have it new thatched; for which purpoſe I made uſe of a part of my ſtraw rick, and it was finiſhed in a few days; whereas, if I had not had this rick, I muſt have bought ſhort ſtraw, for there was ſcarcely any other to be had, at a large price, and the thatching could not have been finiſhed ſo ſoon; by which means I ſhould have had a conſiderable quantity of barley, that was in the barn, damaged, for it rained very hard, for a conſiderable time, in a few days after the thatch was repaired.

"The other accident was occaſioned by a guſt of wind which ſtripped off a good deal of thatch; but it was ſoon repaired, without any damage to the corn that was in the barns at the time.

"All this, perhaps, will not be enough to perſuade your practical readers to rick their long ſtraw. If this is the caſe, they muſt even continue their old practices: yet I hope I may be permitted to ſay one thing, which I know to be true; what I mean is this, that farmers, if they would attend to matters which they generally think beneath their conſideration, would get more money than they do: profits ariſe from what appear to be trifles at firſt ſight, and the mereſt trifle ſhould be by a farmer attended to.

"A habit of induſtry, frugality, œconomy, and perſeverance, is abſolutely neceſſary to the occupier of land, if he does not mean ſoon to ſhift his quarters. *Muſeum Ruſticum, vol.* III. *page* 245.

RIDDLE, an oblong ſort of ſieve uſed to ſeparate duſt, and the ſeeds of plants from corn.

RIDE, a cluſter of ſprigs of hazel, or the underwood, ſhooting out of the ſame root.

RIDGE, a long piece of riſing land between two furrows.

Mr. Tull obſerves, that the method of ploughing lands up into ridges is a particular kind of tillage, the chief uſe of which is the alteration it makes in the degrees of heat and moiſture. But the principal advantage this gentleman propoſes from ridges is the draining wet hills, where the upper ſtratum is mould, and the ſecond ſtratum clay. Theſe ridges he obſerves ſhould be plowed acroſs the hill, almoſt horizontally, that their parting furrows lying open, may each ſerve as a drain to the ridge next below it; for when the plough has made the bottom of theſe horizontal furrows a few inches deeper than the ſurface of the clay, the water will run to their ends very ſecurely, without riſing into the mould, provided no part of the furrows be lower than their ends. Theſe ridges and their parting furrows muſt be made more or leſs oblique, according to the form and declivity of the hill; but the more horizontal they are, the ſooner the rain-water will run off the lands: for in that caſe, it will run to the furrows, and reach them at right angles. Every one of theſe horizontal trenches receives all the water from the rills, or little gutters, which in theſe quagmire-hills run betwixt the mould and the clay; theſe are all cut off by the trenches, which receives the water at their upper ſides, and carry it away, as the gutters of lead, placed under the eaves of a houſe, carry away the rain-water. Theſe ridges ſhould be plowed in pairs, without throwing any earth into the trenches; and at every time of ploughing, the pairs muſt be changed, ſo that the furrow which had two ridges turned towards it one time, muſt have two turned from it the next. *See the article* PLOUGHING.

RIDGES *in a Horſe's Mouth*, are wrinkles or riſings of fleſh in the roof of the mouth, running acroſs from one ſide of the jaw to the other, with furrows between them.

RIDGLING, the male of any beaſt that has been half caſtrated.

RING-BONE, a hard ſwelling on the lower part of the paſtern of a horſe, and generally reaches half round the forepart. It has its name from the reſemblance to a ring.

It often ariſes from ſtrains, &c. and, when behind, from putting young horſes too early upon their haunches; for in that attitude a horſe throws his whole weight as much, if not more, upon his paſterns, than on his hocks.

When it appears diſtinctly round the paſtern, and does not run downwards toward the coronet, ſo as to affect the coffin-joint, it is eaſily cured; but if it takes its origin from ſome ſtrain or defect in the joint originally, or if a calloſity is found under the round ligament that covers that joint, the cure is generally dubious, and ſometimes impracticable; as it is apt to turn to a quittor, and in the end to form an ulcer upon the hoof.

The ring-bones that appear on colts and young horſes, will often inſenſibly wear off of themſelves, without the help of any application; but when the ſubſtance remains, there needs no other remedy beſides bliſtering, unleſs when by long continuance it is grown to an obſtinate hardneſs, and then it may require both bliſtering and firing.

To fire a ring-bone ſucceſsfully, let the operation be performed with a thinner inſtrument than the common one, and let the lines or razes be made not above a quarter of an inch diſtant, croſſing them obliquely, ſomewhat like a chain; apply a mild bliſter over all, and when quite dried up, the rupture plaiſter; and then turn the horſe to graſs for ſome time. *Bartlet's Farriery, page* 264.

RIPPLING *of Flax*, the operation of taking off the ſeed from the flax by drawing it through a ripple, or large comb. *See the article* FLAX.

RISING, yeaſt, or barm.

RIVER, a current, or ſtream of freſh water flowing in a bed, or channel, from its ſource into the ſea.

RIVULET, a little river or ſmall ſtream of water.

ROD, a meaſure in length, conſiſting of ſixteen feet and a half.

ROLLER, a large piece of wood turning on its axis, and drawn over the ſurface of the ground to break the ſmall clods, and render it ſmooth and even.

Spiky ROLLER. *See* SPIKY ROLLER.

ROLLING, the operation of drawing a roller over the ſurface of the ground.

" Rolling, as well as ploughing and harrowing, ſays Mr. Clarke, if admitted in the culture of fallow-lands, would, I preſume, much facilitate eradicating of weeds, and promote the prolific capacity; for it often happens, that after land has been ploughed and worked with the great harrow, &c. there ſtill are graſs and weeds remaining, that will the next ploughing cauſe the furrows to be ropy, and then much labour and time is required to make it to the mind of the judicious huſbandman, which rolling in the following order will be found to elude.

" Thus, when the land has been once ploughed, bracked, and harrowed, immediately give it a double rolling with a ſtone cylinder about four feet long and three feet radius, which, with its furniture, is a roller about one ton weight: the preſſure of ſuch roller, when there is little moiſture in the land, fixes it ſo much, that no weeds nor graſs can vegetate: next, in about a month after, put in manure by another ploughing, viz. dung or compoſt, whereof dung is the major part; but lime is at this time very improper, as it reſiſts putrefaction: then give the land a ſtroke with the great harrow, and roll it as before: this puts the manure, ſoil, and juices in contact; by which, together with the vivifying heat of the ſun, (that muſt be greater on rolled land than on looſe, rough, unſteady particles of earth, becauſe it thereby becomes quieſcent, and the ſurface acquires a kind of poliſh) fermentation and putrefaction muſt be ardently excited.

" That theſe are ſalubrious and moſt powerful agents in the fertiliſing of land, by looſening the compaſſes, and ſetting at liberty the more ſubtile parts of the manure and ſoil, and generating that ſort of air which is found ſo neceſſary to animal as well as vegetable life, none converſant in theſe matters can make the leaſt doubt.

" Now, indeed, may a quantity of quick-lime be applied to great advantage, by being ſpread on the ſurface; for the weeds that are harrowed up, will not only ſoon be diſſolved by it, and converted into nouriſhment for vegetables; but the very principle of vegetation, which is going off in exhalations by the effervescence within, is by it abſorbed, and retained for the nutrition of the crop, which it will communicate when it is ploughed in; and that may be done about fourteen or twenty days after, ſooner or later, as the weather anſwers, or the experimentor ſees it neceſſary: and if it is a ſoil fit to grow turneps, and the ſeaſon proper, the ſeed may be ſown immediately, either in the drill or common way; but the drill, on many accounts, in ſowing turneps, deſerves precedency; or, if it is to be winter corn, one ploughing more, which is the third only, makes it in fine order for the ſeed.

" The utility of rolling does not end here neither; for to roll wheat, rye, barley, &c. with a roller about twice the length, and half the weight of the one above deſcribed, may be advantageous, as it preſſes down the ſoil, that has been raiſed by the froſts, about the minute ramifications of the attracting ducts, and augments the quantity of mould upon them by breaking the little lumps of ſoil, which, indeed, were very ſerviceable in winter, by affording ſhelter, but in ſpring will be of ſtill greater uſe, by ſuch imminution, in filling up the fiſſures, and preventing, in a great meaſure, the ill effects droughts have on light ſoils, by retaining and filtering rain water; whereby the ſoil imbibes whatever is nutritive, what is ſuperfluous of the ſimple fluid only eſcapes.

" Theſe are ſome of the many advantages rolling produces in agriculture; notwithſtanding which, it amounts to more than mere conjecture, that in general rolling corn may do more damage than it can do good, if ſuch as the following cautions be not carefully attended to, viz. Never to roll corn but in dry, freſh weather; by no means uſe heavy rollers, nor roll too early, i. e. before the blades be pretty ſtrong, for the wounds that the blades may receive, the roots, being then tender, will be unable ever to recover; nor too late, i. e. when the ſtalks are hardened and grown any height, for the roller will break them, which injury hardly can be repaired, and the crop is thereby hurt; that none but light lands are proper to be rolled, and thoſe only which have been manured that or the preceding year with dung: in ſhort, none but rich, light ſoils, in general, can be improved by rolling; for in poor lands it oppoſes the moſt active primogeneous agents, and undoes all that has been done for the crop by ploughing, &c.

“ Thus the ſoil, the condition, the growth of the corn, the weather, and the weight of the roller, are all to be moſt ſcrupulouſly regarded: when all coincide, the advantages of rolling will be great; but when they do not, the diſadvantages may be inſuperable.

“ Rolling, then, is neither the leaſt critical, nor moſt inſignificant piece of the huſbandman's profeſſion; therefore ought not to be performed at random and without circumſpection. *Muſeum Ruſticum, vol.* IV. *page* 5.

Rolling it alſo of uſe to land in graſs, by preſſing down mole-hills, &c. It alſo makes the graſs tiller, and grow thicker.

There is a ſort of land, which, when clover is ſown upon it, throws out the young plants after a froſt. Rolling in the beginning of winter, and immediately after the froſt is gone, will, in ſome meaſure, prevent this. The firſt rolling hinders the froſt from penetrating ſo deep as it would otherwiſe do; and the ſecond makes the land firm, after having been looſened by the change from froſt to open weather.

ROOD, a quantity of land equal to forty ſquare poles or perches, that is, a quarter of an acre.

ROOK, a well-known bird, reſembling a crow; but feeds on grain, inſects, &c.

Great care ſhould be taken to guard againſt theſe miſchievous birds at the time when the wheat is juſt ſhooting up; for they perceive its ſhooting much ſooner than the farmer can, and are led by the ſhoot to pick it up. They muſt, therefore, be carefully kept off the ground about a week or ten days after this ſeaſon; for at the end of that time the blade will be grown up, and the grain ſo exhauſted of its ſubſtance, that they will not give themſelves any trouble about ſtealing it. They never moleſt the wheat which is ſown about Michaelmas; becauſe ſo much grain of the late harveſt then lies ſcattered about the fields, that they find it much eaſier to pick up that, than to ſearch for corn under ground in new-ſown lands. They do moſt harm when the ſnow is firſt going off from the green wheat, towards the end of winter; for having been pinched for food during that ſeaſon, they then greedily pluck up the young plants, in order to come at the remainder of the ſeeds ſtill adhering to their roots; and are greatly aſſiſted in this by the looſe ſtate of the earth at that time.

Among the many contrivances to frighten them away, ſuch as feathers ſtuck up, the limbs of rooks ſcattered about the ground, dead rooks hung on ſticks, the gun, a boy to halloo and throw his hat, or to toſs a dead rook up in the air, Mr. Tull ſays he found this laſt to be the moſt effectual. They will immediately quit their uſual places of abode, if the earth is turned up around the trees, in which they have built their neſts, and will not return to them till the graſs is grown again; as was lately experienced in the repairing of Fountain-court in the Temple: Mr. Liſle aſſures us, that the taking down of their neſts, with their young ones in them, and burning under the trees they were built in, will effectually make all the old ones deſert that place. However, it has been doubted, and perhaps with reaſon, whether they do not, upon the whole, compenſate pretty fully, for the miſchief they do to corn, by deſtroying vaſt quantities of grubs, worms, and other pernicious inſects, in the ſpring: as crows are alſo of ſervice in the neighbourhood of populous towns, by devouring a great deal of carrion.

It is a common proverbial ſaying of the countrymen, that at whatſoever farm a colony of rooks plant themſelves, and make a rookery, it is a ſign of proſperity to the occupier of that land; and that, on the contrary, their deſerting it, betides misfortunes and poverty: for both which remarks, Mr. Liſle accounts very rationally, by obſerving, that where a man is a good huſbandman to his land, and improves it, the worms, which are a great food to theſe creatures, eſpecially at certain times of the year, multiply, and grow to a much greater bulk and fatneſs, than in a poor neglected ſoil; the ſtrength of land being as diſcernable by the large ſize of worms, as from the growth of plants; and that the grubs or maggots of the beetle kind in particular, on which the rooks feed greatly, as is apparent from their following the plough, in order to pick them up, not only grow fatteſt and largeſt in rich well tilled ground; but that the beetles themſelves, while in their ſtate of flies, always chooſe to lay their eggs in ſuch land as will beſt nouriſh and provide for their young. The contrary to this ſoon happens under a bad huſbandman.

ROOKERY, a nurſery of rooks, or place where they build their neſts.

ROOP, hoarſeneſs.

ROOT, the lower part of a plant, by which it adheres to the earth, and by which it draws its nouriſhment, and tranſmits the juices to the other parts. For the method of clearing land from the roots, *ſee the article* GRUBBING.

ROSIL, or *Roſills*, land neither light nor heavy, being a medium between ſand and clay.

ROSACEOUS, an epithet applied to ſuch flowers, as are compoſed of ſeveral petals or leaves, diſpoſed in a ſort of circular form, like thoſe of the roſe; of this kind are the flowers of the piony, ranunculus, unquefoil, &c.

ROSE, the name of a well known beautiful plant, and of which there are numerous varieties.

All ſorts of roſes are propagated either by ſuckers or layers; the beſt ſeaſon for laying is in October, which is alſo the proper time for planting, though in moiſt land the ſpring is nearly as proper.

ROSEMARY, the name of an odoriferous plant very common in almoſt every garden.

Roſemary may be raiſed from ſeeds; but it is more commonly, and more eaſily propagated by planting ſlips or cuttings of it in a ſpot of freſh light earth, in the ſpring of the year, juſt before its buds begin to open. When theſe plants have taken root, till which they muſt be watered gently from time to time, and ſhaded if the ſun be too powerful, they ſhould be tranſplanted into the places where they are to remain. This ſhould be done early in September, that they may have time to ſtrike out new roots before they can be in danger of being hurt by froſts; for thoſe which are ſet too late in the autumn ſeldom live thro' the winter, eſpecially if the weather prove very cold. Rather than do this, it is better to let them ſtand till the next enſuing March, and then to remove them after the hard weather is over: but in whatever ſeaſon they are tranſplanted, it ſhould not be during a cold drying eaſterly wind; becauſe this would ſoon ſhrivel up their leaves, and kill them. If a few warm ſhowers fall ſoon after they are ſet, they will ſoon take root, and after that they will require no farther care, than keeping them free from weeds. The diſtances between the plants ſhould be full ſufficient to allow for their utmoſt growth, ſo that they may not touch one another. That growth will be moſt luxuriant, eſpecially in the ſummer, if they are ſet in a rich mould: but then they will be moſt ſubject to be injured by froſts; nor will their odour be near ſo ſtrongly aromatic, as when they are raiſed on a poor gravelly ſoil.

ROT, a diſeaſe incident to ſheep, ariſing frequently from wet ſeaſons, and too moiſt paſture.

“ But the rot in ſheep, ſays an ingenious and practical writer, does not always proceed either from moiſture alone, or the nature of the ſoil alone; for all moiſt grounds do not cauſe the rot in ſheep, and there are ſome lands which rot ſheep in wet years only.

“ The rot, in fact, ariſes from a certain putrefaction, both in the air, and in the graſs or herbs that uſually grow in ſuch moiſt years: theſe, together with their moiſt food, corrupt their livers, and bring on the diſeaſe.

“ It is indeed very difficult to cure this diſorder, unleſs it is attempted before the liver is too much waſted: where there is a convenience of doing it, the beſt remedy is, an immediate removal to ſalt-marſhes; but this is far from being in every farmer's power: I ſhall endeavour therefore, from my own former experience, to ſupply the deficiency.

“ In ſuch caſes as theſe, a prevention of the evil is to be recommended to the practice of every rational farmer.

“ Some grounds naturally yield a ſoft, ſpungy graſs, which is, more than any other, ſubject to breed the rot in ſheep; I would therefore adviſe, that other cattle be fed in theſe grounds, and the ſheep kept in the drieſt, hardeſt, and healthieſt paſtures.

“ I have

“ I have known land that has kept ſheep in health for many ſucceſſive years, yet afterwards, when the months of May and June have proved wet, a ſrim and frothy graſs has ſuddenly ſprung up, which, together with the bad air that muſt of courſe follow, has cauſed a rot in the ſheep that were then on it: the evil was obſerved in time, the ſheep were removed to a dry and almoſt barren heath, and in the ſucceeding winter they were foddered with good, dry, ſweet hay, and a great loſs was prevented: this happened to an old friend of mine, ſince dead.

“ This unwholſome graſs is moſt apt to grow in cold land, and in the ſummer-time; and it is a general opinion, and well founded on experience, that if the ſummer does not rot ſheep, the winter will not, the power of the winter alone not being ſtrong enough to begin a rot.

“ A very ſenſible writer, whoſe book I have juſt turned to, I mean Mr. Liſle, ſays, that broom is very good for the rot; and indeed I have often experienced it; for in a farm I occupied ſome years ago there were ſeveral broom-fields, and I have often obſerved that ſuch of my ſheep as were part of the year fed in them were never infected with the rot, whilſt others in my poſſeſſion had it to a great degree. I profited however by experience, for I took care thenceforward that all my ſheep ſhould, by turns, enjoy the advantages to be derived from their feeding on the young ſhoots of the broom.

“ As to what Mr. Liſle ſays, on the authority of Mr. Ray, that the marſh-trefoil will cure the rot, I cannot, from experience, corroborate it: I have heard its efficacy in this diſorder often mentioned, but never yet heard any particular fact related ſo circumſtantially as to induce me to depend on its effects.

“ That ſalt is good, I agree with the above gentleman and Mr. Boyle; and this gives me an opportunity of communicating a receipt which I know to be a good one.

“ When you perceive, by the colour of your ſheep's eyes, that the rot has taken them, drive your flock into a barn, a covered fold, or ſome ſuch convenient place: around this place let there be wooden troughs, like mangers, in which you ſhould feed your ſheep with good, dry, clean oats, for forty-eight hours: then have ready ſome bay ſalt finely powdered and ſearced, of which you are to ſprinkle a little among the oats, encreaſing the quantity till it diſguſts the ſheep, and you perceive they fall off their appetites: afterwards, for the two following days, give them again clean oats; and then mix your ſalt with them as before, continuing this proceſs till their eyes have recovered their natural colour, when you will find them perfectly cured; and to be convinced, it will only be neceſſary to kill one or two out of the flock.

“ To this I ſhall add a receipt for the rot in ſheep, which was communicated to me by a friend, a man of credit and veracity, who ſays he has often tried it with ſucceſs.

> “ Steep ſome regulus of antimony in ale, adding thereto ſome grains of paradiſe, and a little ſugar to ſweeten it. Of this infuſion ſomewhat leſs than a gill is to be given to every one of your affected ſheep; they are to have two or three doſes, according as they are more or leſs affected by the diſtemper, allowing two days intermiſſion between each doſe.”

“ This is ſaid, as I have already obſerved, to be a cure almoſt certain.

“ I juſt now take notice, that when rain falls in the months of May and June it is apt to cauſe the rot in ſheep: it will be neceſſary to add, that folding them in the above months encreaſes the diſorder; for after having been deprived of their liberty during the whole night, they bite the noxious graſs the more greedily in the morning, having leſs ceremony in their choice of herbs than if they were not folded. This is a matter of ſome conſequence, therefore worthy of being attended to.

“ One thing more I muſt, on the authority of Mr. Liſle, communicate to your readers, viz. an obſervation of a Leiceſterſhire farmer; that ſheep, when firſt touched with the rot, will thrive mightily in fatting for ten weeks; but if they are not diſpoſed of when they are come up to a pitch, they will, in ſeven or eight days time, fall away to nothing but ſkin and bone. The ſame farmer obſerved, that he had often had them die in the height of their pitch, in half an hour's time, with twenty-ſeven pounds of tallow in their bellies.” *Muſeum Ruſticum, vol.* I. *pag.* 434.

To this account we ſhall add a receipt communicated to Mr. Mills by a gentleman of Lincolnſhire.

> “ Steep a handful of rue in a pail of water all night, and at morning put in as much ſalt as will make it bear an egg. Give each ſheep half a pint of this liquor, and repeat it thrice, every other morning.

“ A farmer who kept four hundred ſheep tried this receipt in the laſt general rot (about five years ago), and did not looſe any, though his neighbours loſt almoſt all theirs. For the ſake of the experiment, he ſet apart about twenty, and did not give them this drink. Many of theſe were rotten.” *Mills's Huſbandry, vol.* III. *p.* 416.

Buck-bean, or marſh-trefoil, is alſo excellent in this diſtemper. *See the article* Buck-Bean.

ROUGHINGS, latter-graſs, aftermaths.

ROUP, the name of a filthy diſeaſe in poultry, conſiſting of a boil or ſwelling upon the rump, and is known by the ſtaring, or turning back of the feathers.

The roup, if not ſoon remedied, will corrupt the whole body of the fowl; to prevent which the feathers ſhould be plucked away, the ſwelling laid open, and the matter preſſed out; after which the part is to be waſhed with brine, or ſalt and water.

ROWEL, a kind of iſſue made in horſes for the cure of various diſorders, as inward ſtrains, hard ſwellings, &c.

The operation is performed in the following manner: A little ſlit being made through the ſkin, about a handbreadth below the part aggrieved, big enough to put a ſwan's quill in, the ſkin is raiſed from the fleſh, the end of the quill put in, and the ſkin blowed from the fleſh upwards, and all over the ſhoulder; then, the hole being ſtopped with the finger, the part blown is beat with a hazle-ſtick, and the wind ſpread with the hand all over, and then let go; this done, a ſkain of horſe-hair, or red ſarſenet, half the thickneſs of the little finger, is put in a rowelling-needle, ſeven or eight inches long, and the needle is put into the hole, and drawn through again, ſix or ſeven inches higher; then the needle is drawn out, and the two ends of the rowel tied together, anointing it every day, as well as before the putting it in, with ſweet butter and hog's greaſe, and drawing it backwards and forwards in the ſkin, to make the putrid matter diſcharge itſelf more plentifully.

Others, diſliking theſe rowels, as making too large a ſore and ſcar, uſe the French rowel, which is a round piece of ſtiff leather, with a hole in the midſt, laying it flat between the fleſh and ſkin, the hole in the rowel juſt againſt that in the ſkin, ſewing it with a needle and thread drawn through the hole and the ſkin, cleaning it once in two or three days, and then anointing it afreſh.

“ The general and abſurd reaſoning of farriers, ſays Mr. Bartlet, on the effects and uſe of rowelling, makes the following obſervations the more neceſſary, as it is too notorious how impertinently they talk on this ſubject: for in ſhort with them, a rowel is to draw off all the bad and corrupt humours from the blood, by a ſort of magick.

“ It is neceſſary to obſerve that the matter generally diſcharged by a rowel, is nothing more, than an ouzing from the extremities of the veſſels divided in the making of it; in fact then, it is blood, which loſes its colour, by being ſhed out of the veſſels, the warmth of the part, and its confinement.

“ If this is granted, it will evidently appear, that the good effects enſuing this operation, muſt be owing to a gradual depletion, or emptying of the veſſels in general; by which means the ſurchage or load on a particular part, is taken off and removed; and impurities or bad juices (generally called humours) run off with the good, in proportion to their quantity in the blood.

“ To imagine particular humours are thus ſeparately, and alone diſcharged from the blood, through theſe orifices, is an opinion but too generally received, though a very abſurd one; and muſt be very pernicious in its conſequences, from the bad effects it may have in practice; as muſt the ſame reaſoning alſo in regard to purging.

“ Thus to lean hide-bound horſes, and thoſe of a dry hot conſtitution, the diſcharge, by depriving the conſtitution of ſo much blood, and fluids, is daily exhauſting the ſtrength of the animal; and may be productive of bad conſequences, by defrauding the conſtitution of a neceſſary fluid.

“ But in diſorders from fullneſs, attended with acrimony, or ſharpneſs of the juices, and with defluxions on the eyes, lungs, or any part of conſequence ; the gradual diſcharge brought on by theſe means, will contribute to leſſen the fullneſs on the parts affected, and give the veſſels an opportunity of recovering their tone, while evacuating and alterative medicines are doing their office.

“ It may be neceſſary however to obſerve, that there is a wonderful communication between the veſſels of the cellular membrane under the ſkin, which remarkably appears, by inflating thoſe of ſheep, calves, &c. by the butchers; hence probably it is that ſome diſorders of this integument, are ſo apparently relieved by iſſues, or rowels, without our having any recourſe to that general depletion of the veſſels we have juſt obſerved, to account for it; and hence alſo may be deduced their utility, ſometimes in draining off any extravaſated fluids, which may lodge between the interſtices of the muſcles, after violent ſtrains of the ſhoulder; alſo in diſcharging ſuch vicious, or ſharp fluids, as are thrown on the membranes, and occaſion thoſe flying pains and lameneſſes, which we find are often removed by this local remedy.” *Bartlet's Farriery, page* 220.

ROWEN, *or* Rowet, winter-graſs.

ROWTY, over-rank, too ſtrong.

RUDDLE, a ſort of red earth, of a lax texture, and very eaſily reduced to powder. It is found in ſeveral parts of England, eſpecially in Derbyſhire; and is much uſed in marking ſheep.

RUNCHES, charlock when dry and withered.

RUE, the ſtem of a well-known plant, cultivated in moſt kitchen-gardens.

It may be propagated either by ſowing its ſeeds, or by planting ſlips or cuttings of it in the ſpring.

RUNNEL, pollard wood.

RUNNET, the acid juice found in the ſtomachs of calves, that have fed on nothing but milk, and are killed before the digeſtion is perfect. It alſo ſignifies a liquor made by ſteeping of the ſtomach of a calf in hot water. The latter is the runnet uſed in making cheeſe, &c.

RUNNING-THRUSH, *or* Frush, is an impoſthume that ſometimes gathers in a horſe's frog; or a ſcabby and ulcerous diſpoſition, which ſometimes cauſes it to fall off.

When this diſcharge is natural the feet ſhould be kept clean, but no drying waſhes made uſe of, it being thought as unſafe to repel ſome of theſe diſcharges, as to cure ſome ſweaty feet.

When an impoſthume, or gathering appears, the ſafeſt way is to pare out the hard part of the frog, or whatever appears rotten; and waſh the bottom of the foot two or three times a day with old chamberlye; this is the ſafeſt and beſt way of treating them. But when a horſe has been neglected, and there is a ſtrong flux to the part, it is apt to degenerate into a canker, to prevent which, uſe the following:

> Take ſpirit of wine and vinegar, of each two ounces, tincture of myrrh, and aloes one ounce; Ægyptiacum half an ounce; mix together.

Bathe the thruſh with this, wherever there appears a more than ordinary moiſture, and lay over the ulcer a little tow dipped in the ſame. The purges and diuretics recommended in the greaſe, ſhould be given at this time, to prevent the inconveniencies that the drying up theſe diſcharges frequently occaſion *See the article* Canker. *Bartlet's Farriery, pag.* 312.

RUNT, a name given to the ſmall black cattle brought out of Wales and Scotland.

Runt, is alſo an epithet applied to ſeveral ſpecies of pigeons; as the Leghorn, Spaniſh, and Frieſland runt, &c.

The Leghorn runt is a ſtately large pigeon, ſeven inches or better in the legs, cloſe-feathered and faſt-fleſhed, extremely broad-breaſted, and very ſhort in the back. He carrries his tail, when he walks, ſomewhat turned up like a duck's; his neck is longer than any other pigeon's, and he carries it bending like a gooſe or ſwan. He is gooſe-headed, and his eye lies hollow in his head, with a thin ſkin round it, like that of the Dutch tumbler. His beak is very ſhort for ſo large a bird, and has a ſmall wattle on it, and the upper chap falls a little over. It is a very valuable pigeon, but is tender, and requires care.

The Spaniſh runt is the longeſt-bodied of all the pigeons; it is ſhort-legged and looſe-feathered, and does not walk ſo upright as the Leghorn runt. Theſe are of a great variety of colours, but are apt to have accidents in ſitting, from their ſitting too heavy, and often breaking their eggs.

The Frieſland runt is a large pigeon, and has all its feathers reverted, or looking as if placed the wrong way.

The Roman runt is a pigeon of the ſame general make with the common kind, but ſo large and heavy that it can hardly fly.

The Smyrna runt is middle-ſized, and is feather-footed, and that to ſuch a degree ſometimes, as to look as if there were wings upon the foot; the feathers of theſe are ſometimes four or five inches long, and often pull the eggs and young out of the neſts. The common runt is the common blue pigeon kept for the table, and known to every body. *Moore's Columbarian.*

RUPTURE, a preternatural eruption of the guts or caul.

In regard to ruptures, though they are generally divided into particular claſſes, we ſhall only obſerve, that by violent efforts of the horſe, or other accidents, the guts or caul may be forced between the muſcles of the belly at the navel, and through the rings of the muſcles into the ſcrotum or cod. The ſwellings are generally about the ſize of a man's fiſt, ſometimes much larger, deſcending to the very hock; they are frequently ſoft, and yield to the preſſure of the hand, when they will return into the cavity of the belly with a rumbling noiſe; and in moſt the vacuity may be felt, through which they paſſed.

On their firſt appearance, endeavours ſhould be made to return them by the hand; but if the ſwelling ſhould be hard and painful, in order to relieve the ſtricture, and relax the parts, through which the gut or caul has paſſed, let a large quantity of blood be immediately taken away, and the part fomented twice or thrice a day, applying over it a poultice made with oatmeal, oil and vinegar, which ſhould be continued till the ſwelling grows ſoft and eaſier, or the gut is returned. In the mean time it would be proper to throw up emollient oily glyſters twice a day, and to let the horſe's chief diet be boiled barley, ſcalded malt, or bran.

Should the ſwelling afterwards return, we apprehend the reſtringent applications uſually recommended on theſe occaſions, will avail little without a ſuſpenſory bandage; ſo that an ingenious mechanic in that art is chiefly to be relied on, for any future aſſiſtance; though it has been obſerved, that with moderate feeding, and gentle exerciſe, ſome horſes have continued to be very uſeful under this complaint. *Bartlet's Farriery, page* 334.

RUSH, the name of a well known plant, too common in wet lands.

Ruſhes always intimate a good ſoil; and may be deſtroyed by lime, even after it has been ſlaked, by ſea-coal aſhes, and by draining the land.

RUST, a diſtemper incident to corn, and generally called mildew. *See the article* Mildew.

RYE, a ſpecies of corn, greatly cultivated in the northern parts of England.

Mr. Miller is of opinion that all the rye ſown in England is of the ſame ſpecies, though diſtinguiſhed by farmers into two varieties of winter and ſpring rye, as he has not been able, by the moſt ſedulous experience, to find any difference.

The winter rye, which has the largeſt grain, is what the generality of farmers cultivate. It is uſually ſown in autumn, or at the ſame time as wheat; and in many of our northern countries, as well as in Wales, they are often mixed and ſown together; though as Mr. Miller rightly obſerves, this muſt be very bad huſbandry, becauſe the rye will always ripen ſooner than the wheat; ſo that if the latter be ſuffered to ſtand till fully ripe, the grain of the former will ſhed; nor can this be practiſed where the people are not accuſtomed to eat rye-bread: for though ſome account it good when mixed, it is ſo very clammy that few who have been uſed to wheaten bread will ever reliſh it.

Rye is generally ſown on poor, lime-ſtone, dry, gravelly, or ſandy ſoils, where wheat will not thrive, and in ſuch places it does very well. The ground ſhould be dry when it is ſown: for if much rain falls, even after the ſowing, before the rye is come up, it often rots in the earth. It indeed riſes in a much ſhorter time than wheat.

When ſown upon light land, it ripens much earlier than a cold ſtiff ground, and by continuing to ſow it in ſuch a ſoil during two or three years, it will be forwarded ſo much as to ripen a month earlier than that which has been long raiſed upon ſtrong cold ground. For this reaſon, thoſe who are obliged to ſow rye toward ſpring, generally provide themſelves with this early ſeed. A little ſprinkling of dung or mud, though it be but half the quantity commonly uſed for other corn land, will, if laid upon the rye ground, greatly advance the crop. The uſual allowance is two buſhels of ſeed to a ſtatute acre, or, if it be new broke up ground, or land ſubject to worms, about a peck more; and the produce commonly is about twenty buſhels upon an acre.

In the ſummer of the year 1699, which was uncommonly dry, Mr. Mortimer reckoned ninety grains apiece in ſeveral ears of rye.

The ſmall rye may be ſown in the ſpring, about the ſame time as oats, and uſually ripens as ſoon as the other ſort: but if the ſeaſon prove wet, it is apt to run much to ſtraw, and the grain is generally lighter than the other. The chief uſe of this ſort is to re-ſow lands where the autumnal crop has failed.

This corn is ripe when its ſtraw turns yellow, its ear hangs, and its grain is hard. It is not very apt to ſhed; and therefore, if it be weedy (though this ought never to be the caſe with any corn), it ſhould be let lie upon the ground, or gavel, as ſome call it, a week or ten days after it is cut, if the weeds do not dry ſooner, before it be bound up; for otherwiſe thoſe weeds will give in the barn, make the rye not thraſh well, and render it muſty. But as this grain will grow in the ear ſooner than any other, if it be wet, particular care muſt be taken, eſpecially if rain comes on, to turn it at leaſt once in two or three days, and lay the ears upon the ſtubble, as high above the ground as can be. This will help to preſerve it from hurtful moiſture: but if it be cut in perfectly dry weather, and without weeds, it may be houſed as it is reaped.

The general uſe of rye is for bread, either alone, or mixed with wheat, in which ſtate it is called meſlin corn. It alſo yields a ſtrong ſpirit when diſtilled; and, if ſowed only for dreſſing of land, is of vaſt ſervice to the ground where it is plowed in green and ſucculent. The truly worthy, and reverend Dr. Eliot informs us, that he has not only been told, but knows by his own obſervation, that if rye be ſowed ſucceſſively every year upon the ſame land, both the crop and the land will be greatly improved; inſomuch that ſome grounds which would yield but five buſhels to the acre at firſt, have, in time, afforded a crop of fifteen buſhels to the acre, without the charge of dung, or any manure. But it ſhould be remembered that the land ſown by Dr. Eliot, was newly broke up.

This plant is likewiſe ſown in autumn to great advantage, purpoſely for green feed for cattle, particularly for ewes and lambs in the ſpring, before there is plenty of graſs. When this is intended, the rye ſhould be ſown early, that it may have ſtrength to furniſh early fodder. In this light, it ſupplies the want of turnips where they have failed, or where their ſeaſon is over: ſo that, in ſuch caſes, it is very good huſbandry to ſow the land with rye, eſpecially where there are ſtocks of ſheep, which cannot be well ſupported without green food early in the ſpring. The farmer who has many ſheep ſhould conſider, that turnips are always a very precarious crop; and therefore he ſhould, beſide ſowing ſome places with cole-ſeed, in order to have green fodder, ſow rye in others, to guard againſt accidents. If ſome of the ground ſowed late with turnips, which have failed, be ſown in the autumn with rye, he will find it turn to good account. To have green fodder for cattle in April, which is the ſcarceſt time of all the year, ſome ſplit the ridges of their wheat-ſtubble, and ſow them with rye, allowing about a buſhel to an acre, which they harrow in, and feed about April, or when they want it; and in May they plough it up for a fallow.

The ingenious Mr. Camber of Eaſt Newton, in Yorkſhire, has given us the following obſervations on this grain, which is greatly cultivated in his neighbourhood.

"Rye, ſays he, is very excellent for giving a good ſkin to horſes, as it is looſening, and carries off foul humours, which hard exerciſe and bad provender may have left in them. It is alſo a moſt excellent feed for geeſe. I cannot ſay the ſame with reſpect to hogs, for which animal it ſeems to me to be too looſening; inſomuch that I have given a great deal of it to them when put up to feed, both dry and boiled, without perceiving any advance in their fleſh.

"Rye is very generally liked for bread by the people of countries in which it grows commonly, and who are therefore much uſed to it; inſomuch, that many of them ſcruple not to prefer it to wheat, the bread of which preſently grows dry. There are, however, numbers of perſons, who, though uſed to it from their youth, can never reliſh it. Some object to the ſourneſs of it when made with leven, and others to the natural ſweetneſs of the grain, which is diſagreeable, eſpecially with the ſavourineſs of fleſh meat; and, indeed, I am myſelf of this number.

"I agree entirely with Mr. Miller, that it muſt be very bad huſbandry to ſow wheat and rye together, as the latter will ripen much ealier than the former, and ſeveral obvious inconveniences enſue. They who like meſlin, may mix them to their mind when carried to the mill, without any inconvenience.

"Many incidents may hinder the ſowing of rye in autumn; the ground ſhould, by all means, be dry when it is ſown, and heavy rains after it is ſown may rot it in the ground before it come up: ſo that the ſowing of ſpring-rye becomes an object well deſerving our attention: and all the directions and cautions which can be given about it ſhould be nicely attended to.

"As dryneſs is eſſential to the ſucceſs of rye, it ſeems adviſeable to delay the ſowing of ſpring-rye as long as can be, with any proſpect of ſucceſs, rather than not have both the ground dry for ſowing, and the ſucceeding weather for ſome time after ſowing likely to be fair; eſpecially as rye ſoon rots in the ground, if wet.

"The ground deſigned to be ſown with rye in ſpring, ſhould be laid in winter with high ridges, and have good drains to carry off the water, that it may be as dry as poſſible when ſown.

"Hot manures ſhould be uſed, and particularly lime, which will bring on a ſpeedy ſhooting. It was long a prevailing opinion, that lime was not a proper manure for the ſoil in which the lime-ſtone was found; but experience has ſhewn the vanity of this notion.

"Rolling may be more neceſſary to ſettle the earth about the roots of plants of rye ſown in ſpring than in autumn; for the winter froſts will have broke down the clods on to the roots of the autumn-ſown rye, though indeed the rains may have partly waſhed that earth away.

"A moderare ſowing of ſoot, after the plants are come up and rolled, may be of great advantage." *Muſeum Ruſticum, vol.* IV. *pag.* 225.

The ſame ingenious gentleman has obliged the world with the following obſervations on a courſe of crops; by which it appears that rye-land is nearly, if not quite, as valuable as wheat-land.

"The lands of Nether Dunſforth, in the weſt riding of this county, are, in general, a ſtrong clay, and bear good wheat. The lands at Helperby, a few miles diſtant, are, in general, a good black loam, which bear good rye, but, on repeated trials, prove too light for wheat, as the moſt ſenſible farmers there affirm. Be this as it will, the lands let at the ſame prices in both places, viz. at ten ſhillings per acre; and we ſhall ſee that it may be as well afforded, according to the courſe of their crops, &c. which I learned only yeſterday from two ſenſible farmers, one of them living at the former place, on an eſtate of my father's, and the other at the latter, and deſirous to ſucceed his companion as tenant to my father.

“ At Dunsforth they have a wheat-crop, a crop of blendings, as they are called; that is, beans and peas, then a fallow, and ſo round again.

“ At Helperby they have a crop of rye, then a crop of barley, then a crop of peas, then another crop of barley, and ſo round again; and they obſerve that the peas ſo mellow the ground, that their fourth crop is better than their ſecond.

“ To bring theſe crops to a fair compariſon, we muſt ſay, that the Dunsforth men have five crops of wheat, and five of blendings, in fifteen years; and that the Helperby men have three crops of rye, three crops of peas, and ſix crops of barley, in the ſame ſpace.

“ To eſtimate the real value of theſe crops, without too much nicety, we may ſuppoſe that the wheat is, one year with another, worth one ſhilling and ſix-pence per buſhel more than the rye; and that there are twenty-five buſhels of wheat and thirty of rye on an acre. We will take the medium price of wheat to be four ſhillings and ſix-pence, and of rye three ſhillings.

	l.	s.	d.
An acre's crop of wheat then would be	5	12	6
Ditto of rye	4	10	0
Difference	1	2	6
But as the ſtraw of rye is known to be much more valuable, and of greater quantity, and the expence of manure and ſeed to be leſs, we may ſafely deduct	0	10	0
So that the real difference of profit, on one acre, will be	0	12	6
The crops of blendings and of peas may be reaſonably conſidered as on a par.			
The difference of profit then betwixt three crops of wheat and blendings on one ſide, and three crops of rye and peas on the other, will be	1	17	6

We are now, gentlemen, to conſider the difference betwixt the two remaining crops of wheat and two additional crops of blendings on one ſide, and the ſix crops of barley on the other.

	l.	s.	d.
Suppoſing the charge of both ſides to be the ſame, (and there will be no conſiderable difference) the two crops of wheat will be worth	11	5	0
A crop of blendings uſually falls betwixt fifteen and twenty buſhels to the acre, and the medium price is three ſhillings per buſhel: the value of a crop then, at an average, will be ſeventeen buſhels and an half, at three ſhillings; that is, two pounds twelve ſhillings and ſix-pence, and of two crops of an acre	5	5	0
A crop of barley is uſually thirty-two buſhels to the acre at the place in queſtion; and the medium price per quarter is one pound: the value therefore of the corn of an acre of barley is four pounds, or of ſix crops	24	0	0
But the ſtraw of barley is ſo valuable, that it may be reckoned to exceed the expence of reaping by at leaſt five ſhillings; that is, for ſix crops	1	10	0
I did not enquire whether the men of Helperby ſow clover with their fourth crop; but they certainly may, and reap one good crop in the fallow year, and turn in all their ſtock for a fortnight or three weeks to feed it down, and have time enough to plough in the roots of the clover, and the manure made by the cattle which eat it, and get their fallow into order; ſo that we cannot reckon leſs profit hence than one pound per acre; that is, for three crops	3	0	0
Nay, when one conſiders, that rye is, of choice, ſown late in this country, we may allow a ſecond crop of clover and feeding, which cannot be worth leſs than fifteen ſhillings per acre; that is, for three crops	2	5	0

The whole account then will ſtand as follows.

For the wheat-growers.

	l.	s.	d.
By balance of three crops of wheat againſt ditto of rye, and two of blendings againſt ditto of peas	1	17	6
Brought over	1	17	6
By two crops of wheat	11	5	0
By ditto of blendings	5	5	0
Total	18	7	6
For the rye-growers:			
By the corn of ſix crops of barley	24	0	0
By the ſtraw	1	10	0
By clover	5	5	0
Total	30	15	0
Balance of the fifteen years, in favour of the latter	12	7	6

“ That is, for one year on one acre, ſixteen ſhillings and ſix-pence; that is a profit more than the rent of the ground, and half as much again above the profit of the wheat-grower.

“ Some inexperienced people may think that I have thrown more advantage into the ſcale of the rye-growers than I ought: yet, on the ſtricteſt review, I cannot think ſo; but that, on the contrary, I have reckoned their advantages too low. I am ſure I am not partial, for I own a wheat-crop my favourite one, (I having a natural diſlike to rye-bread) though I own the rye-ground more advantageous to the farmer. Let us review my account.

“ Am I thought to deduct too much, when I take off ten ſhillings for the ſaving in ſeed, and gaining in ſtraw, of rye? ſurely I ought not; for, as wheat is conſiderably larger than rye, fewer grains fill the buſhel, conſequently more ſhould be allowed to an equal portion of land: and farmers who ſow nine pecks of rye, ſow twelve of wheat to the acre. Now the price of the former (according to the reaſonable ſtate above) is ſix ſhillings and nine-pence; of the latter, thirteen ſhillings and ſix-pence; conſequently the ſaving, ſeven ſhillings and three-pence. And whoever conſiders the greater length and fineneſs of rye-ſtraw than that of wheat, muſt think two ſhillings and nine-pence per acre a very ſmall allowance for it.

“ Is it thought that more labour in ploughing attends the production of twelve crops than ten? Be it conſidered, rye-land is lighter, and therefore much eaſier ploughed, than wheat land; and that in the courſe of this wheat-huſbandry, the fallow is to be ſtirred nearly as often as it would be to prepare it for the additional crops; and that, the oftener any ground is ſtirred, the more eaſily it is ſtirred; and that the crops of peas and clover mellow the ground, and make it more eaſily ſtirred for the ſowing down with hard corn; alſo, that it lies unſtirred every fourth year, from the ſowing down of barley to the eating off the clover, about fifteen months. From all which conſiderations it ſeems moſt evident, that the ſame team and ploughman will, with more eaſe, work the ſame quantity of rye-land, to produce its twelve crops of corn, and the clover too, than they could wheat-land to produce the ten corn-crops.

“ Am I imagined to reckon the expences of ſeed and manure for two crops of wheat and two of blendings too high, when I put them on a par with thoſe of ſix crops of barley? As this ſeems the moſt exceptionable, I will ſtate the matter ſomewhat more particularly.

“ The ſeed for wheat is three buſhels to an acre, which, at four ſhillings and ſix-pence, come to thirteen ſhillings and ſix-pence; for two crops, to one pound ſeven ſhillings. The ſeed for blendings is four buſhels to an acre, which, at three ſhillings the buſhel, come to twelve ſhillings per acre; for the two crops, to one pound four ſhillings. The ſeed for the four crops coſts then two pounds eleven ſhillings.

“ Four buſhels of barley ſow an acre, and, at two ſhillings and ſix-pence per buſhel, come to ten ſhillings per acre, or, for the ſix crops, to three pounds. The difference then in the value of the ſeed in the two methods, is only nine ſhillings. Now, let it be conſidered, that the ground is prepared, as to manure, by the rye-crop for the former barley-crop, and by the crop of peas for the latter barley-crop; ſo that nothing need be charged on this account: whereas, to prepare the ground for the two crops of wheat, the farmer muſt be at great expence in manure, either in burning, or (which is generally much worſe) buying of lime, and leading it, or at leaſt in leading his own or bought dung; ſo that the nine ſhillings ſaved in the ſeed will go a very little way in this great expence. Beſides, the clover ſo opens and mellows the ground, and the dung occaſioned by eating of it, either at home or in the field, ſo enriches the ſoil, that much, if not all, the expence of manure for a crop of rye is ſaved; and this allows the farmer to lay his manure, otherwiſe needleſs, on to his barley-ground, and improves it for that crop, and the ſucceeding crops of clover and rye too; and on this account great deductions ſhould be made from the expence of the three rye-crops compared with the three of wheat at the head of this account; ſo that I am clearly of opinion, that, inſtead of there being any balance therein in favour of the wheat-growers, it would fall conſiderably on the ſide of the rye-growers.

“ In the laſt place, am I ſuppoſed to take the quantity of wheat on an acre too low? I anſwer, I take it from the courſe of the country where the compariſon is made; and if greater crops are reaped elſewhere of wheat, ſo are there alſo of rye.

“ I was lately aſſured, by a farmer on the eſtate adjoining to this, that he has frequently reaped fifty-five buſhels of rye off an acre, and his father has reaped as much or more off the land in this eſtate. I am fully perſuaded it will be found, on enquiry, that one ſixth in quantity, as I ſtate it, is too little in favour of rye. A ſtook of good rye uſually yields five pecks, or more, while a good ſtook of wheat, whoſe ſtalks are thicker, and bed leſs cloſe, and make much leſs bands, ſeldom yields ſo much as a buſhel; ſo that, if there be an equal number of ſtooks, as large as can be made, of each ſort, on an acre, there will be one fifth, or ſix buſhels in thirty more of rye than wheat, cæt. par. as philoſophers ſpeak.” *Muſeum Ruſticum, vol.* IV. *pag.* 345.

RYE-GRASS. *See the article* Ray-Grass.

S.

SAFFRON, a genus of plants with narrow graſs-like leaves, which have a white line running along the middle: the ſtalk is ſhort and undivided, and bears on the top a purpliſh blue flower, deeply cut into ſegments: in the middle of the flower ariſes, among the ſtamina, a whitiſh piſtil, divided at the top into three chives or fleſhy filaments, the lower part of which is ſlender and pale coloured, the upper broader, of a deep orange red, and very finely indented about the ſides: theſe filaments, carefully picked, and preſſed together into cakes, are the ſaffron of the ſhops. The plant is perennial, and flowers in autumn.

As ſaffron grows at preſent moſt plentifully in Cambridgeſhire, and has grown formerly in ſeveral other counties of England, the method of culture does not, I believe, vary much in any of them; and therefore I judge it ſufficient to ſet down here the obſervations which I employed proper perſons, in different ſeaſons to make, in the years 1723, 1724, 1725, and 1728, up and down all that large tract of ground that lies between Saffron-Walden and Cambridge, in a circle of about ten miles diameter.

In that county ſaffron has been cultivated; and therefore it may reaſonably be expected, that the inhabitants thereof are more thoroughly acquainted with it than they are any where elſe.

I ſhall begin with the choice and preparation of the ground: the greateſt part of the tract already mentioned is an open level country, with few incloſures; and the cuſtom there is, as in moſt other places, to crop two years, and let the land be fallow the third. Saffron is always planted upon fallow ground, and, all other things being alike, they prefer that which has borne barley the year before.

The ſaffron grounds are ſeldom above three acres, or leſs than one; and, in chooſing, the principal thing they have regard to is, that they be well expoſed, the ſoil not poor, nor a very ſtiff clay, but temperate dry mould, ſuch as commonly lies upon chalk, and is of an hazel-colour; though, if every thing elſe anſwers, the colour of the mould is pretty much neglected.

The ground being made choice of about Lady-day, or the beginning of April, it muſt be carefully plowed, the furrows being drawn much cloſer together, and deeper, if the ſoil will allow it, than it is done for any kind of corn; and, accordingly, the charge is better.

About five weeks after, during any time in the month of May, they lay between twenty and thirty loads of dung upon each acre; and, having ſpread it with great care, they plow it in as before; the ſhorteſt rotten dung is the beſt; and the farmers, who have the conveniency of making it, ſpare no pains to make it good, being ſure of a proportionable price for it. About Midſummer they plow a third time, and, between every ſixteen feet and a half or pole in breadth, they leave a broad furrow or trench, which ſerves both as a boundary to the ſeveral parcels, when there are ſeveral proprietors to one incloſure, and to throw the weeds in at the proper ſeaſon.

To this head likewiſe belongs the fencing of the grounds, becauſe moſt commonly, though not always, that is done before they plant. The fences conſiſt of what they call dead hedges, or hurdles, to keep out not only cattle of all ſorts, but eſpecially hares, which would otherwiſe feed on the ſaffron leaves during the winter.

About the weather we need only obſerve, that the hotteſt ſummers are certainly the beſt: and therewith, if there be gentle ſhowers from time to time, they can hardly miſs of a plentiful crop, if the extreme cold, ſnow, or rain of the foregoing winter have not prejudiced the heads.

The next general part of the culture of ſaffron, is planting or ſetting the roots: the only inſtrument uſed for which is a narrow ſpade, commonly termed a ſpit-ſhovel.

The time of planting is commonly in July, a little ſooner or later, according as the weather anſwers. The method is this: one man with his ſpit-ſhovel ariſes between three and four inches of earth, and throws it before him about ſix or more inches; two perſons, generally women, following with heads, place them in the fartheſt edge of the trench he makes, at three inches diſtance from each other, or thereabouts: as ſoon as the digger or ſpitter has gone once the breadth of the ridge, he begins again at the other ſide, and digging, as before, covers the roots laſt ſet, and makes the ſame room for the ſetters to place a new row, at the ſame diſtance from the firſt as they are from one another: thus they go on, till a whole ridge, containing commonly one rod, is planted; and the only nicety in digging is, to leave ſome part of the firſt ſtratum of earth untouched, to lie under the roots; and, in ſetting, to place the roots directly upon their bottom.

What ſort of roots are to be preferred, ſhall be ſhewn under the fourth head; but it muſt be obſerved in this place, that formerly, when roots were very dear, they did not plant them ſo thick as they do now; and that they have always ſome regard to the ſize of the roots, placing the largeſt at a greater diſtance than the ſmaller ones.

The quantity of roots, planted in an acre, is generally about ſixteen quarters, or one hundred and twenty-eight buſhels, which, according to the diſtances left between them, as before aſſigned, and ſuppoſing all to be an inch in diameter one with another, ought to amount to three hundred and ninety two thouſand and forty in number.

From the time that the roots are planted, till about the beginning of September, or ſometimes later, there is no more labour about them; but as they then begin to ſpire, and are ready to ſhew themſelves above ground, which is known by digging a few out of the earth, the ground muſt be carefully pared with a ſharp hoe, and the weeds, &c. raked into the furrows, otherwiſe they would hinder the growth of the plants.

In ſome time after appear the ſaffron flowers; and this leads us to the third branch of our preſent method. The flowers are gathered as well before as after they are full blown; and the moſt proper time for this is early in the morning. The owners of the ſaffron get together a ſufficient number of hands, who place themſelves in different parts of the field, pull off the whole flowers, and throw handful by handful into a baſket, and ſo continue till all the flowers are gathered, which happens commonly about ten or eleven o'clock. Having then carried home all they have got, they immediately ſpread them upon a large table, and fall to picking out the filamenta ſtyli, or chives, and together with them a pretty long proportion of the ſtylus itſelf, or ſtring to which they are joined; the reſt of the flower they throw away as uſeleſs. The next morning they return into the field again, whether it be wet or dry, weather; and ſo on daily, even on Sundays, till the whole crop be gathered.

The chives being all picked out of the flowers, the next labour about them is to dry them on the kiln. The kiln is built upon a thick plank, that it may be removed from place to place, ſupported by four ſhort legs: the outſide of eight pieces of wood about three inches thick, in form of a quadrangular frame, about twelve inches ſquare at the bottom on the inſide, and twenty-two inches at top; which is likewiſe equal to the perpendicular height of it. On the foreſide is left a hole about eight inches ſquare, and four inches above the plank, through which the fire is put in. Over all the reſt laths are laid pretty thick, cloſe to one another, and nailed to the frame already mentioned; and then are plaiſtered over on both ſides, as are alſo the planks at bottom very thick, to ſerve for an hearth. Over the mouth or wideſt part goes an hair-cloth, fixed to the ſides of the kiln; and likewiſe to two rollers, or moveable pieces of wood, which are turned by wedges or ſcrews, in order to ſtretch the cloth. Inſtead of the hair-cloth, many people now uſe a net-work, or iron wire, with which it is obſerved that the ſaffron dries ſooner, and with a leſs quantity of fuel: but the difficulty in preſerving the ſaffron from burning, makes the hair-cloth be preferred by the niceſt judges in drying.

The kiln is placed in a light part of the houſe; and they begin by laying five or ſix ſheets of white paper on the hair-cloth, upon which they ſpread the wet ſaffron, between two and three inches thick; this they cover with other ſheets of paper, and over theſe lay a coarſe blanket five or ſix times doubled; or, inſtead thereof, a canvas pillow filled with ſtraw; and, after the fire has been lighted for ſome time, the whole is covered with a board, having a large weight upon it.

At firſt they give it a pretty ſtrong heat, to make the chives ſweat, as their expreſſion is; and in this, if they do not uſe a great deal of care, they are in danger of ſcorching, and ſo of ſpoiling all that is on the kiln.

When it has been thus dried about an hour, they take off the board, blanket, and upper papers, and take the ſaffron off from that which lies next it; raiſing, at the ſame time, the edges of the cake with a knife; then, laying on the paper again, they ſlide in another board between the hair-cloth and under papers, and turn both papers and ſaffron upſide down; afterwards covering them, as above.

This ſame heat is continued for an hour longer; then they look on the cake again, free it from the papers, and turn it: then they cover it, and lay on the weight, as before. If nothing happens amiſs during theſe firſt two hours, they reckon the danger to be over: for they have nothing more to do, but to keep a gentle fire, and to turn their cakes every half-hour, till thoroughly dry: for the doing of which as it ought, there are required full twenty-four hours.

In drying the layer plump chives they uſe nothing more, but towards the latter end of the crop, when theſe come to be ſmaller, they ſprinkle the cake with a little ſmall beer, to make it ſweat as it ought; and they begin now to think, that uſing two linen cloths next the cake, inſtead of two innermoſt papers, may be of ſome advantage in drying: but this practice is followed as yet but by few.

Their fire may be made of any kind of fuel; but that which ſmokes the leaſt is beſt; and charcoal, for that reaſon, is preferred to any other.

What quantity of ſaffron a firſt crop will produce, is very uncertain; ſometimes five or ſix pounds of wet chives are got from one root; ſometimes not above one or two; and ſometimes not enough to make it worth while to gather and dry it. But this is always to be obſerved, that about five pounds of wet ſaffron go to make one pound of dry, for the firſt three weeks of the crop; and ſix pounds during the laſt week; and, now the heads are planted very thick, two pounds of dried ſaffron may, at a medium, be allowed to an acre for the firſt crop, and twenty-four pounds for the two remaining; the third being conſiderably larger than the ſecond.

In order to obtain theſe, there is only a repetition to be made every year of the labour of hoeing, gathering, picking, and drying, in the ſame manner as before ſet down, without the addition of any thing new; except that they let cattle into the field, after the leaves are decayed, to feed upon the weeds; or, perhaps, mow them for the ſame uſe.

About the Midſummer after the third crop is gathered, the roots muſt be all taken up and tranſplanted: the management requiſite for which is the fourth thing to be treated of. To take up the ſaffron heads, or break up the ground, as the term is, they ſometimes plow it, ſometimes uſe a forked kind of hoe, called a pattock, and then the ground is harrowed once or twice over; during all which time of plowing or digging, and harrowing, fifteen or more people will find work enough to follow and gather the heads, as they are turned up.

They are next to be carried to the houſe in ſacks, and there cleaned and raiſed: this labour conſiſts in cleaning the roots thoroughly from earth, and from the remains of old roots, old involucra, and excreſcences; and thus they become fit to be planted in new ground immediately, or to be kept for ſome time, without danger of ſpoiling.

The quantity of roots taken up, in proportion to thoſe which were planted, is uncertain; but, at a medium, it may be ſaid, that, allowing for all the accidents which happen to them in the ground, and in breaking up from each acre, may be had twenty-four quarters of clean roots, all fit to be planted.

The owners are ſure to chuſe for their own uſe the largeſt, plumpeſt, and fatteſt roots; but do leaſt of all approve the longeſt-pointed ones, which they call ſpickets, or ſpickards; for very ſmall round or flat roots are ſometimes obſerved to flower. This is the whole culture of ſaffron in the county abovementioned; and we have only now to conſider the charges and profits which may be ſuppoſed, one year with another, to attend that branch of agriculture; and of theſe I have drawn up the following computation for one acre of ground, according to the price of labour in this county.

	l.	s.	d.
Rent for three years	3	00	0
Plowing for three years	0	18	0
Dunging	3	12	0
Hedging	1	16	0
Spitting and ſetting the heads	1	12	0
Weeding or pairing the ground	1	04	0
Gathering and picking the flowers	6	10	0
Drying the flowers	1	06	0
Inſtruments of labour for three years, with the kiln, about	0	10	0
Plowing the ground once, and harrowing twice	0	12	0
Gathering the ſaffron heads	1	00	0
Raiſing the heads	1	12	0
Total charge	23	12	0

This calculation is made upon ſuppoſition, than an acre of ground yields twenty-ſix pounds of net ſaffron in three years; which I ſtated only as a mean quantity between the greateſt and the leaſt; and therefore the price of ſaffron muſt be judged accordingly; which I think cannot be done better than by fixing it at thirty ſhillings per pound; ſince, in plentiful years, it is ſold at twenty, and is ſometimes worth three or four pounds: at this rate, twenty-ſix pounds of ſaffron are worth thirty-nine pounds; and the net profits of an acre of ground, producing ſaffron, will, in three years, amount to fifteen pounds thirteen ſhillings, or about five pounds four ſhillings yearly.

This, I ſay, may be reckoned the net profit of an acre of ſaffron, ſuppoſing that all the labour were to be hired for ready money: but, as the planter and family do a conſiderable part of the work themſelves, ſome of this expence is ſaved: that is, by planting ſaffron, he may not only reaſonably expect clear about five pounds yearly per acre, but alſo to maintain himſelf and family for ſome part of each year: and it is upon this ſuppoſition only, that the reſult of other computations can be ſaid to have any tolerable degree of exactneſs; but the calculations themſelves are undoubtedly very inaccurate.

I have ſaid nothing here concerning the charge in buying, or profits in ſelling the ſaffron heads; becauſe, in many large tracts of ground, theſe muſt at length balance one another, while the quantity of ground planted yearly continues the ſame; which has been pretty much the caſe for ſeveral years paſt. *Philoſophical Tranſactions, Numb.* 405.

SAGE, the name of a well known plant, much cultivated in kitchen-gardens.

Sage is moſt commonly propagated by ſlips; not only becauſe its ſeeds cannot always be obtained perfect in this country; but alſo, becauſe that is by much the eaſieſt and moſt expeditious way. Theſe ſlips ſhould be planted about the beginning of April, in a ſhady border, where they will ſoon take root, if they are watered now and then in caſe the ſeaſon be dry. When they are grown ſtrong enough to be removed, they ſhould be taken up with a ball of earth about their roots, and tranſplanted into the places where they are to remain. This ſhould be in a dry ſoil, where they may enjoy the benefit of the ſun: for if they are left to remain in moiſt ground, or in a ſhady ſituation, they will not well bear the inclemency of the winter: neither will they be ſo hardy, or ſo highly flavoured, if they are ſet in a rich ſoil, as when they grow on a barren, dry, and rocky ſpot. Keeping them clear from weeds is the principal part of their culture. The roots of all the common garden ſorts of ſage will laſt ſeveral years: but their tops ſhould not be cropped too often for uſe, leſt the plants ſhould become ragged, and there ſhould not be a due ſucceſſion of young ſhoots. The ſureſt way to obtain this, is to ſet a parcel of new ſlips every other year. The ſide ſhoots, and tops of the balſamic or tea ſage, which is generally dried and kept for uſe, ſhould be gathered in a very dry day, in the ſummer; but thoſe of the other ſorts are beſt when taken green from the plants.

The ſpecies of ſage moſt uſually cultivated in the kitchen-garden, are, the large broad leaved ſort, of which the common green, the wormwood, the variegated green, the red, and the variegated red, are only accidental variations; the tea ſage abovementioned, which alſo has broad leaves, but more jagged at their edges; and the ſmall, or rather narrow, hoary leaved ſage, commonly called ſage of virtue. All the other ſorts of this plant are cultivated for variety, more than for uſe.

Sage in general flowers about the latter end of June, and beginning of July; and whenever its ſeeds ripen in this country, which is but ſeldom, it is in autumn.

SAINTFOIN, *or* SAINFOIN, the name given by the French, and continued by us to a ſpecies of plant, frequently uſed for the food of cattle, either freſh or dried; it is called holy-hay, or wholeſome hay, from its excellent nutritive quality. The ſtalks of the plant are commonly about two feet long, but they grow ſometimes to five or ſix feet, and it has tufts of red flowers of three, four, or five inches in length.

This plant will make a forty times greater increaſe in poor ground than the common turf; and this is owing to its having a long perpendicular root, of that kind, called tap roots, which ſinks to a great depth to attract its nouriſhment. The length of this root is ſcarce to be credited by any but thoſe who have ſeen it; it is frequently drawn out of the ground to the length of twelve or fourteen feet, but it is ſaid to be often thirty feet or more in length.

The farmers have a general opinion, that this plant never ſucceeds well in any land, where there is not an under ſtratum of ſtone, or chalk, or ſome other hard matter, to ſtop its running; but that otherwiſe it ſpends itſelf in root, and comes to nothing above ground. This is an error too groſs to need much refutation. It is certain, that the roots being to plants what the ſtomach and guts are to animals, the more and larger roots any plant has, the more nouriſhment it receives, and the better it thrives.

Saintfoin always ſucceeds where its roots run deep, and the beſt crops of all are produced upon lands where there is no hard under ſoil to obſtruct their paſſage. An under ſoil of clay may kill the plants, by retaining the water, and chilling and rotting their roots.

The long root of ſaintfoin has, near the ſurface, many horizontal roots iſſuing from it, which extend themſelves every way; there are of the ſame kind all the way down, as the roots go, but they grow ſhorter and ſhorter all the way. Any dry land may be made to produce this valuable and uſeful plant, though it be ever ſo poor, but the richeſt and beſt land will produce the beſt crops of it. The beſt way of ſowing it is by drilling, but the earth muſt be very well prepared, and the ſeed well ordered, or elſe very little of it will grow. The heads of theſe ſeeds are ſo large, and their necks ſo weak, that, if they be much more than half an inch deep, they are not able to riſe through the incumbent mould; and, if they are not covered, they will be malted, as the farmers expreſs it; that is, it will ſend out its root while it lies above-ground, and be killed by the air; and whether the farmer plants bad ſeed that will not grow, or good ſeed that is buried or malted, the event will be the ſame. The ground will be underſtocked with plants. A buſhel of ſeed to an acre of land is full twenty ſeeds to each ſquare foot of land; but, as there is ſome difference in the largeneſs of the ſeeds, there is no abſolute certainty as to this calculation. The worſt ſeaſons for planting it are the beginning of winter, and the drought of ſummer; the beſt is the beginning of the ſpring; and it is always ſtrongeſt when planted alone, and is not ſown together with corn, as is the practice of ſome farmers. If barley, oats, or any other corn, ſown with the ſaintfoin, happen to be lodged afterwards, it kills the young ſaintfoin. If it be planted with any other corn, it is beſt done by drilling in the horſe-hoeing way; in this caſe it is not much liable to be killed by the lodging of the corn, as the drilled corn ſeldom falls at all, and, when it does, never falls ſo low as the ſown corn.

The quantity of ſeed to be drilled upon an acre of land will depend wholly upon the goodneſs of it; for there is ſome ſeed of which not one in ten will ſtrike, whereas in good ſeed not one in twenty will fail. The method of knowing the goodneſs, is, by ſowing a certain number of the ſeeds, and ſeeing how many plants are produced by them. The external ſigns of the ſeeds being good are, that the huſk is of a bright colour, and the kernel plump, of a light grey or blue colour, and ſometimes of a ſhining black. The ſeed may be good, though the huſk be black, as that is owing ſometimes to the letting it receive the wet in the field, not to its being half rotted in the heap.

If the kernel be cut a-croſs, and appear greeniſh and freſh, it is a certain ſign that it is good. If it be of a yellowiſh colour, and friable, and look thin and pitted, they are bad ſigns. The quantity of ſeeds allowed to the acre in the drill way is much leſs than that by ſowing, and is to be computed according to the number of plants that are to be allowed in that ſpace, allowing for the common caſualties. It is not neceſſary to be exact in this calculation, or to ſay whether two, three, or four hundred plants are to be allowed to a ſquare perch; neither is it poſſible to know beforehand the preciſe number of plants that may live out of thoſe that come up; for ſometimes the grub takes them when they have only the two firſt leaves, and the crop is greatly diminiſhed by this means. Four gallons of good ſeed to an acre of land will cover it with plants, when judiciouſly managed.

Single plants of ſaintfoin make the greateſt crops; but the farmers, in general, plant them ſo cloſe, that they ſtarve one another. The ſingle plants always run the deepeſt, and thoſe which do ſo will always draw moſt nouriſhment. The plants which ſtand crowded ſtarve one another, and often die after a few years; but the ſingle ones grow to a vaſt bigneſs, and are every year better and better.

The beſt way to calculate how many plants are to be allowed to a perch, is to compute how much hay each ſingle large plant will produce; for, if kept ſingle, and well cultivated, they will all be large ones. Without culture, theſe plants never arrive at a fourth part of the ſize that they do with it. The hay of a large ſingle cultivated plant will weigh more than half a pound, a hundred and twelve plants upon a ſquare perch, weighing but a quarter of a pound a piece, one with another, amount to two tons to an acre. If ſaintfoin be planted on ſome ſorts of land early in the ſpring and hoed, it will ſometimes produce a crop the following ſummer; in a garden the ſeeds ſown in February will yield plants of two feet high that will flower in the month of June following; and, though March be froſty, the young plants ſeldom ſuffer by it. This ſhews, that this plant is naturally a quick grower; but the farmers uſually plant it on poor or cold land, and give it too little culture, which make it backward, and ſlow of growth with them. The poor land, uſually allotted to this plant, alſo makes it generally yield but one crop a year, but on a rich land it will yield two very good crops annually, with a moderate ſhare of culture and management.

The farmer who expects to make a profit of this plant muſt not expect a good crop the firſt year. Nothing is ſo injurious to ſaintfoin as its ſtanding too thick; if it be ſown ſo thick as to cover the ground the firſt ſummer, the plants will ſtarve one another for ever after; but, if the owner will be content to place them ſo thinly as to have but a ſmall crop the firſt year, they will increaſe prodigiouſly, and every ſucceeding crop will be better and better. When ſaintfoin is well hoed, it will grow as much in a fortnight as it would otherwiſe do in ſix weeks; and this quick growing is of advantage to it every way, not only making the plants large, but of better nouriſhment to the cattle, whether they are eaten green or made into hay.

The proper diſtance to drill this plant for the horſe-hoeing huſbandry is at double rows with eight inch partitions between them, and thirty inch intervals between every two and two. Theſe intervals need only be hoed alternately, leaving every other interval for making the hay on. This method of hoeing is of vaſt advantage, and poor land by means of it will always produce two crops a year. The land is always to be perfectly cleared of graſs before the ſowing the ſaintfoin, and the lumps of earth carefully broken. But no harrowing is to be allowed after it is drilled, for that would bury it; and; and it is not proper to roll it at all, unleſs for the ſake of barley, when they are ſown together; and when that is done, it ſhould be with a light roller, and in dry weather. This ſhould be done lengthwiſe of the rows, and as ſoon as it is drilled; if it be not done at this time, it is beſt to ſtay three weeks before it is done, that the necks of the young ſaintfoin may not be broken.

No cattle are to be ſuffered to come in the firſt winter upon the ſaintfoin, after the corn is out, among which it was ſown. Their feet would injure it by treading the ground hard, as much as their mouths by cropping it, and it would never come to good. Sheep ſhould not be ſuffered to come at it, even the following ſummer and winter. One acre of drilled ſaintfoin, conſidering the difference of the quantity and goodneſs of the crop, is worth two acres of ſown ſaintfoin on the ſame land, though the expence of drilling be twenty times leſs than that of ſowing. The firſt winter is the time to lay on manure after the corn is reaped off. Pot-aſhes, or the like, are very proper, and a ſmall quantity of them will do, as there are at this time no other plants to partake of the benefit, but the young crop has it all; and the young plants, being thus made ſtrong at firſt, will continue ſo, and be long the better for it.

It is obſerved, however, that in the drilling and horſe-hoeing-way there is no neceſſity for any manure at all. Some farmers ſow eight or ten buſhels of the ſeed of ſaintfoin to an acre along with their corn, with intent that it ſhould kill all the other weeds; but the conſequence is, that the plants ſtand cloſe, and ſtarve one another, and are no bigger than where the plant grows wild on the hills in Calabria, where it is ſo ſmall and ſeemingly deſpicable a plant, that it ſeems a wonder that any body ſhould be tempted to think of cultivating it: yet, when rightly managed, it ſeems capable of being as uſeful a plant as any in the world. Where theſe plants ſtand ſo thick, they draw out all the nouriſhment from the ground, in a few years, and ſo die, though manured ever ſo carefully. Six or ſeven years ſeems their greateſt duration; whereas, when the ſeed is drilled in, and the plants are horſe-hoed, they will be as ſtrong and vigorous as ever, at thirty years ſtanding.

Some people who have turned their thoughts to huſbandry, have been of opinion, that the cytiſus would ſucceed better with us than the ſaintfoin; it is probable enough that it would grow well; but the labour of ſheering it would, with us, where the pay of ſervants is ſo dear, run away with the greateſt part of the profits of the crop.

Lucerne is another thing which many have thought of introducing among us in the place of ſaintfoin, but it requires ſo much care to ſuit it with a proper ſoil, that, whatever are the profits of it, it never can be ſo general as ſaintfoin. *Tull's Horſe-hoeing Huſbandry.*

Saintfoin, ſays Mr. Duhamel, deſerves the farmer's utmoſt attention, as one of the moſt profitable plants he can cultivate. It will do on almoſt any land; and though it ſucceeds beſt in good ſoils, yet it will grow even on dry barren ſpots, where ſcarce any other graſs can live; provided its roots be not chilled by a cold clay, or other ſubſtance which retains water: and it has this farther advantage, that it may be mowed at different degrees of ripeneſs, with nearly the ſame profit.

1. It may be mowed before it is in bloom, for it is then admirable food for horned cattle; and when cut thus

early, it yields a ſecond crop, which makes ample amends for what was loſt by not letting the firſt come to its full growth. This early cutting is likewiſe attended with another benefit, which is, that it purges cattle, in the beginning of the ſummer, and thereby frees them from diſorders occaſioned by the winter's cold, or dry food.

2. If the weather be rainy, the ſaintfoin may be left ſtanding till it is in bloom; when it ſtill is excellent fodder for cows. But care muſt be taken in making it into hay, that the flowers do not drop off, as they are very apt to do: for cattle are ſo fond of theſe flowers, that they often induce them to eat the reſt of the plant.

3. If the rain continues, the ſaintfoin may be left ſtanding till ſome of its ſeeds are formed, and the crop will then be the more plentiful; not only becauſe it will have attained its full growth, but likewiſe becauſe its leaves, being more ſubſtantial, diminiſh leſs in drying. It is not indeed, then, quite ſo ſweet as before; but horſes eat it readily, becauſe they love to feel between their teeth the ſeeds, which now begin to be formed.

Mr. Tull ſays this fodder is ſo excellent, that horſes need no oats when they are fed with it. He affirms that he kept a team of horſes with it a whole year in good plight, without giving them any oats, though they were worked hard all the time. He adds, that he fattened ſheep with it, in leſs time than others which were fed with corn. But the hay of this plant can never be ſo good as when it is cultivated with the horſe-hoe: for in the common huſbandry, it bloſſoms almoſt as ſoon as it is out of the ground.

4. If the ſeaſon continues rainy, it may be more adviſeable to let the ſaintfoin remain ſtanding, than to run the hazard of having it rot upon the ground: for then the ſeed will ripen, and nearly make up for the loſs of the fodder; not only becauſe it will fetch a good price, but alſo becauſe two buſhels of it will go as far in feeding of horſes, as three buſhels of oats; and cattle in general, as well as poultry, are extremely fond of it.

The firſt of theſe ſorts of ſaintfoin hay, cut before the bloom, is Mr. Tull's virgin hay, which, he ſays, is the beſt beyond compariſon, and has not its equal, in the world, except lucerne. He gives the next place to the ſecond ſort, cut whilſt in bloom, and ſays that an acre of land, well cultivated, may yield three tons of this bloſſomed hay: and he eſteems the third ſort, which he calls the full grown, many degrees inferior to either of the former; though it yields a greater crop, becauſe it has grown to its full bulk, and ſhrinks but little in drying.

Even the ſaintfoil that has yielded its ſeed, may be cut down and dried; and when other fodder is ſcarce, this will be better food for horſes and large cattle, than the coarſe hay of flowed meadows, or any kind of ſtraw.

The manner of making ſaintfoin hay is thus directed by Mr. Duhamel.

In a day or two after the ſaintfoin has been mowed, it will be dry on the upper ſide, if the weather be good. The ſwarths, or mowed rows, ſhould then be turned, not ſingly, but two and two together: for by thus turning them in pairs, double the ſpace of ground is left betwixt pair and pair, and this needs but once raking, whereas, if the ſwarths were turned ſingly, that is, all the ſame way, the ground would require as much raking again.

As ſoon as both ſides of the ſwarths are a little dry, they ſhould be made up into ſmall cocks, the ſame day they are turned, if poſſible: for when the ſaintfoin is in cock, a leſs part of it will be expoſed to the injuries of the night, than when it lies ſcattered upon the field. The ſun and dew would exhauſt almoſt all its juices, in this laſt caſe, in leſs than a week's time.

Theſe little cocks of ſaintfoin may be ſafely made into larger ones, without waiting for their being ſo thoroughly dry as thoſe of common hay ought to be before they are laid together: becauſe common hay, by ſinking down cloſer, excludes the air neceſſary for keeping it ſweet; ſo that if the weather prevents its being frequently ſtirred and opened, it will heat, turn yellow, and be ſpoiled; whereas ſaintfoin, by admitting the air more freely, becauſe its ſtalks are leſs flexible, will remain much longer without any danger of fermenting.

Saintfoin hay is never better than when it has been dried by the wind only, without the aſſiſtance of the ſun. A little rain, or a miſt, which will turn common hay, clover, and even lucerne, black; will do no hurt to ſaintfoin, which is not really ſpoiled, till it rots upon the field.

If the weather threatens rain, and the ſaintfoin is not yet dry, it may be laid in cocks, without fear of its heating, provided a large baſket, or buſhy faggot, be ſet up in the middle of each cock, where it will ſerve for a vent-hole, through which the ſuperfluous moiſture of the hay will tranſpire.

As ſoon as all danger of its heating is over, theſe cocks ſhould be made into ricks, and thatched. That which is laid up quite dry, will come out of the rick of a green colour: that which has heated much in the rick, will look brown.

It requires ſome experience to know at what degree of ripeneſs it is beſt to cut the ſeeded ſaintfoin; becauſe all its ſeeds do not ripen at the ſame time. Some ears bloſſom before others; every ear begins bloſſoming at its lower part, and continues to blow gradually upward, for many days; ſo that before the flower is gone off at the top, the ſeeds are almoſt filled at the bottom. By this means, if the cutting be deferred till the top ſeeds are quite ripe, the lower, which are the beſt, would ſhed, and be loſt. The beſt time, therefore, to cut it, is when the greateſt part of the ſeed is well filled, the firſt blown ripe, and the laſt blown beginning to be full. The unripe ſeeds will ripen after cutting, and be, in all reſpects, as good as thoſe that were ripe before. Some, for want of obſerving this, have ſuffered their ſaintfoin ſeed to ſtand till all of it has ſhed, and been loſt in cutting.

Saintfoin ſhould never be cut in the heat of the day, while the ſun ſhines out; for then much, even of the unripe ſeed, will ſhed in mowing. The right time for this work, is the morning or the evening, when the dew has rendered the plants ſupple.

If the weather is fine and clear, the ſaintfoin will ſoon dry ſufficiently in the ſwarths, without turning them: but if any rain has fallen, and there is a neceſſity for turning them, it ſhould be done very gently, while they are moiſt, and not two ſwarths together, as in the other hay made of ſaintfoin before it has ſeeded. If the ſwarths are turned with the handle of the rake, it is beſt to raiſe up the ear-ſides firſt, and let the ſtub-ſide reſt on the ground in turning: but if it is done with the teeth of the rake, let the ſtub-ſide be lifted up, and the ears reſted on the earth.

If ſaintfoin be cocked at all, the ſooner it is done, the better; becauſe, if the ſwarths are dry, much of the ſeed will be loſt in ſeparating them; the ears being entangled together. When moiſt, the ſeed ſticks faſt in the ear; but when dry, it drops out with the leaſt touch or ſhaking.

There are two ways of threſhing it: the one in the field, the other in the barn. The firſt cannot be done but in very fine weather, and while the ſun ſhines in the middle of the day. The beſt manner of performing this, is to have a large ſheet pegged down to the ground, for two men to threſh on with their flails, while two others bring them freſh ſupplies in a ſmaller ſheet, and two more clear away the hay that has been threſhed. The ſeed is emptied out of the larger ſheet, and riddled through a large ſieve, to ſeparate it from the chaff and broken ſtalks; after which it is put into ſacks, and carried into the barn to be winnowed. Care ſhould be taken not to let the hay get wet, becauſe it would then be ſpoiled.

A very important, and at the ſame time very difficult article, is the keeping of the ſeed that has been threſhed in the field, without having ever been wetted. If it be winnowed immediately, and only a little of it laid amidſt a great heap, or put into a ſack, it will ferment to ſuch a degree, in a few days, that the greateſt part of it will loſe its vegetative quality. During that fermentation, it will be very hot, and ſmell ſour. Spreading it upon a barn floor, though but ſeven or eight inches thick, will anſwer no end, unleſs it be frequently and regularly turned both day and night, until the heating it over: but even this will not make its colour keep ſo bright as that which is well houſed, well dried, and threſhed in the winter. This laſt, laid up unthreſhed, will keep without any danger of ſpoiling, becauſe it does not lie cloſe enough to heat. The beſt way to preſerve the ſeed threſhed in the field, is, to lay a layer of ſtraw upon a barn floor, and upon that a thin layer of ſeed, then another layer of ſtraw, and another layer of ſeed, and ſo on alternately. By this means the ſeed mixing with the ſtraw, will be kept cool, and come out in the ſpring with as green a colour as when it was put in.

The following method is followed in cultivating ſaintfoin in the Iſle of Thanet.

Though the lands in general here are very rich and fruitful, owing to the good tillage, and the quantity of manure they enjoy, yet at ſome diſtance from the ſea they have land which is very barren and thin by nature; nevertheleſs, even this indifferent land they farm to the greateſt advantage. In theſe ſoils the farmers ſow ſaintfoin or French graſs with great ſucceſs, having ſometimes two loads of hay on an acre.

This graſs thrives beſt in theſe parts, on a thin coat of earth with a chalky bottom; it puſhes its long tap-root deep into the chalk, and extracts thence a nouriſhment, which is out of the reach of almoſt any other plant.

The land muſt always be exceedingly well prepared, before they attempt to put the ſeed in the ground; it has frequent plowings, and every the leaſt appearance of a weed or root of graſs is diligently picked off: graſs in particular is a very great enemy to this plant; without the utmoſt care it ſoon choaks and deſtroys it. They ſow this ſeed in April, either at the beginning, middle, or latter end of the month, according to the ſeaſon: dry weather is beſt, provided it does not long continue: however, a little rain in theſe light ſoils does no great hurt. The quantity of ſeed they allow to an acre is five buſhels; of courſe it is ſown very thick. It does not lie any great length of time in the ground: when it is come up, they carefully hoe and weed it, to keep down the roguery and graſs: this puts the plants forward, and makes them ſo vigorous and ſtrong, that they will of themſelves keep down the graſs, eſpecially in theſe chalky bottoms, where graſs does not thrive well, and is not apt to coat land with turf.

Saintfoin uſed formerly to hold good in theſe parts for twenty years together, but it does not now of late years laſt ſo long: this is probably owing to their want of care in chuſing their ſeed, which ſurprizes me, conſidering what good farmers they in general are. They get, it is true, when they can, the beſt ſeed the iſland affords: but it would certainly be a much better way were they now and then to procure ſome of a finer growth from France: for it was from that country, as far as I can underſtand, it firſt came hither, about the latter end of Charles the Second's reign; and I do not hear from the inhabitants that they ever remember the imporring any more ſince.

The climate of France is more natural to it; of courſe the ſeed comes to greater perfection there, whilſt, on the contrary, in England, that, as well as many other crops, is apt to degenerate after a certain number of years.

Where this crop takes, it is very advantageous to the farmer; it yields him for many years plenty of excellent fodder, and that upon land which would otherwiſe, perhaps, ſcarcely yield him any profit at all; and beſides all this, when the ſaintfoin begins to fail, if proper care is taken, the land when broke up will be found greatly refreſhed, and in a better condition to bear tillage and a ſucceſſion of other crops.

The farmers here, when they intend breaking up a ſaintfoin lay, feed it the laſt three or four years: mowing it at this time, they think, hurts and exhauſts the land too much; and beſides, the dung and urine of the cattle are of great ſervice.

They obſerve here, as well as in other places where ſaintfoin is cultivated, that after land has been once ſown with it, it will not for ſome years, to any advantage, bear ſaintfoin again. *Muſeum Ruſticum, vol.* I. *pag.* 109.

The reader is obliged to Mr. Holdway, an old experienced farmer at Marlborough in Wiltſhire, for the following account of cultivating ſaintfoin in that county.

“ About one hundred years ago, ſays he, the culture of ſaintfoin was firſt introduced into Wiltſhire, and was ſoon preferred to clover graſs; and there was indeed ſome reaſon for this preference, for it thrives much better, and yields a much larger encreaſe, on poor hungry ſoils, than clover can do.

“ Another very good reaſon may be aſſigned why ſaintfoin was ſo well received. The ſowing it at all was conſidered as a new huſbandry, and the timorous farmers were very unwilling to hazard the trial of any new method on lands which would any other way yield them any conſiderable advantage: it was chiefly in corners of fields, of very little uſe to the farmer, that this paſture was firſt tried, and that on poor land, as, ſhould it not have ſucceeded, the only loſs would have been the ſeed; yet many occupiers of land would not, at firſt, hazard even this trifling loſs.

“ But the ſentiments of theſe farmers were ſoon altered in this matter: clover wears out in a few years, whereas many, who ſowed ſaintfoin on poor land not worth above ſix ſhillings an acre, found their land ſo much improved, as to be very ſpeedily worth thirty ſhillings the acre, and at the end of twenty years it continued yet in good proof.

“ In fact, it will thrive, and be a very conſiderable improvement, on the pooreſt, and ſeemingly the barreneſt land; but it muſt be remembered, that ſheer and ſlight ſands, and all clays, and other cold and wet ſoils, are to be excepted: on rich land the weeds ſoon deſtroy it. Beſides, as it ſends its roots very deep in ſearch of nouriſhment, the longer it occupies the land, the more good it does it; whereas this is far from being the caſe with ſhallow-rooting plants.

“ A ſaintfoin lay may at any time be broke up, when it will be ſure to yield ſeveral good crops of corn, and may afterwards again with good ſucceſs be ſown with ſaintfoin; and one principal reaſon why it thrives ſo well on poor lands muſt be the length of the roots, by which it is enabled to reſiſt the parching heat of the ſun better than moſt other graſſes are.

“ One thing I muſt notify, which is, that I am by long experience convinced that the land cannot be made too fine for ſaintfoin; it thrives the better for it, and is the more certain to take.

“ I have often, with very good ſucceſs, ſown it with oats and barley in the manner clover is ſown, the proportion much about equal to the grain it is ſown with; for as the ſeed of ſaintfoin is much larger and lighter than clover ſeed, of courſe a larger quantity ſhould be ſown: it is much beſt for the plants to come up thick; the ground is thereby ſooner ſtocked, and the weeds are eaſier kept under.

“ Some in this county have ſown it in rows with intervals, to afford a better opportunity of deſtroying the weeds; and I have heard that on tolerable rich land, apt to produce weeds, it has done very well in this way; but as I never experienced it, I ſhall not enlarge on that head.

“ It is beſt not to feed it the firſt year; but whether it is ſown by itſelf, or with any other crop, it may be mowed the firſt year.

“ It is much beſt, if a good crop is deſired, and it is to continue any time to the land, to ſow it in autumn by itſelf, the earlier the better: the proper ſeaſon is from the beginning of Auguſt to the end of September; but if you mix it with other grain, let it be ſown from the beginning of February to the end of March; the earlier in either ſeaſon, the better.

“ I have, I think, before obſerved that the land cannot be made too fine for this plant; and it ſhould be well harrowed before ſowing, and again harrowed afterwards to cover the ſeed.

“ I muſt once more repeat, that it muſt not be fed the firſt year; for the ſweetneſs of the graſs will cauſe the cattle to bite it too near the ground, which will greatly injure your crop: in fact, it is our practice not to let great cattle feed it till the third year, particularly in grounds that are inclinable to moiſture; for the roots are tender, and much treading is very injurious to it.

“ When the ground is well covered, ſuppoſe in the third year after ſowing, if you intend to mow your ſaintfoin, it is beſt to lay it up by the middle of April at fartheſt; but it is better done three or four weeks ſooner. The time for cutting it is when it begins to flower, as it is then fulleſt of ſap: this will ſometimes be about the middle of May, but often later, according as the ſpring is cold or warm.

“In feeding it ſome neceſſary rules are to be obſerved. In the ſpring turn in your great cattle, and you may be pretty certain the buds will not be cropped too near. Oxen thrive well on it, without the danger, at their firſt grazing, that is to be apprehended from clover, &c. yet even this danger chiefly ariſes from the negligence or ignorance of the hinds.

“In the autumn, and part of the winter, you may feed your ſheep on it, which, if in health, will thereby be very ſuddenly fattened.

“Saintfoin hay is excellent food for horſes, and they are uncommonly fond of it.

“If you turn your cows in ſpring in your ſaintfoin lay, you will find it will breed in them abundance of milk; and all my acquaintance know that the butter made of it is excellent.

“When it is intended to ſave the ſeed of ſaintfoin, it is beſt to roll it in the ſpring, that the ſtones may be preſſed down, and the ſcythe go cloſe to the ground; or elſe the beſt ſeeds, which grow on the lowermoſt joints, will be loſt.

“When land is inclined to moiſture, ſaintfoin may thrive very well on it till a wet winter comes; but it is then a great chance if it is not deſtroyed.

“In this county it has long been the opinion of the ableſt farmers, that it is beſt not to dung our ſaintfoin; for the dung ſerves only to encourage weeds, and ſeldom reaches deep enough to give any ſupply of nouriſhment to the roots of the ſaintfoin.

“I have, if I miſtake not, before obſerved that the treading of great cattle, particularly in winter, is hurtful to this graſs: I would therefore by no means adviſe the farmer to fodder his cattle on it, as the field will thereby be poached full of holes, in which the wet lodging, it is a chance but the roots of the ſaintfoin are rotted by it.

“I have often fed my ſheep in winter with ſaintfoin hay; but whenever I intended this, I always cut my ſaintfoin ſome little time before it flowered: it is very eaſy to obſerve when the flower cup is forming: the ſheep will eat it very clean, and thrive well on it, provided it is not old and ſticky.

“When I ſay that ſheep in autumn will fatten very ſuddenly on ſaintfoin graſs, it muſt be obſerved, that I did not mean the aftermath of ſuch as had been mowed that ſeaſon; but the ſecond growth, when the field had been for ſome time ſhut up after the great cattle had fed it in the ſpring. The aftermath is, it is true, good for ſheep; but, I think, not quite ſo good as the aftermath of natural graſs; at leaſt, this I am certain of, that turn ſome ſheep into a field where there is a mixture of natural graſs and ſaintfoin, both of which have been mowed, they will to chuſe eat up the firſt, before they touch the other with any degree of appetite.

“Saintfoin ſhoots very early in the ſpring, and to nip it in the bud is very injurious; I would therefore adviſe that the ſheep be taken out about Chriſtmas, ſoon after which time it often begins to grow.

“Some of our Wiltſhire farmers have had a cuſtom of ſowing their ſaintfoin ſeed under furrow; but I do not much approve of this practice, though they ſay in light land it cannot be buried.” *Muſeum Ruſticum, vol.* I. *pag.* 463.

The following method of cultivating ſaintfoin in Switzerland, was written by an experienced huſbandman of that country.

“You have bought, you ſay, a little eſtate, at no great diſtance from the metropolis, and have thought of improving ſome of the lands by ſowing ſaintfoin: you requeſt me to let you know what are the methods in practice in this country relative to that graſs, as, when you left Switzerland to go to our uncle in London, you were too young to gain the neceſſary knowledge in farming. I ſhall oblige you with pleaſure, and the rather as I have had very good ſucceſs myſelf in this particular article.

“The roots of ſaintfoin, ſays he, penetrate very deep into the earth, by which means they do not exhauſt the ſurface ſo much as one would imagine, the vigour of the plant conſidered: the roots are perennial, and conſiſt of a white woody ſubſtance within, covered by a black outward coat or bark: from the crown of the root proceed ſeveral leaves, and ſome branches about two feet long, which incline on all ſides. Our fodder is furniſhed from theſe branches and leaves. Saintfoin is a very vigorous plant, and yields a moſt excellent fodder.

“It is not nice with reſpect to ſoil, but grows in almoſt any, if we except ſuch as are clayey, very damp, and low, or ſtoney: the crop is in proportion to the goodneſs of the land; but the ſaintfoin that grows on poor land, though leſs in quantity, is moſt nouriſhing and heartening for cattle: the virtues of it ſeem concentrated, and the cattle thrive much better on it than on ſuch as grows in greater quantities on rich mellow land.

“When we have it in our power to chuſe our ſituation and ſoil for ſaintfoin, we ought to prefer a light land, gently ſloping on the ſouth ſide of an eminence: here it proſpers to admiration.

“This plant does not thrive in the ſhade; for this reaſon we ſhould avoid having any trees in the fields that bear ſaintfoin: and it is ſubject to be ſometimes chilled, by having ſnow lie too long on it in winter; it ſhould not therefore be ſown on flat level land.

“To have a good crop, the land ſhould be properly prepared, by having two or three good plowings between harveſt and barley ſeed-time: the ſtones muſt be very carefully picked off the field; and it muſt be cleaned from all kinds of weeds, and other ſuch traſh.

“If it is likely that there will be a wet ſeaſon, the ſpring is the beſt time for ſowing ſaintfoin, as it will be much forwarder than that ſown in autumn: but if the ſpring is too dry, the ſowing will be beſt deferred till about Auguſt, as by that means the plants will have time to acquire ſtrength in their roots, and make vigorous ſhoots in the ſpring.

“The farmer may take it for granted, that if the ſoil will admit of it, he cannot well plow his land too deep, or make it too fine: he will reap all the benefit of it in his ſucceeding crops.

“In Switzerland we ſow it three times as thick as we do wheat; or, which amounts to the ſame thing, we uſe the ſame weight of ſeed, the ſaintfoin ſeed being ſo much ſmaller as to make that difference.

“Good ſeed ſhould be heavy, plump, bright, and of a yellowiſh red colour: if, on opening the pods, you find the ſeeds black and ſhrivelled, reject it as of no value; for it has been heated in the heap, and will not grow: if it appears white and ſhrivelled, the plant was cut before the ſeed was ripe; from this you are to expect only ſtarved, meagre, ſhort-lived plants: you muſt therefore by no means ſow it. The pods encloſing good ſeed ſhould be plump, large, and armed on one ſide with ſmall prickles: and they ſhould alſo be of a deep brown colour: but it is beſt not to depend on the appearance of the pods, but open them, and examine the ſeed.

“The weather ſhould be mild at the time of ſowing the ſeed of ſaintfoin; and it ſhould be harrowed in, and not covered with above two inches of earth at moſt: ſome ſow it in the ſpring with oats; but this I by no means approve of: it is much better ſown alone, eſpecially if you would have a ſtrong vigorous plant, that ſhall laſt for years.

“In our very poor lands in Switzerland we ſometimes purſue the following method.

“Immediately after harveſt we give the land intended for ſaintfoin a good deep plowing, laying it in high ridges; in this manner it is left to be mellowed by the froſt and ſnow: we take advantage of the firſt hard froſt to carry on our dung, and manure it well.

“When the froſt breaks in the ſpring, we ſpread the dung and turn it in with the plow: we afterwards beſtow at leaſt two more plowings on the land, not only to keep down the weeds, but to make the land as fine as poſſible: in autumn we ſow wheat, and have reaſon to expect a tolerable good crop.

“When the wheat is got in, the land is again plowed, and left to meliorate and pulverize by the winter froſts: early in the ſpring it is plowed and laid level, the ſtones are all picked off, and the weeds cleared away: if rain is expected, it is now ſown pretty thick with the ſaintfoin, otherwiſe the ſowing is deferred till autumn. When poor land is managed in this manner, it will yield tolerable good crops of ſaintfoin for ſeveral years: it ſhould not, however, be fed the firſt year, as the treading of the cattle will deſtroy the crown of the plant, and prevent its ſhooting the ſucceeding year: and ſheep ſhould never be turned in to feed on it, as they will crop it ſo cloſe as to prevent its budding.

" Saintfoin comes up about a fortnight after ſowing it, and if the weather is moiſt, ſomething ſooner. When the plants are come up, they ſhould be ſet out at a proper diſtance with a hoe, that they may have room to ſpread. The young plants are very apt to be choaked by weeds; they muſt on that account be kept very clear of weeds, till, by their branches, ſtalks, and leaves, they cover the land; after which there will be no danger of the weeds getting a-head.

" As ſaintfoin ſeed is often faulty, it will not be amiſs to make a trial of it, by ſowing ſome of it in a detached bed of a garden, counting the ſeeds before they are put into the ground: by this means it may eaſily be known how many of them fail, and the quantity of ſeed to be ſown may be proportioned accordingly.

" Some have aſſerted, that ſaintfoin ſhould not be mowed the firſt year: but this is an ideal precaution; for in Switzerland we think it rather does it good than harm ro mow it in autumn; and experience every day convinces us we are right in our opinion. The firſt crop is not, it is true, very large; but the mowing cauſes the plants to branch, and gives ſtrength to the roots.

" No cattle, as I ſaid before, ſhould be turned on ſaintfoin the firſt year: and indeed, it is beſt, if poſſible, always to mow it. We have three crops of green fodder, or two of hay, from it, in one ſeaſon in this country.

" When we intend to ſave the ſaintfoin ſeed, we leave a part of it ſtanding, and do not cut it till we obſerve, by the colour of the pods, which will then be of a deep brown, that the principal part of the ſeed is ripe: we then either gather the heads by hand, or reap them with a ſickle, and lay them carefully on a cloth. The heads muſt be dried in layers three or four inches thick: if they were laid thicker, they would be apt to heat and ſpoil: when dry, we gently threſh them with ſticks; flails would be too heavy; for if the ſeed is the leaſt bruiſed, it does not come up. The ſtubble that remains after the heads are cut off may be mowed, and given either dry or green to the cattle; for though a little ſticky, they will not refuſe to eat it.

" I generally uſe my ſaintfoin green, foddering the cattle with it as ſoon as it is cut; and this I the rather do, becauſe the making it into hay is ſuch critical work: but when there is a likelihood of my being ſhort of winter-fodder, I have no choice to make.

" The weather ſhould be very fine when it is cut; for as it is full of ſap, it requires great heat to dry it; and if it happens to rain, it takes more damage than common graſs; and it is beſt not to cock it, as it is ſubject to heat in a very ſmall ſpace of time: if it is much wetted, it grows black, and loſes all its ſweetneſs.

" Even when ſaintfoin is ſeemingly quite dry, it is apt to heat in the ſtack; but this is eaſily prevented by ſpreading alternately a layer of good oat or barley ſtraw, and another of ſaintfoin: when it comes to be uſed all together, it makes an excellent winter-fodder.

" Great care muſt be taken both in turning the ſwarths of ſaintfoin, and in loading it on the waggons, as a very little ſtirring will, when it is dry, ſhake off all the leaves; and this greatly leſſens its value: for this reaſon I make my men turn the ſwarths with the handles of their forks, which is eaſily done; and I never cart it, but either early in a morning, or late in the evening, when it is ſomewhat moiſtened by the dews.

" Saintfoin is a very hardy plant, and bears, without being ſenſibly affected, the extremes of heat and cold; but the bottom of the land where it is ſown muſt not be wet, and there muſt be room for the roots to ſpread.

" A field of ſaintfoin on a good ſoil will laſt from ſixteen to twenty years in prime, and even longer, with care; for if, after ſeven or eight years, ſome well-rotted dung is laid on it, the future crops, as well as its duration, will be greatly encreaſed. When it is ſown on light land, marling it is of very great ſervice.

" But if after all a piece of ſaintfoin falls off, our method is to plow it up in autumn as deep as poſſible; give it another plowing in ſpring, ſow it with oats, plow it again immediately after harveſt, dung it, ſow it with wheat; when the wheat is off, plow it again, and giving it another plowing ſow ſaintfoin in it about the end of Auguſt; and this in general ſucceeds as well as that which was firſt ſown on the land.

" Before I conclude, I muſt give you a few cautions relative to this excellent fodder, which has of late ſo much improved this neighbourhood.

" It is ſo very ſweet, and cattle are ſo fond of it, that without great care they are apt to eat too much of it; whence often proceeds a ſurfeit, and ſometimes a corruption of the maſs of blood, and cutaneous eruptions: they ſhould at firſt have but a little at a time given them, that they may be by degrees habituated to it: by this management the danger vaniſhes.

" It is much more proper for ſlow draught-horſes than for ſuch as are uſed for berlins, or for riding; for it is apt to make horſes thick-winded, foggy, and ſomewhat ſluggiſh: for farmers horſes nothing can be better, or more nouriſhing; ſpeed is not required in them.

" When ſaintfoin is intended to be made into hay for horſes, it is beſt not to cut it till the ſeed is formed in the pod, as by that means the hay will be much more nouriſhing; and when the dried ſeed itſelf is plenty, nothing better can be given to the horſes by way of corn; for I can aſſure you from experience, that one buſhel of it will go as far as two of oats.

" When ſaintfoin is cut to be given green to cattle, it is beſt to mow it when it is in full bloom, as it is then moſt juicy, and fulleſt of ſap, and will conſequently afford moſt nouriſhment to the cattle. The beſt way of managing is to cut no more than will ſerve for the day; and by properly apportioning, or parcelling out the field, there will be, during the whole ſummer, ſome of it in order to cut for green fodder.

" If this green fodder is intended for ſheep, it may with great propriety be cut juſt before it flowers: the ſtalks are then in a tender ſtate, and very nouriſhing and good either for wethers or ewes. When it is to be made into hay for ſheep, the ſame rule ſhould be obſerved.

" I have very little more to ſay on the ſubject of ſaintfoin, except that, as when a ſaintfoin lay is brought into tillage, it prepares land very well for wheat or rye, and bears good crops, there is ſeldom occaſion among the good farmers to try how long it will continue in heart, as they generally break up theſe lays in turn, and find it advantageous ſo to do." *Muſeum Ruſticum, vol.* I. *pag.* 37.

Experiments on Saintfoin.

The following judicious ſeries of experiments were communicated by a gentleman of diſtinguiſhed rank and fortune, in Yorkſhire.

" From an entire conviction, ſays this excellent huſbandman, that it is the duty of every ſubject to contribute all in his power to the good of ſociety; I have endeavoured, during ſeveral years that I have reſided in the country, to promote and encourage the advancement of agriculture. To this end I have made variety of experiments, on different ſoils, to prove and aſcertain the moſt beneficial methods of huſbandry, or how to employ land to the moſt advantage.

" A great part of my eſtate, conſiſting of waſte and uncultivated heath, which did not let for more than a ſhilling an acre, I judged it to be a matter of importance to try if it was not poſſible, by culture, or by applying this ground to a different purpoſe, to increaſe the value of it. Happy would it be, could pleaſure be made to coincide with profit! and it is certain, that whoever ſucceeds in the improvement of his own eſtate, may enjoy the inward ſatisfaction of rendering ſome ſervice to his country: for the example of a landlord may be thought to have ſome weight with his tenants; and if, amidſt a great number of experiments made for the ſake of truth, ſome have proved ſucceſsful, one may expect that the farmer will at laſt adopt a method which he has for many years ſeen repeated with advantage : for however the common farmer may have been accuſed of an obſtinate adherence to old cuſtoms, many inſtances might be produced of his quitting the paths of his anceſtors in favour of modern improvements ; but then he muſt be thoroughly ſatisfied, that the new way is indeed preferable to the old, not in theory only, but in practice, confirmed by actual experiments often repeated before his eyes. And can we juſtly blame the illiterate peaſant for refuſing to forſake a method he is well acquainted with, and can depend on for the ſupport of himſelf and family, upon other terms? It is the province of the landlord to adopt a theory, and to try it by experiment; for if it fails, as is often the caſe, his ruin is by no means the conſequence, and the loſs is amply made up to him, by the ſecret pleaſure always accompanying a good intention. But whatever ſervice a gentleman may be of in encouraging reſearches of this nature, or by his influence in his own neighbourhood ; yet ought his benevolence to extend farther, ſo as to be of uſe, if poſſible, to his country and mankind. It is the deſire of communicating the little knowledge I may have gained from the experience of a few years, that has prompted me to addreſs this letter to you, who are engaged in an uſeful and public undertaking : and you are at full liberty to make uſe of it, together with the detail of the experiments. They were begun without the leaſt deſign of making them public, and may therefore be deficient in point of method and order : but they are ſtrictly true.

“ On the third of April, 1759, two acres of very ſandy land (which had a hundred loads of red marle laid on it the year before, and had borne a good crop of oats in 1758) were drilled with ſaintfoin, on four feet ridges in double rows, eleven inch partitions, the intervals three feet one inch wide, and took four pecks and a half of ſeed. This was intended to be horſe-hoed, as Tull directs ; but the land was in ſuch bad tilth, and abounded ſo with the natural graſs, that, after once or twice attempting to deſtroy it, by plowing the intervals, the horſe-hoeing ſcheme was given up, and the ſaintfoin left to take its chance. However, a few plants remained thinly ſcattered in the rows (whether this thinneſs was owing to the badneſs of the ſeed, or to its being ſown too deep, I know not, though I rather impute it to the latter cauſe, as, in ſandy land, the ſhares of the drill are very apt to penetrate too far into the ground.) Theſe remaining plants flouriſhed exceedingly from the time of their being ſown ; many were in flower the following June, and afforded a tolerable crop, viz. about a load. The after-eatage was very good. In 1760, theſe plants ſeemed to have arrived at their perfection, and the product was two waggon loads, or about two tons. In 1761, and 1762, this ſmall cloſe, having had ſome manure laid on it yearly, yielded nearly the ſame quantity of hay ; and it is now let for forty ſhillings a year : a much higher rent than any land is let for in this neighbourhood, and four times the rent paid for it before the improvement.

“ N. B. This cloſe of two acres was ſeparated from another of twenty-ſeven acres, of ſo ſandy and dry a nature, that, unleſs in a wet ſummer, the hay upon it was ſcarce ever worth mowing : and this experiment was made in order to determine what improvement the adjoining large cloſe was capable of, and to experience whether or no the common opinion, that ſaintfoin is improper for all ſandy and deep ſoils, be founded on truth, or only the reſult of prejudice : for the reaſon given for its diſagreeing with this kind of ſoil, did not appear to me ſatisfactory ; and great part of my eſtate conſiſting of ſuch ſandy land, it ſeemed a matter of importance, to know, whether the great advantage derived from ſaintfoin, on ſome ſoils, might not alſo be applicable to ſandy ſoils.

“ Encouraged by the flouriſhing condition of the ſaintfoin on this ſmall cloſe, I determined to extend the improvement to the larger one alſo, as ſoon as it could be brought into ſufficiently fine order to be laid down with this graſs. Accordingly, in the winter of 1759, twenty-five acres were plowed with the five coultered plough, as recommended by M. Duhamel, in his Treatiſe on the Cultivation of Land, in order thereby to prepare the ground for turneps the enſuing ſummer : for I look upon this as one of the beſt methods of deſtroying the natural graſs, and preparing the land for any of the artificial graſſes ; eſpecially if the turneps are drilled in rows, and cultivated with the horſe-hoe. The land was plowed level in the ſpring of 1760, and into ridges of about five feet broad in June, and a ſingle row of turneps was drilled on the middle of each ridge in July. It is to be obſerved, that the natural graſs was far from being deſtroyed by theſe three plowings ; nor could it be entirely ſo by the ſubſequent hoeings of the turneps ; ſo that it certainly was a great prejudice to the ſaintfoin. The ſame ground is now ſown again with the ſame plant : but I would ſtrongly recommend to thoſe who are inclined to follow this method on ſuch a ſoil as I have deſcribed, to continue the culture of turneps, with the horſe-hoe, two years, inſtead of one : for by this means, the natural graſs and weeds may probably be effectually deſtroyed. But to return to the experiment : the turneps ſucceeded as well as could be expected on ſuch a ſoil, and without manure : they were eaten off by ſheep, and Scotch cattle, folded on the land.

“ About four acres, on which the turneps were the firſt ſpent, were plowed level, and afterwards, viz. in November, drilled with ſaintfoin in equally diſtant rows, one foot aſunder. They took about a buſhel to an acre. This was an uncommon, and may be thought an improper ſeaſon for the ſowing of ſaintfoin : but I choſe to ſow part of the field before winter, and part in the ſpring, part with ſaintfoin mixed with corn, and part with ſaintfoin alone ; in order to ſee which method would ſucceed beſt, that I might make it my guide in other places, more likely to yield good crops.

“ Five or ſix acres of land were drilled in the beginning of April 1761, with ſaintfoin ſeed, in rows, at the ſame diſtance, and with the ſame proportion of ſeed, as the four acres ſpoken of before : about three acres were ſowed ſoon after with ſaintfoin and oats, both drilled : and about twelve acres were drilled with ſaintfoin and barley ; each in rows, about a foot aſunder. The whole of this field, which contained twenty-five acres, had been plowed but once ſince the turneps ; whereas two plowings might have been better : but, on account of eating them off with ſheep and cattle, there was not time for it.

“ The three acres ſowed with oats in rows a foot aſunder, took four buſhels and a half of ſeed, and produced a very good crop ; by computation, five quarters to an acre : but the exact quantity, neither of the oats, nor of the barley, could be known, on account of its being mixed in the barn with corn that grew in other places. The twelve acres ſowed with barley took ſeventeen buſhels of ſeed, and produced a much greater crop than any land in the neighbourhood; though this was a great year for barley. All the farmers who obſerved this crop, allowed that they had never ſeen finer barley ; and it may be ſaid, without the leaſt exaggeration, to have yielded above five quarters to an acre. I am convinced that this computation of five quarters to an acre is a very moderate one ; not only from the number of ſheaves, and the judgment of all who ſaw it ; but likewiſe becauſe I had no more than twenty-ſix acres and an half of land drilled with barley this year ; and the whole produce, when threſhed, amounted to one hundred and twenty-eight quarters and two buſhels ; which is very near five quarters to an acre, taking one part with another : but theſe twelve acres bore by much the greateſt crop in proportion, and ſeven acres of the twenty-ſix were ſown on beds five feet broad, and horſe-hoed, which never produces ſo large a crop.

“ The ſummer of 1762 was remarkably dry, and bad for graſs : many fields hereabouts, of ten acres, did not produce above a load or two of hay ; but this of twenty-five acres produced twelve tons of good hay : which, conſidering that the ſaintfoin was not nearly arrived at its perfection, may be ſaid to be conſiderable.

“ It was now eaſy to ſee in what parts of the field the ſaintfoin had ſucceeded beſt.

“ The four acres ſowed before winter had the ſmalleſt number of plants of ſaintfoin of any ; perhaps not more than one or two in ten yards : but this ground abounded ſo with natural graſs, that this alone furniſhed a tolerable crop. The five acres ſown in the ſpring, without corn, did not abound much leſs with natural graſs, or more with ſaintfoin, than the preceding: but there being a great mixture of the ſeeds of rye-graſs with all the ſaintfoin ſowed in this field, the rye-graſs appeared diſtinctly in tufts all along the rows; and, together with the natural graſs, ſeemed compleatly to have covered the ſurface of the ground. The rows were much better ſtocked with ſaintfoin plants in the twelve acres ſown with it and barley: but the rye-graſs abounded here likewiſe.

" It is remarkable, that the ſaintfoin flouriſhes beſt in thoſe parts of the field where the land is moſt barren; the reaſon of which undoubtedly is, that, as ſcarce any natural graſs, or weeds, ariſe to choak it there, its young and tender ſhoots have the benefit of the whole paſture, and its roots are not obſtructed in their progreſs by the growth of other plants.

" Though the greateſt part of this field is much underſtocked with ſaintfoin plants, yet it is in a very promiſing condition for a good crop of hay this year.

" I attribute the bad ſucceſs of the ſaintfoin on the firſt four acres, partly to its being ſowed too late, whereby the plants could not acquire much ſtrength before winter, which deſtroyed many of them; partly to ſome violent hurricanes of wind, which blew clouds of ſand from one part of the field to another, and overwhelmed many plants; and partly to the ſhares going too deep, by which the ſeed was covered at leaſt two inches. The bad condition of the five acres ſowed alone in the ſpring, I believe to be owing, in ſome meaſure, to the cauſes already aſſigned, and alſo to the want of protection and ſhelter from drought, which corn would have afforded in that very dry ſoil. Barley does alſo help to ſtifle the natural graſs, ſaintfoin's greateſt enemy. The ſaintfoin which was drilled with barley, looked, as was before obſerved, by much the beſt: but, indeed, ſome precautions were uſed to ſow the ſeed ſomewhat ſhallower on theſe twelve acres; and this may, in ſome degree, have contributed to its ſucceſs.

" Upon the whole, from the experiments made in this field (and ſeveral others made ſince have ſtrengthened my opinion on that head) I conclude, firſt, that ſaintfoin is very ſuitable to any ſandy or deep ſoils, provided they are dry, and that the natural graſs and weeds can by any means be completely deſtroyed: ſecondly, that it is better to ſow ſaintfoin in the ſpring, and with barley, than in the autumn, or ſpring, alone: thirdly, that the ſeed ſhould not be covered above an inch deep; but I believe half an inch the moſt proper depth. One foot may be a very proper diſtance for drilling the rows; and from a buſhel to a buſhel and an half, a proper allowance of ſeed for an acre of ground, provided that ſeed be good.

" I have tried the horſe-hoeing of ſaintfoin ſown on beds three and four feet broad: but, though the plants do by that means certainly grow more vigorous, I do not think the crop ſo great; and when the ſtalks are ſtrong and pipy, I have obſerved that cattle will not eat them. The ſowing in equally diſtant rows ſeems preferable, eſpecially where a large extent of ground is to be ſowed. But my experience is very inſufficient to decide this point abſolutely. I could wiſh that gentlemen would make trials of the horſe-hoeing of ſaintfoin in different ſoils and ſituations.

" Experiments carefully made, and often varied, by perſons void of prejudice, may, in time, decide that important queſtion in agriculture, viz. whether the common, or the horſe-hoeing, huſbandry be, upon the whole, moſt advantageous to the Engliſh farmer.

" If ſaintfoin be drilled on a ſandy ſoil, or on one that is in very fine order, the ſhares of the drill ought to be two inches thick, or they will go too deep; and a ſmall wooden roller ſhould be fixed to, and follow, the drill, inſtead of a harrow with teeth, which would bring too much earth upon the ſeed. Such a roller will lay the ground ſmooth, and fitter for mowing. A ſpring made of three pieces of aſh, as deſcribed by M. Chateauvieux, is of great uſe, and may eaſily be added to Mr. Tull's drill plough. It may be faſtened underneath the middle of the plank, by four ſcrews, and made to preſs more or leſs on the roller, or harrow, which ever is made uſe of, by a wedge put in betwixt the ſpring and the hinder edge of the plank. If a harrow is uſed, iron teeth are much preferable to wooden ones.

" In the year 1757, I had a mind to try how much a ſoil naturally extremely bad, could be improved by art. Accordingly, I made choice of a piece of ground one acre and an half in extent, a barren ſand, which produced only a few miſerable weeds, and which the farmer who rented it did not think worth his while to cultivate. There happened to be a great quantity of red ſtony marle in an adjoining field, of which near three hundred loads were laid on this acre and an half. It was drilled with barley in 1758, and horſe-hoed: but the crop proved a very bad one. In 1759, a load of lime, and about ten loads of dung were laid thereon, and it was drilled with turneps and horſe-hoed: however, the crop ſtill was but moderate; though a good deal better than could have been expected from ſuch a ſoil. In 1760, it had turneps again, managed in the ſame manner as the former, but they were a great deal better. In 1761, it was drilled with oats, ſaintfoin and rye-graſs, mixed, in equally diſtant rows one foot aſunder. It took two buſhels and a peck of oats, and two buſhels of graſs ſeeds. The oats were very good, and produced four quarters and four buſhels. By continued horſe-hoeing three years together, the land was got into perfectly fine order, the marle and ſand were thoroughly incorporated, and the natural graſs and weeds intirely deſtroyed: ſo that the ſaintfoin and rye-graſs grew and flouriſhed exceedingly. In 1762, the ſummer being uncommonly dry, the produce was about half a load of hay; which was as much as one could expect the firſt year after ſowing. It is very well ſtocked with plants, which now, in May 1763, ſeem as vigorous as in any of my other fields, though I have ſome which yield two tons of hay to an acre. This little piece of ground, which before was not worth a ſhilling a year, is, by the labour and coſt beſtowed on it, now worth at leaſt fifteen ſhillings an acre; which is a proof that, let land be ever ſo bad, it may be improved, and perhaps made equal to the beſt in the neighbourhood: but at the ſame time it muſt be confeſſed, that the expence is too great to be repeated at once on a large extent of ground. I calculate that three hundred loads of marle, dug and carried about three hundred yards, might coſt about four pence a load, or five pounds for three hundred loads, which has been the whole expence attending this acre and half: for the manure, plowings, and horſe-hoeings, were repaid by the crops of barley, oats, and turneps."

Mr. Duhamel has mentioned the following experiments relative to the culture of ſaintfoin:

In 1754, M. Eyma, near Bourdeaux, planted ſaintfoin, lucerne, and clover, in rows eight feet aſunder, with diſtances of ſixteen inches between the plants in the rows, which yielded him an immenſe increaſe. The alleys were horſe-hoed after each cutting.

In 1755, he planted a field, a little more than three roods ſquare, with ſaintfoin, which he cultivated according to the rules of the new huſbandry; and this ſpot yielded him 10,000 pounds of dry hay. M. de Chateauvieux had 15,300 pounds of lucerne, as we ſhall ſee, off ſomewhat more than an acre of ground, which he cut five times: but M. Eyma thinks that 14445 pounds, Geneva weight, of ſaintfoin, which he had at another time, at one cutting, is a greater crop than M. de Chateauvieux's lucerne; beſides the after crop, which indeed was but inconſiderable, on account of the dryneſs of the ſeaſon. He ſays he cuts his ſaintfoin three times in good years, and that the two laſt cuttings produce nearly as much as the firſt: but he allows, that ſuch years are not to be expected often.

M. Eyma doubts whether the preference be due to ſaintfoin, or to lucerne: but he is confident that either of them, properly cultivated, will produce ſurprizing crops.

He thinks that one row of ſaintfoin, or lucerne, planted in the middle of a bed three feet wide, will profit more by the different hoeings, and conſequently produce more graſs, than double or triple rows, though theſe laſt be planted on broader beds; becauſe the ſingle rows have the earth looſened on each ſide of them.

M. Diancourt ſowed ſaintfoin, each plant of which, in 1753, had a head of two feet diameter. They throve ſo well, that, in 1755, one plant, and that not the largeſt in the field, yielded twenty-three ounces of hay.

The following inſtructions were given by an ingenious gentleman in Lincolnſhire.

“ Mr. Tull ſays, that a deep ſoil is beſt for ſaintfoin. I believe every thing grows better, in a better ſoil: but by what I have ſeen of this plant, I ſhall always prefer for it a ſhallow ſoil, where there is a rock, or ſome hard ſubſtance, within ſix inches, or a foot, of the ſurface, to ſtop the roots of the plants, and make them ſpread horizontally. This has not only the good effects propoſed in M. de Chateavieux's manner of tranſplanting lucerne, but, it is ſaid, occaſions its filling the ground with more ſhoots by their ſtriking up from the knots of the roots. This fact I cannot verify: but certain it is, that, in ſuch ſoils as I here ſpeak of, a crop of ſaintfoin which at firſt appears very thin, will afterwards fill the ground perfectly well, and the plants of it will appear in much greater quantities than at firſt.

“ I have ſeveral times broke off a root of ſaintfoin four or five inches within ground, and it always ſprang up again. This is a ſmall argument for the fact I mentioned.

“ Saintfoin is much cultivated in Lincolnſhire. The common allowance of ſeed is five buſhels to an acre. A gentleman ſouth of Lincoln adviſed me always to ſow a ſmall quantity of trefoil with it (about four pounds on an acre). The reaſon is, that, in this expoſed country, the young plants ſuffered more by the ſun in ſummer, than by the froſts in winter. Now the trefoil, coming to perfection the firſt year, and living only three, will be a ſhelter for the young plants, during the firſt year or two, and die off when the ſaintfoin wants its room. This ſyſtem is well ſupported by practice: but rye graſs ſhould on no account be ſowed with it; that being, when left for fodder, a great impoveriſher of ground.

“ Saintfoin is obſerved to get to perfection in three years, laſts good four or five, and then dwindles during four or five more. Its firſt crops are from one or two loads; its ſecond-ſtage, from three to four loads, and it dwindles down again to one.—Laſt ſummer, which was remarkably dry, did very well with this graſs.

“ I have ſown ſaintfoin with barley, with wheat, without corn in the ſpring, and now” (this gentleman's letter is dated September 4th, 1763) “ am ſowing ſome more at this preſent writing; but can form no judgment as yet.

“ Three years ago I drilled ſome, according to Mr. Tull's directions, in beds, with treble rows, and ſome at equi-diſtant rows. The horſe-hoed beds were good, as far as they went: the others, drilled at a foot diſtance, gave ſo much room for weeds to come up, that the ſucceſs was very moderate; which, indeed, would have been the caſe with the former, had not the horſe-hoe cleared them. On the whole as far as my ſmall experience and obſervations reach, I would never chuſe any one to drill his ſeed, but to ſow it in the broad caſt-way, on land very fine, with a good quantity of ſeed.”

SALLENDERS, a diſeaſe in horſes, conſiſting in cracks in the bending of the hough, and occaſion a lameneſs behind. This diſeaſe is cured in the ſame manner as the mallenders. *See* MALLENDERS.

SALT-MARSHES, paſture-lands lying near the ſea, and ſometimes overflowed by the ſea-water.

“ It has been obſerved, ſays an ingenious writer in the Muſeum Ruſticum, that horſes and black cattle thrive better, and get fleſh and fat ſooner, in ſalt marſhes, than in freſh-water meadows or upland paſtures; yet I do not remember ever to have heard any good reaſon aſſigned for it.

“ Some will tell you that the air of the ſea whets their appetites; that the paſture is rich and nouriſhing; and that the herbs produced by the lands near the ſea are more conducive to the health of herbaceous animals, than ſuch as grow on upland paſtures, whether natural or artificial.

“ But may we not rather attribute the thriving of cattle on theſe marſhes, to the ſaline particles with which the earth as well as its produce, is, when near the ſea, ſtrongly impregnated? Perhaps even the dews have their portion of ſalt; but of this I have made no experiment, therefore mention it only as a probable conjecture; for as they fall ſoon after they are exhaled from the ſea, without paſſing through the ſecretions neceſſary to ſeparate their ſaline parts, why ſhould not this be the caſe?

“ But to return to my firſt ſubject: I am fully of opinion, that the ſaline particles only, with which the graſs is impregnated in the above-mentioned marſhes, cauſe cattle to thrive in them in the manner they are known to do. Theſe ſalts purge away the foul humours which the beaſts have contracted, either by idleneſs, or by being overheated in labour; by which means they are better diſpoſed to be nouriſhed by the aliment they receive.

“ It may, perhaps, be objected, that if the graſs of theſe marſhes is apt to purge cattle, this very purging, by being long continued, will be a means of preventing their growing fat. To this I anſwer, that the cattle take with their food every day nearly the ſame quantity of theſe purgative particles; but that the quantity of ſalt, which at their being firſt put into the marſh will have that effect, will ceaſe producing it when they are, by cuſtom, habituated to take a daily portion of it: this muſt be allowed, as we all know, that a few grains of rhubarb will operate as a cathartic to a perſon that is not accuſtomed to take it; yet it is as well known, that a man may take many grains daily, if he uſes himſelf to it, without its being ſenſibly purgative to him.

“ It is not convenient to every one to ſend their cattle to a ſalt marſh: would it not, therefore, be happy, if we could ſubſtitute a method that would nearly anſwer the ſame purpoſe? I do not think this impoſſible: perhaps, if common ſalt-water was to be laid in the fields for the horſes to lick as often as they pleaſed, they would thrive much better: were I to ſay I know it would have that effect, it would be no preſumption.

“ Cattle are naturally fond of ſalt, and if left at their liberty, will take no more of it than what does them good. With this help, our freſh-water meadows, and upland natural and artificial paſtures, would yield us a greater profit, and of courſe be worth more both to the land-owner and farmer.

“ Some will not allow a thing to have merit; unleſs it is ſupported by what they call a proper authority; and they do not allow the experiments of a particular perſon to be ſufficient. To ſatisfy ſuch I can aſſure you, that in the inland parts of Switzerland, when their horſes and cattle have endured the hardſhips of a long and ſevere winter, they turn them in the ſpring looſe into the mountains, laying ſalt here and there upon the rocks, for them to reſort to when they pleaſe; and of this they are ſo fond, that when the farmers want to catch their horſes, they take ſome ſalt in their hats, as we do oats in a ſieve, to allure them.

“ Experience has long convinced them, that the ſalt thus laid in their way anſwers every good purpoſe: their cattle are more healthy in general than ours are in England; and almoſt to this alone do they attribute it.

“ In the province of Munſter and Connaught, in Ireland, they very frequently lay ſalt on ſlates, for the benefit of their horſes when at graſs: this, they find, does the cattle great ſervice; and in this ſhould we imitate them, and not be too proud to learn of them, becauſe in Ireland agriculture is not in ſo flouriſhing a ſtate as in England.

“ Some few farmers have (to do them juſtice) practiſed this method in our own country; but contenting themſelves with the profit reſulting from it, they have not propagated the knowledge of the many advantages they are ſenſible may be derived from this practice of giving ſalt to cattle.

“ The farriers and horſe-jockeys know well the uſe of ſalt; they mix it often in their medicines, and find, by experience, that nothing proves ſo powerful a ſtomachic to horſes, as a little ſalt thrown into their oats.

“ I muſt farther obſerve, that the uſe of ſalt is very proper when cattle are turned into clover, lucerne, or coleſeed to feed: it is well known, that, on theſe occaſions, they are very apt, unleſs great care is taken, to be ſurfeited; the ſalt would prevent this accident, and thereby greatly accelerate the fattening of the cattle, and make it much ſafer to the farmer.

“ Salt has alſo been found to be of great ſervice in fattening hogs, by cauſing them to drink more plentifully than otherwiſe they would.”

For the uſes of ſalt in rendering hay more grateful to cattle, *ſee the article* BRINING *of* HAY-RICKS.

SAND, a genus of foſſils found in minute concretions, forming together a kind of powder, the genuine particles of which are all of a tendency to one determinate ſhape, and appear regular, though more or leſs complete concretions; not to be diſſolved or diſunited, by water, or formed into a coherent maſs by means of it, but retaining their figure in it; tranſparent, vitrifiable by extreme heat, and not diſſoluble in, nor efferveſcing with acids.

Theſe are ſubject to be variouſly blended and intermixed either with homogene, or heterogene particles, particularly with flakes of talc; and according to theſe, and their different colours, are to be ſubdivided into ſeveral kinds, as red, white, &c.

Dr. Liſter divides the Engliſh ſands into two claſſes; the firſt, ſharp or rag ſand, conſiſting of ſmall tranſparent pebbles, naturally found on the mountains, and not calcinable: theſe he farther divides into fine and coarſe, and ſubdivides each, according to the colours, into white, grey, reddiſh, brown, &c.

The ſecond, ſoft or ſmooth, which he ſubdivides into that with flat particles broken from lime-ſtones, that with ſilver-like particles, and that with gold-like particles.

As to ſand, its uſe is to make the clayey earth fertile, and fit to feed vegetables, &c. for earth alone, we find, is liable to coaleſce, and gather into an hard coherent maſs, as is apparent in clay: and earth thus embodied, and, as it were, glued together, is no-ways diſpoſed to nouriſh vegetables: but if with ſuch earth, ſand, &c. i. e. hard cryſtals, which are not diſſolvable in water, and ſtill retain their figure, be intermixed, they will keep the pores of the earth open, and the earth itſelf looſe and incompact, and by that means give room for the juices to aſcend, and for plants to be nouriſhed thereby.

Thus a vegetable, planted either in ſand alone, or in a fat glebe, or earth alone, receives no growth or increment at all, but is either ſtarved or ſuffocated; but mix the two, and the maſs becomes fertile. In effect, by means of ſand, the earth is rendered, in ſome manner, organical; pores and interſtices being hereby maintained, ſomething analogous to veſſels, by which the juices may be conveyed, prepared, digeſted, circulated, and at length excerned, and thrown off into the roots of plants.

Grounds that are ſandy and gravelly, eaſily admit both of heat and moiſture; but then they are liable to theſe inconveniencies, that they let them paſs too ſoon, and ſo contract no ligature, or elſe retain it too long, eſpecially where there is a clay bottom; and by that means it either parches or chills too much, and produces nothing but moſs, and cankerous infirmities; but if the ſand happens to have a ſurface of good mould, and a bottom of gravel, or looſe ſtone, though it do not hold the water, it may produce a forward ſweet graſs; and, though it may be ſubject to burn, yet it quickly recovers with the leaſt rain.

Sea ſand is accounted a very good compoſt for ſtiff ground; for it effects the two things following, viz. it makes way for the tree or ſeed to root in ſtiff ground, and makes a fume to feed it.

Sand indeed is apt to puſh the plants, that grow upon it, early in the ſpring, and make them germinate near a month ſooner than thoſe that grow upon clay, becauſe the ſalts in the ſand are at full liberty to be raiſed, and put into motion, upon the leaſt approach of the warmth of the ſun; but then, as they are haſty, they are ſoon exhaled and loſt.

It is remarkable that ſand, though it appear a very hard, denſe, and indiſſoluble body, yet is contained inviſibly in the brine, or ſalt water of our ſalt ſprings; and even on the ſhooting of the ſalt, after evaporation, there ſtill remain the particles of it in the clear pellucid ſalt; and this, though wholly ſoluble in water, yet when a brine, made by ſuch a ſolution, is boiled, depoſits as much of the ſand as the common brine of the pits, or ſea water.

Dr. Plot, who was very curious to know the true hiſtory of this ſingular effect, procured experiments to be made in the following manner: eight folds of fine holland, and as many of much finer cambric, were put together, and, a quantity of the brine of the Staffordſhire ſalt pits being ſtrained through this, there was nothing ſeparated from it but a ſmall quantity of black duſt, which ſeemed to have fallen in by accident, and which was not at all like ſand; yet, on evaporating this brine, it was found to contain no leſs than one fourth part as much ſand as ſalt; the quantity of brine, yielding a buſhel of ſalt, yielding alſo a peck of ſand.

Some have ſuppoſed from theſe, and the like obſervations, that the ſand was generated during the time of the boiling the liquor, but the more careful examiners think otherwiſe; it appearing to them, that the particles of this ſand may be ſeen in the brine, by the help of a microſcope, before the boiling, in form of rectangular oblong plates, ſome nearly ſquare; theſe were ſo ſmall, as readily to paſs the ſtrainer with the water; and appearing as numerous in it after, as before the ſtraining, ſhew that they are no more to be kept, by ſuch means, than the ſalt.

The pores of the fineſt ſtrainers, examined by the microſcope, appear twenty times bigger than theſe plates, or particles of the ſand, and therefore it is not to be wondered at, that they let them through. There requires, therefore, no more to the formation of the ſand, than the coaleſcing of ſeveral of theſe particles into one larger granule, and ſo on; and this is very likely to be done by means of the evaporation of a part of the fluid which kept them ſeparate, and of the motion given to them in boiling, which naturally and neceſſarily brought them into the ſpheres of their own mutual attractions, at a time when their attraction with the fluid they ſwam in, was alſo much diminiſhed with its quantity. This attraction ſeems even evidently to increaſe between the particles, as the water becomes evaporated, and, when finally the ſalt is drawn from it, and it is examined, as it drops from the baſkets, in which the ſalt is pur to drain, it is ſeen to contain more numerous particles of this ſandy matter than before; and theſe are found to coaleſce into yet larger concretions, by degrees, as the remainder of the fluid evaporates from them on the glaſs.

The particles of this ſtony matter, when once thus united, are no more to be ſeparated by water, nor is the matter any longer ſoluble in that fluid. The common ſpar found in form of ſtalactites and incruſtations on the roofs, walls, and floors of old caverns, ſhews that it was once diſſolved in water, and by that means brought to thoſe places, and made into thoſe forms; and it ſhould ſeem, that this ſand, as it is called, was only this ſort of ſpar, which is contained more or leſs in all water; and which, on the evaporating of that water and ſeparation of the ſalt, which might help in making the water a menſtruum proper for the retaining it, ſhoots out into its own natural concretions; for the figure of theſe thin plates is the true and natural thin parallellopiped or rhomboidal figure of the ſmaller concretions of that matter, and even of thoſe pieces into which it falls on breaking. *Phil. Tranſ.* N°. 145.

Common ſand is a very good addition by way of manure to all ſorts of clay lands; it warms them, and makes them more open and looſe. The beſt ſand for the farmers uſe is that which is waſhed by rains from roads, or hills, or that which is taken from the beds of rivers; the common ſand that is dug in pits never anſwers nearly ſo well. Sand mixed with dung is much better than laid on alone: and a very fine manure is made by covering the bottom of ſheep-folds with ſeveral loads of ſand every week, which are to be taken away, and laid on cold ſtiff lands, impregnated as they are with the dung and the urine of the ſheep.

Beſides clay land there is another ſort of ground very improveable by ſand; this is that ſort of black ſoggy land on which buſhes and ſedge grow naturally, and which they cut into turf, in ſome places. Six hundred load of ſand being laid upon an acre of this land, according to the Cheſhire meaſure, which is near double the ſtatute acre, meliorate it ſo much, that without plowing, it will yield good crops of oats or tares, though before it would have produced ſcarce any thing. If after this crop is taken off, the land be well dunged, and laid down for graſs, it will yield a large crop of ſweet hay.

Once ſanding this land will improve it for a vaſt number of years, and it will yield two crops of hay in the year, if there be weather to make it in. Some land in Cheſhire has been, by this means, rendered of twelve times it former value to the owner. The bogs of Ireland, when drained, have been rendered very fruitful land, by mixing ſand in this manner among the earth, of which they conſiſt. Add to this, that in all theſe boggy lands, the burning them, or firing their own turf upon them, is alſo a great advantage. The common peat, or turf aſhes, mixed with the ſand for theſe purpoſes, add greatly to its virtue.

Sea ſand, which is thrown up in creeks and other places, is by much the richeſt of all ſand for manuring the earth; partly its ſaltneſs, and partly the fat and unctuous filth that is mixed among it, give it this great virtue. In the weſtern parts of England, that lie upon the ſea coaſts, they make very great advantages of it. The fragments of ſea ſhells alſo, which are always in great abundance in this ſand, add to its virtues; and it is always the more eſteemed by the farmers, the more of theſe fragments there are among it.

The ſea ſand uſed as manure in different parts of the kingdom is of three kinds: that about Plymouth, and on other of the ſouthern coaſts, is of a blue grey colour like aſhes, which is probably owing to the ſhells of muſcles, and other fiſh of that or the like colour, being broken and mixed among it in great quantity. Weſtward, near the land's end, the ſea ſand is very white, and about the iſles of Scilly it is very gliſtering, with ſmall particles of talc; on the coaſts of the north ſea the ſand is yellowiſh, brown, or reddiſh, and contains ſo great a quantity of fragments of cockle ſhells, that it ſeems to be chiefly compoſed of them. That ſea ſand is accounted beſt, which is of a reddiſh colour: the next in value to this is the bluiſh, and the white is the worſt of all.

Sea ſand is beſt when taken up from under the water, or from ſand banks, which are covered by every tide.

The ſmall-grained ſand is moſt ſudden in its operation, and is therefore beſt for the tenant who is only to take three or four crops; but the coarſe or large-grained ſand is much better for the landlord, as the good it does laſts many years.

Where the ſand is dredged out of the ſea, it is uſually twice as dear as where it is taken from the ſand banks.

When the land has been well manured with the large ſand, they take four crops of corn from it, and then lay it down for paſture for ſix or ſeven years before they plow it again. The graſs is ſo good, that they commonly mow it for hay the firſt year; it always abounds very much with the white-flowered clover. If the graſs grows but ſhort, it is the farmer's intereſt to feed his cattle upon it, and it will turn to as good account this way, being very ſweet and rich, and making the cattle fat, and the cows yield a very large quantity of milk. *Mortimer's Huſbandry.*

SAND-*Flood*, a terrible diſaſter incident to the lands of Suffolk, and ſome other parts of England, which are frequently covered with vaſt quantities of ſand, rolling upon them like a deluge of water, from ſandy hills in their neighbourhood.

Violent winds break through the turf that covers theſe hills, and then the ſand, lying looſe and naked, is ſoon carried down upon the plains, where it covers and buries the graſs, and in a very little time eats through the light turf, and mixing itſelf with the ſand underneath, becomes one bed of this dry matter never to be covered with turf again. A large body of ſand being thus got together, nothing ſtops its progreſs; but it, at every ſtorm, rolls over more and more ground, ſo that in a few years it extends itſelf a vaſt way, eſpecially where the ground, over which it paſſes, is of the ſame ſandy nature, and only covered with a thin turf.

In ſome parts of Suffolk the ground encourages this change ſo greatly, that a bed of ſand broke looſe from a neighbouring hill, and covering only a few acres, perhaps eight or ten, will, before it has travelled four miles forward, which it does in a ſmall courſe of years, deluge a thouſand acres. It travels down hill faſter than any way elſe, but will not be ſtopped by aſcent, but will move up the ſteepeſt hill, only that it requires more time. The making of fences, in the common way, to keep it out, is vain. It runs through the hedges, and flies over the tops of the banks; and when it reaches a village, in its courſe, will bury the cottages, unleſs preferved at more charge than they are worth. It will in a very little time beat up to the eaves of a houſe, of the low kind, that are uſually built in a country village, and has often weight enough to break down walls in its paſſage.

The beſt way of ſtopping its progreſs is by hedges of furze, planted one over another, as they become levelled; theſe, if well kept up, will, by degrees, ſtop or divert the progreſs; and ſome who have tried this, with reſolution, after they have had the ſand raiſed twenty feet high, have found it ſtop its increaſe, and then, having manured this adventitious ſoil with dung, found it as good ground as that which made the ſurface before.

About Thetford, the villages were wholly deſtroyed by this about ninety years ago, and the branch of the river Ouſe, called then Thetford river, ſo blocked up by it, that very ſmall veſſels only could go up it, where very large ones uſed before. The river has been of great ſervice in ſtopping its progreſs into Norfolk, where otherwiſe its courſe would have carried it, and its vaſt ſpreading ſideways, in proportion to its going forward, would have made it bury vaſt quantities of land in a few years.

The moſt probable conjecture, as to the cauſe of this ſtrange ſort of deluge in theſe parts of England, is, that this portion of the county of Suffolk lies eaſt-north-eaſt of a part of the great level of the fens, and is by this expoſed to very impetuous winds, which acquire more than ordinary force, by their paſſing through ſo large a tract of country uninterrupted; the ſtorms ſeem to be one great cauſe of the miſchief, and the ſandy nature of the ſoil the other. There are old ſtories, in the country, of ſuits at law commenced among the farmers, for grounds blown out of the owners poſſeſſion; but the people who gain this ſort of wandering land are the greateſt ſufferers. A little ſand ſprinkled by the winds over a tract of land, where there is a bed of ſand under the turf, ſoon eats through that obſtacle; and what was at firſt only a thin coat of ſand, becomes then a deep plain of it, capable of being blown away to the depth of eight, ten, twenty, or more feet, and is carried over every thing in its progreſs before the winds, when once taken up by them. *Philoſophical Tranſactions*, N°. 37.

SAND-*lands, or Sandy-lands*, a term uſed by our farmers to expreſs ſuch grounds as conſiſt wholly of a pure ſheer ſand.

This is of different colours, as white, blackiſh, reddiſh, or yellowiſh, and is very different in its nature, and in the ſize of its particles, ſome being harſher and ſome milder, and ſome very light, ſeeming only to be mere duſt. The grey, black, and aſh-coloured ſand-land are the worſt of all, and generally are found on heaths and commons. Gravelly lands approach much to the nature of theſe, and thoſe which conſiſt of the largeſt ſtones, and are mixed with the harſheſt ſands, are of all the moſt barren.

The propereſt plants for arable land, of this kind, are white oats, rye, black wheat, and turneps. The natural produce, in weeds, is quick graſs, ſorrel, broom, furze, fern and heath.

The beſt manure for them is either marl, or ſuch clay as will break with the froſts. Cow dung is alſo a good manure for theſe lands, and many uſe with ſucceſs chalk, mud, and the half rotten ſtraw from dunghils.

When the farmer has a mind to raiſe corn on theſe lands, he muſt order them the ſame as they do the clays; but where they are over-run with broom, furzes, and ſuch ſort of weeds, marle is to be laid on in great quantities. This is the practice in Staffordſhire, and by it they rid themſelves of theſe troubleſome weeds, and procure good crops of corn, though at ſome expence.

The firſt ſowing of this land is with black wheat, and for this they make three fallowings in winter, and ſtir them in the May following; at this time they ſow them, allowing one buſhel of ſeed to an acre, which generally yields them ſixty again. Then once plowing theſe lands, after this crop is off, they are fit to ſow rye on.

In Oxfordſhire, they ſeldom give theſe lands more than two fallowings for wheat, except they are very much over-run with weeds; and they eſteem the white and Lammas wheat the moſt agreeable for this ſort of land, and then after a fallow rathripe barley. They afterwards generally fallow them every other year, and reckon them unfit for beans and peas, though they ſometimes ſow them with winter vetches. If they ſow peas on them, they eſteem the rathripe kinds the beſt.

In Herefordſhire, they are much ſubject to moſs growing upon their ſandy lands, and they make a great improvement by burning it on the ground, and mixing the aſhes with lime, which they plow in.

They generally ſow them with rye after this manure, and that yields a very great increaſe upon them, and brings on a very good kind of graſs, if they are laid down after a crop or two. *Mortimer's Huſbandry.*

SAP, a juice furniſhed by the earth, and changed into the plant, conſiſting of foſſil, ſaline, aerial, and other particles from putrified animals, vegetables, &c.

The notion of the ſap's circulation was entertained by ſeveral authors much about the ſame time, without any communication from one another; particularly M. Major, a phyſician of Hamburgh, M. Perrault, Mariotte, and Malpighi. It has met, however, with ſome conſiderable oppoſers, particularly the excellent M. Dodart, who could never be reconciled to it.

One of the great arguments for it is, that the ſame experiments of ligature and inciſion, which evince a circulation of the blood in animals, ſucceed in the like manner in plants, particularly in ſuch as abound with a milky ſap, as the great tithymale, milk-thiſtle, &c. if the ligature be faſtened tight round them, the part above is found to ſwell very conſiderably, and that below it, a little: whence it appears, that there is a juice aſcending from the branches; and that the latter is thicker than the former, which quadrates exactly with the common ſyſtem; the juice being ſuppoſed to ariſe in capillary veſſels, in form of a ſubtile vapour, which, condenſed in the extremes of the plant, by the neighbourhood of the cold air, turns back in form of a liquor, through the more patent pipes of the inner bark.

M. Dodart, inſtead of the ſame juices going and returning, contends for two ſeveral juices; the one imbibed from the ſoil digeſted in the root, and from thence tranſmitted to the extremes of the branches, for the nouriſhing of the plant; the other received from the moiſture of the air entering in at the extremities of the branches: ſo that the aſcending and deſcending juices are not the ſame.

One of his chief arguments is, that if two trees of the ſame kind be tranſplanted in one day, after firſt cutting off their roots and branches, and if, after they have taken root again, ſome of the new ſhoots put forth each year be cut off one of them, it will not thrive half ſo well, notwithſtanding its root and trunk being intire as the other.

This he conceives to be a proof of the plants deriving nouriſhment by the branches, and concludes it to be of an aerial nature, becauſe formed of the moiſture of the air, dew, &c. whereas that imbibed from ſoil is terreſtrial, &c. *Hiſt. de l'Acad. Roy. Ann.* 1709.

The humour or ſap of a plant, then, is a juice furniſhed by the earth, and changed into the plant, conſiſting of ſome foſſil parts, other parts derived from the air and rain, and others from putrified animals, plants, &c. Conſequently, in vegetables, are contained all kinds of ſalts, oil, water, earth, &c. and, probably, all kinds of metals too, inaſmuch as the aſhes of vegetables always yield ſomewhat which the loadſtone attracts.

This juice enters the plant in form of a fine and ſubtile water; which the nearer it is to the root, the more it retains of its proper nature; and, the farther from the root, the more action it has ſuſtained, and the nearer it approaches to the nature of the vegetable.

Conſequently, when the juice enters the root, the bark whereof is furniſhed with excretory veſſels, fitted to diſcharge the excrementitious part, it is earthy, watery, poor, acid, and ſcarce oleaginous at all.

In the trunk and branches it is further prepared, though it ſtill continues acid; as we ſee by tapping or perforating of a tree in the month of February, when it diſtils a watery juice apparently acid.

The juice being here carried to the germs or buds is more concocted; and here, having unfolded the leaves, theſe come to ſerve as lungs for the circulation and further preparation of the juice.

For theſe tender leaves, being expoſed to the alternate action of heat and cold, moiſt nights, and hot ſcorching days, are alternately expanded and contracted, and the more on account of their reticular texture.

By ſuch means is the juice ſtill further altered and digeſted, as it is further in the petala or leaves of the flowers which tranſmit the juice, now brought to a further ſubtility, to the ſtamina: theſe communicate it to the farina or duſt in the apices, which is, as it were, the male ſeed of the plant, where having undergone a further maturation, it is ſhed into the piſtil, which performs the office of an uterus or womb; and thus, having acquired its laſt perfection, it gives riſe to a new fruit or plant.

The root or part whereby vegetables are connected to their matrix, and by which they receive their nutritious juice, conſiſts of an infinite number of vaſa abſorbentia, which, being diſperſed through the interſtices of the earth, attract or imbibe the juices of the ſame: conſequently, every thing in the earth that is diſſoluble in water, is liable to be imbibed; as air, ſalt, oil, fumes of minerals, metal, &c. and of theſe do plants really conſiſt.

Theſe juices are drawn from the earth very crude; but by the ſtructure and fabric of the plant, and the various veſſels they are ſtrained through, become changed, further elaborated, ſecreted, and aſſimilated to the ſubſtance of the plant.

The motion of the nutritious juices of vegetables is produced, much like that of the blood in animals, by the action of the air; in effect, there is ſomething equivalent to reſpiration throughout the whole plant.

The diſcovery of this is owing to the admirable Malpighi, who firſt obſerved, that vegetables conſiſt of two ſeries or orders of veſſels.

Firſt, ſuch as receive and convey the alimental juices, anſwering to the lacteals, veins, &c. of animals.

Secondly, tracheæ or air veſſels, which are long hollow pipes, wherein air is continually received and expelled, i. e. inſpired and expired; within which tracheæ he ſhews all the former ſeries of veſſels are contained.

Hence, it follows, that the heat of a year, nay, of a day, of a ſingle hour, or minute, muſt have an effect on the air included in theſe tracheæ, i. e. muſt rarefy it, and conſequently dilate the tracheæ; whence ariſes a perpetual ſpring or ſource of action, to promote the circulation in plants.

For, by the expanſion of the tracheæ, the veſſels containing the juices are preſſed, and by that means the juice contained is continually propelled, and ſo accelerated; by which propulſion, the juice is continually comminuted, and rendered more and more ſubtile, and ſo enabled to enter veſſels ſtill finer and finer; the thickeſt part of it being at the ſame time ſecreted, and depoſited into the lateral cells or loculi of the bark, to defend the plant from cold, and other external injuries.

The juice having thus gone its ſtage, from the root to the remote branches, and even the flower; and having in every part of its progreſs depoſited ſomething both for aliment and defence; what is redundant paſſes out into the bark, the veſſels whereof are inoſculated with thoſe wherein the ſap mounted; and through theſe it re-deſcends to the root, and thence to the earth again: and thus a circulation is effected.

Thus is every vegetable acted on by heat and cold, during the day-time eſpecially, while the ſun's force is conſiderable, the ſap-veſſels ſqueezed and preſſed, and the ſap protruded and raiſed, and at length evacuated, and the veſſels exhauſted; and, in the night again, the ſame tracheæ being contracted by the cold of the air, the other veſſels are eaſed and relaxed, and ſo diſpoſed to receive freſh food for the next day's digeſtion and excretion.

What courſe the juice takes, after it is imbibed by the roots, is not very clear; the veſſels that take it up, to convey it to the plant, are too fine to be traced; and hence it has been controverted, whether it is by the bark, or the pith, or the woody part, that the plant is fed.

The more common opinion is for the bark: the juice, raiſed by the capillaries of the wood, is here ſuppoſed to deſcend by the larger fibres, placed in the inmoſt part thereof, immediately over the wood; in which deſcent, the ſap, now ſufficiently prepared, adds a part of its ſubſtance to the contiguous wood, and thus increaſes by appoſition: and hence it may be, that hollow, carious, or rotten trees, which have neither pith nor wood, except juſt enough to ſuſtain the bark, do grow and bear. Some contend for the wood, which they obſerve to conſiſt of ſlender capillary tubes running parallel to each other from the root up to the trunk, being proper to receive in a fine vapour; in the aſcent whereof the fibres become opened, and their ſubſtance increaſed; and thus the trunks of trees are ſaid to increaſe in their circumference.

As for the pith; as the woody ſubſtance of the trunk becomes more woody, the pith is compreſſed and ſtreightened to ſuch a degree that in ſome trees it quite diſappears: whence it ſeems, that its office in vegetation is not very important, ſince its uſe is not perpetual. By its ſpongious ſubſtance, it ſhould ſeem fitted to receive any ſuperfluous moiſture tranſuding through the pores of the woody fibres: and, if by the exceſs of ſuch moiſture, or the like cauſe, it corrupt and rot, as it frequently happens in elms, the tree does not grow the worſe for it; which is a convincing proof it is of no great uſe.

The learned Dr. Boerhaave diſtributes the juices of plants into ſix claſſes.

Firſt, the firſt claſs comprehends the crude nutritious juice, or the juices of the root and ſtem of plants, which are little more than the mere matter of the element, as drawn by the root from the body it adheres to, whether it be earth, water, or the like.

This juice is found in every part of the plant, and therefore may be held an univerſal juice; yet he conſiders it as the juice of the root and ſtem, becauſe it is chiefly found in them.

This he takes to be a ſubacid watery lymph, without any ſpecific taſte or ſmell, as not being yet arrived to the maturity of oilineſs.

To this claſs belong thoſe juices which diſtil in great abundance from wounds or inciſions made in the woody parts of plants; ſuch, for inſtance, is that tart liquor ouſing from the root of the walnut-tree, when cut off in the month of May.

Such alſo is that limpid, ſubacid humour, flowing out very plentifully at an inciſion in the birch-tree in the month of March, to the quantity of ſeveral gallons in a few days.

Such alſo is the juice iſſuing out of the vine wounded in the ſpring-time, which always taſtes tartiſh, and ferments like the grapes themſelves.

This juice may be eſteemed as yet foſſil, being generated of and in the earth; for the juice of the earth, being received into the canals of this plant, retains its nature during two or three circulations; nor does immediately commence a vegetable juice.

This claſs of juices therefore he accounts as the chyle of the plant, being chiefly found in the firſt order of veſſels, viz. in the roots and the body of the plant, which anſwers to the ſtomach and inteſtines of animals.

Secondly, the ſecond claſs of the juices is that of the leaves, which are the real lungs of plants, and accordingly make a further change of the juice, which they receive from the roots and ſtem by force of the air. The juice of leaves is different therefore from the firſt juice, as being more ſulphureous, and farther elaborated; not that it derives any ſulphur from the ſun, but that, its watery part exhaling, it becomes more oily, and leſs volatile.

The juice of leaves he diſtinguiſhes into three kinds:

The firſt is the nutritious juice of the leaves; which is that already deſcribed, only further elaborated in the minute veſiculæ of the leaves, and conſequently leſs watery, and more oily and ſaccharine.

The ſecond is wax, which, exuding out of the leaves, adheres to the ſurface, and is ſcraped off by bees with their rough thighs, to build their combs withal. This is chiefly afforded by lavender and roſemary: upon the latter of which, the wax may be plainly perceived ſticking to the leaves of it.

The third is manna: not that with which the Iſraelites were fed in the deſart, but a drug ſold among us: it is an eſſential ſaccharine ſalt, exuding chiefly by night, and, in the ſummer-ſeaſon, from the leaves of a ſort of aſh growing in Calabria and Sicily, and adhering thereto in the form of a cruſt, to be gathered the next morning before the ſun is up.

The like ſubſtance is found to exude from the leaves of the linden-tree and poplar, in the heats of May and June; at which time they have an honey-taſte, and are even ſeen with a fatty juice on them, which, at the approach of the cold evening, gathers into grains.

Thirdly, the third claſs of juices are thoſe of flowers, or the genital parts of plants; in theſe are:

Firſt, a pure, elaborated, volatile oil or ſpirit, wherein the particular ſmell of the plant or flower reſides, and which, by reaſon of its extreme volatility, exhales ſpontaneouſly; inſomuch that, if the flower be laid for ſome time in a warm place, the odorous juice or ſpirit will be all fled.

The ſecond is the juice expreſſed from the flower, which in reality is the ſame with that of the root and leaves, only farther prepared; it is thicker than the former, and has ſcarce any ſmell at all: thus, if you bruiſe an hyacinth, or other fragrant flower, and expreſs the juice, it will be found altogether inodorous.

The third is the ſweet juice called honey, which exudes from all flowers; aloes, colocynthis, and other bitter flowers, not excepted.

In all male flowers, that have utricles at the bottom of the petala, which Dr. Linnæus ſtiles the nectarium, is found a viſcid, ruddy, ſweet juice in ſome plenty; and accordingly we ſee the children gather cowſlips, fox-gloves, honeyſuckles, &c. and ſuck the honey from them: the bees too viſit theſe flowers, and, putting in their proboſcides or trunks, ſuck out the honey, and load their ſtomachs therewith, to be afterwards diſcharged and laid up in their combs: ſo that honey is a vegetable juice.

Fourthly, the fourth claſs of juices are thoſe of the fruit and ſeed; the preparative whereof is nature's final work: which performed, the plants ſeem to die for a time, as all animals are ſeen to languiſh after the emiſſion of their ſemen.

The juice of the fruit is like that of the root, only farther elaborated.

The juice of the ſeed is an eſſential oil or balm, elaborated and exalted to its laſt perfection. This juice or oil is not found in the very point or embryo in the center of the placenta; all we meet with in that part, is a few fine watery particles ſecreted from the placenta: but it is in the placentula or cotyledons themſelves, which conſiſt of innumerable little folliculi or cells, wherein this only juice is contained, ſerving to defend the embryo, and preſerve it from being corrupted by water, which, it is well known, will hardly paſs through oil.

Thus, if you take, for inſtance, fennel-ſeed, cut it through the middle, and apply it to the microſcope, you will eaſily perceive a clear ſhining oil in the cells of each lobe, inveſting the tender embryo. Without this oil, it were impoſſible a ſeed ſhould live a month, and, much leſs, a year or two, intire and uncorrupted in the ground.

This oil is found in the ſeeds of all plants; in ſome, for inſtance, in almonds, cocoa-nuts, &c. in very great quantities; in others leſs, as pepper, arum, &c. where one would ſcarce imagine any oil at all: and theſe ſeeds loſe their vegetative quality very ſoon.

Fifthly, the fifth claſs of juices are thoſe of the bark; which is an artful congeries or bundle of perſpirative ducts, and abſorbent veſſels.

Of theſe juices there are divers ſpecies; for the ſeveral humours raiſed and diſtributed through the leaves, flowers, and other parts of the plants, have all circulated through the bark, and accordingly are frequently found to diſtil from wounds made therein. In ſome caſes, even the whole plant is no more than bark, the pulp having been eaten out; as in willows, poplars, &c. which will live a long time in that ſtate.

The bark ſerves divers purpoſes; for it not only tranſmits the nutritious juices of the plants, but alſo contains divers fat oily humours, to defend the fleſhy parts from the injuries of the weather.

Sixthly, as animals are furniſhed with a panniculus adipoſus, uſually replete with fat, which inveſts and covers all the fleſhy parts, and ſcreens them from external cold; ſo are plants incompaſſed with a bark replete with fat juices, by the means whereof the cold is kept out, and in winter-time the ſpiculæ of ice prevented from fixing and freezing the juices in their veſſels; whence it is that ſome ſorts of trees remain ever-green the year round, by reaſon their barks have more oil than can be ſpent and exhaled by the ſun; and their leaves are covered with a thick oily film over their ſurface, which prevents their perſpiring, ſo much as other plants, and alſo defends them from the cold, &c.

All the juices of barks are reducible to eight, viz.

Firſt, the crude, acid, watery juice, called the chyle of the plant.

Secondly, an oily juice, which, burſting the bark in the beginning of the ſummer, exudes out of ſeveral plants; as cypreſs, pine, fir, ſavin, juniper, and other ever-greens; and ſuch alone: this oil diſſolves by the ſmalleſt degree of warmth, and is eaſily inflamed, and is that which defends the plant; which is the reaſon why moſt of theſe plants will not thrive in very hot climates.

For balm, or fatty liquor, more glutinous than oil, is nothing but the laſt-mentioned oily juice, which was more fluid during the ſpring-time; but which, by the greater heat of the ſun, has evaporated all its moſt ſubtile parts, and is converted into a denſer liquor. Thus the finer part of oil of olives being exhaled by the ſummer's warmth, there remains a thick balſam behind: thus alſo oil of turpentine, having loſt its more liquid parts by heat, becomes of the thick conſiſtence of a balm.

Thirdly, a pitchy juice, which is the body of the oil itſelf, inſpiſſates, and turns black, when put into a great warmth: this is the moſt obſerved in the pine and fir.

Fourthly, reſin, which is an oil ſo far inſpiſſated, as to become friable in the cold, and may be procured from any oil, by boiling it much and long. Thus, if turpentine be ſet over a gentle fire, it firſt diſſolves, and becomes an oil, then a balſam, then pitch, and then a reſin; in which ſtate it is friable in the cold, fuſible by fire, and withal inflammable and combuſtible; diſſoluble in ſpirit of wine, but not in water, which makes the character of reſin.

Hence the oil is moſt abundant in the barks in the winter-time, the balſams in ſummer, and the reſin in autumn.

Fifthly, colophony, which is a reſin ſtill farther exhauſted of its volatile part, being pellucid, friable, and approaching to the nature of glaſs.

Sixthly, gum, which is an humour exuding out of the bark, and, by the warmth of the ſun, concocted, inſpiſſated, and rendered tenacious, but ſtill diſſoluble in water and at the ſame time inflammable, and ſcarce capable of being pulveriſed. This oily mucilage ſerves as a pigment to cover over, and defend the buds of trees, from the injuries of wet and froſt in winter; but will melt with a moiſt warmth, and eaſily run from them, when the gentle warmth of the ſpring approaches: nor is ever ſo far hardened into a cruſt, as to do any injury to the incloſed ſhoot. This oily ſubſtance always contains in it an acid ſpirit; which is a preſervative againſt putrefaction.

Seventhly, a gummous reſin; which is an humour ſecreted in the bark, and dried by the heat of the ſun; and thus conſtituting a body that is partly gummous, and, as ſuch, tenacious, and ſoluble in water; and partly reſinous, and therefore friable, and ſoluble in oil, or ſpirit of wine, but not in water.

Botaniſts are now generally agreed, that all plants are furniſhed with organs and parts neceſſary both for chylification and ſanguification; that they have veins, arteries, heart, lungs, adipoſe, cellules, &c. If ſo, it is obvious, that there muſt be ſome difference between the juices, which have not undergone the action of thoſe parts, and ſuch as have already circulated a number of times.

The ſeveral juices, hitherto recounted, are the firſt or nutritious juice, called alſo the chyle of the plant, under ſuch alterations, and new modifications, as it undergoes in being received, and kept ſome time, in parts of a peculiar ſtructure; as leaves, flowers, ſeed, &c. This laſt juice, called the blood, is the ſame nutritious juice farther altered, by being divers times paſſed through each of thoſe parts, and remixed, and at length converted into a new juice, with properties different from any of them all.

To prove the circulation of the ſap, inſtances are brought from experiments made by Mr. Fairchild; as, his budding or inoculating of a paſſion-tree, whoſe leaves are ſpotted with yellow, into one of that ſort of paſſion-tree whoſe leaves are plain: for though, the buds did not take, yet, after it had been budded a fortnight, the yellow ſpots began to ſhew themſelves about three feet above the inoculation; and, in a little time after that, the yellow ſpots appeared on a ſhoot, which came out of the ground from another part of the plant; which has been accounted a plain proof of the ſap's circulation.

Another inſtance is, a ſecond experiment of the ſame perſon, who grafted the ever-green oak, or ilex, upon the common oak. The leaves of the common oak, which was the ſtock, decayed, and fell off, at the uſual ſeaſon of the year; but the ever-green oak, which was the cyon grafted upon it, held its leaves, and continued ſhooting in the winter. From whence it is concluded, that, when trees drop their leaves, the ſap keeps ſull in motion, and is not gone into the root, as ſome perſons think.

There are alſo other experiments of the ſame perſon, which were ſhewn before the Royal Society; as the New-England cedar, or rather juniper, grafted on the Virginian: and what is taken to prove the circulation in it, is, the branch which was grafted was left ſeveral inches below the grafting; which continued growing as well as the upper-part above the grafting.

And alſo another, which is the viburnum, with the top planted in the ground, which was become roots; and the roots turned up, which were become branches: which plant was in as good a ſtate of growing, as it was in its natural ſtate.

A third experiment of his was on a pear-tree, which he inarched upon two pear-ſtocks, in March 1721-2, having the roots out of the ground; and was in a good flouriſhing ſtate, with a branch in bloſſom, that receives no other nouriſhment but by the juices that return down the other two branches; which, though it had been done above two years, yet it continued ſhooting ſuckers out of the root; which is eſteemed as a proof, that the branches are as uſeful to ſupport the roots, as the roots the branches: and thence he infers, that it is not ſtrange, that ſo many trees miſcarry in planting, when there are no branches left to the head to maintain the circulation to the roots.

A fourth experiment he made on the cedar of Lebanon, grafted on the larix, which dropped its leaves in the winter, yet maintained the cedar in a flouriſhing condition, as if it had been on a tree which held its leaves all the winter; and the circulation of juices ſupported the graft below the grafting, and kept it in as good health as above the grafting.

In oppoſition to the notion of the circulation of the ſap in trees like to that in animal bodies, the Rev. Dr. Hales, in his excellent treatiſe on Vegetable Statics, preſents us with various experiments, and ſays:

When the ſap has firſt paſſed through that thick and fine ſtrainer, the bark of the root, we then find it in greateſt quantities in the moſt lax part, between the bark and wood, and that the ſame through the whole tree.

And if, early in the ſpring, the oak, and ſeveral other trees, were to be examined near the top and bottom, when the ſap firſt begins to move, ſo as to make the bark run, and eaſily peel off, he believes it would be found, that the low bark is firſt moiſtened; whereas the bark of the top branches ought firſt to be moiſtened, if the ſap deſcends by the bark. As to the vine, he ſays, he is pretty well aſſured, that the lower bark is firſt moiſtened.

He adds, that it is to be ſeen in many of the examples of the experiments he has given in that book, what quantities of moiſture trees daily imbibe and perſpire: now the celerity of the ſap muſt be very great, if that quantity of moiſture muſt moſt of it aſcend to the top of the tree, then deſcend, and aſcend again, before it is carried off by perſpiration.

The defect of a circulation in vegetables ſeems, in ſome meaſure, to be ſupplied by the much greater quantity of liquor, which the vegetable takes in, than the animal, whereby its motion is accelerated: for, by the firſt example he gives, we find the ſunflower, bulk for bulk, imbibes and perſpires ſeventeen times more freſh liquor than a man every twenty-four hours.

Beſides, nature's great aim in vegetables being only, that the vegetable life be carried on and maintained, there was no occaſion to give its ſap the rapid motion which was neceſſary for the blood of animals.

In animals, it is the heart which ſets the blood in motion, and makes it continually circulate: but in vegetables we can diſcover no other cauſe of the ſap's motion, but the ſtrong attraction of the capillary ſap-veſſels, aſſiſted by the briſk undulation and vibration cauſed by the ſun's warmth; whereby the ſap is carried up to the top of the talleſt trees, and is there perſpired off through the leaves: but, when the ſurface of the tree is greatly diminiſhed by the loſs of its leaves, then alſo the perſpiration and motion of the ſap are proportionably diminiſhed; as is plain from many of his experiments.

So that the aſcending velocity of the ſap is principally accelerated by the plentiful perſpiration of the leaves, thereby making room for the fine capillary veſſels to exert their vaſtly attracting power; which perſpiration is effected by the briſk rareſying vibrations of warmth; a power that does not ſeem to be any-ways well adapted to make the ſap deſcend from the tops of vegetables, by different veſſels, to the root.

If the ſap circulated, it muſt needs have been ſeen deſcending from the upper part of large gaſhes, cut in branches ſet in water, and with columns of water preſſing on their bottoms in long glaſs tubes, in his forty-third and forty-fourth experiments. In both which caſes it is certain, that great quantities of water paſſed through the ſtem; ſo that it muſt needs have been ſeen deſcending, if the return of the ſap downwards were by truſion or pulſion, whereby the blood in animals is returned through the veins to the heart; and that pulſion, if there were any, muſt neceſſarily be exerted with prodigious force, to be able to drive the ſap through the finer capillaries.

So that, if there be a return of the ſap downwards, it muſt be by attraction, and that a very powerful one, as may be ſeen by many of theſe experiments, and particularly by experiment the eleventh. But it is hard to conceive what and where that power is, which can be equivalent to that proviſion nature has made for the aſcent of the ſap, in conſequence of the great perſpiration of the leaves.

The inſtances of the jaſmine-tree, and of the paſſion-tree, have been looked upon as proofs of the circulation of the ſap; becauſe their branches which were far below the inoculated bud, were gilded. But we have many viſible proofs in the vine, and other bleeding trees, of the ſap's receding back, and puſhing forwards alternately, at different times of the day and night; and there is great reaſon to think, that the ſap of all other trees has ſuch an alternate receding and progreſſive motion, occaſioned by the alternacies of day and night, warm and cold, moiſt and dry.

For the ſap in all vegetables does probably recede, in ſome meaſure, from the tops of branches, as the ſun leaves them; becauſe, its rareſying power then ceaſing, the greatly rarefied ſap and air mixed with it will condenſe, and take up leſs room than they did, and the dew and rain will then be ſtrongly imbibed by the leaves, as is probable from the forty-ſecond experiment, and ſeveral others; whereby the body and branches of the vegetable, which have been much exhauſted by the great evaporation of the day, may, at night, imbibe ſap and dew from the leaves.

For, by ſeveral experiments in the firſt chapter of the book of Vegetable Statics, plants were found to increaſe conſiderably in weight in dewy and moiſt nights.

And by other experiments on the vine, in the third chapter, it was found, that the trunk and branches of vines were always in an imbibing ſtate, cauſed by the great perſpiration of the leaves, except in the bleeding ſeaſon; but, when at night the perſpiring power ceaſes, then the contrary imbibing power will prevail, and draw the ſap and dew from the leaves, as well as moiſture from the roots.

And we have a further proof of this in the twelfth experiment, where, by fixing mercurial gauges to the ſtems of ſeveral trees which do not bleed, it is found that they are always in a ſtrongly imbibing ſtate, by drawing up the mercury ſeveral inches; whence it is eaſy to conceive, how ſome of the particles of the gilded bud in the inoculated jaſmine may be abſorbed by it, and thereby communicate their gilding miaſma to the ſap of the other branches; eſpecially when, ſome months after the inoculation, the ſtock of the inoculated jaſmine is cut off a little above the bud, whereby the ſtock, which was the counter-acting part to the ſtem, being taken away, the ſtem attracts more vigorouſly from the bud.

Another argument for the circulation of the ſap is, that ſome ſorts of grafts will infect and canker the ſtocks they are grafted on; but by the twelfth and thirty-ſeventh experiments, where mercurial gauges were fixed to freſh-cut ſtems of trees, it is evident, that thoſe ſtems were in a ſtrongly imbibing ſtate; and, conſequently, the cankered ſtock might very likely draw ſap from the graft, as well as the graft alternately from the ſtock; juſt in the ſame manner as leaves and branches do from each other in the viciſſitudes of day and night.

And this imbibing power of the ſtock is ſo great, where only ſome of the branches of the ſtock will, by their ſtrong attraction, ſtarve thoſe grafts; for which reaſon, it is uſual to cut off the greateſt part of the branches of the ſtock, leaving only a few ſmall ones to draw up the ſap.

The inſtance of the ilex grafted upon the Engliſh oak ſeems to afford a very conſiderable argument againſt a circulation, for, if there were a free uniform circulation of the ſap through the oak and ilex, why ſhould the leaves of the oak fall in winter, and not thoſe of the ilex?

Another argument againſt an uniform circulation of the ſap in trees, as in animals, may be drawn from Dr. Hales's thirty-ſeventh experiment; viz. where it was found, by three mercurial gauges, fixed to the ſame vine, that, while ſome of its branches changes their ſtate of protruding ſap into a ſtate of imbibing, others continued protruding ſap, one nine, and the other thirteen days longer.

That the ſap does not deſcend between the bark and the wood, as the favourers of a circulation ſuppoſe, ſeems evident from hence, viz. that, if the bark be taken off for three or four inches breadth quite round, the bleeding of the tree above that bared place will much abate; which ought to have the contrary effect, by intercepting the courſe of the refluent ſap, if the ſap deſcended by the bark.

But the reaſon of the abatement of the bleeding, in this caſe, may be well accounted for, from the manifeſt proof we have in theſe experiments, that the ſap is ſtrongly attracted upwards by the various operation of the perſpiring leaves and attracting capillaries; but, when the bark is cut off for ſome breadth below the bleeding place, then the ſap which is between the bark and the wood below that diſbarked place is deprived of the ſtrong attracting power of the leaves, &c. and conſequently the bleeding wound cannot be ſupplied ſo faſt with ſap, as it was before the bark was taken off.

But the moſt conſiderable objection againſt this progreſſive motion of the ſap, without a circulation, ariſes from hence, viz. that it is too precipitate a courſe for a due digeſtion of the ſap, in order to nutrition: whereas in animals nature has provided that many parts of the blood ſhall run a long courſe before they are either applied to nutrition, or diſcharged from the animal.

But when we conſider that the great work of nutrition in vegetables, as well as animals (we mean after the nutriment is got into the veins and arteries of animals) is chiefly carried on in the fine capillary veſſels, where nature ſelects and combines, as ſhall beſt ſuit her different purpoſes, the ſeveral mutually attracting nutritious particles, which were hitherto kept disjoined by the motion of their fluid vehicle; we ſhall find, that nature has made an abundant proviſion for this work in the ſtructure of vegetables: all whoſe compoſition is made up of nothing elſe but innumerable fine capillary veſſels, and glandulous portions or veſicles.

Upon the whole, he thinks we have, from theſe experiments and obſervations, ſufficient ground to believe, that there is no circulation of the ſap in vegetables; notwithſtanding many ingenious perſons have been induced to think there was, from ſeveral curious obſervations and experiments, which evidently prove, that the ſap does, in ſome meaſure, recede from the top, towards the lower part of plants; whence they were, with good probability of reaſon, induced to think, that the ſap circulated.

SAVORY, a plant much cultivated in the kitchen-garden, and is of two ſorts, viz. ſummer and winter ſavory, the uſes of both which are nearly the ſame.

The former is an annual plant, raiſed only from its ſeed, which ſhould be ſown in the beginning of April, in a bed of looſe and light earth. If the plants are not intended to be removed, their ſeeds ſhould be ſcattered thinly; but if they are to be tranſplanted, they may be ſown thicker. They muſt be kept clear from weeds, and are, in other reſpects, to be treated as before directed for marjoram.

Winter ſavory may be propagated from ſeeds ſown at the ſame time as thoſe of the ſummer ſort; or by ſlips off its roots, for theſe are perennial, and will laſt ſeveral years: but as they do not put forth equally tender or well furniſhed ſhoots after they are grown old, the beſt way is to raiſe a ſupply of young plants every other year. The ſlips of the winter ſavory will ſoon take root and flouriſh; and they, as well as the plants of this ſpecies raiſed from ſeed, will endure the greateſt cold of our winters, and have the moſt aromatic ſmell and taſte, when they are planted in a poor and dry ſoil. Wet ground is very apt to render them mouldy, and conſequently make them rot. Mr. Miller has noticed ſome of theſe plants growing upon the top of an old wall, where they were fully expoſed to the cold, and they there ſurvived ſuch ſevere froſt as killed moſt of thoſe of the ſame kind that were planted in the ground.

The winter ſavory flowers in June, and the ſummer ſavory in July; but the ſeed of both ripen in the autumn, and at no great diſtance of time from each other.

SCAB, a diſeaſe incident to ſheep, chiefly occaſioned by a tedious length of wet weather

“ I imagine, ſays Mr. Veſey, your readers will not be diſpleaſed if I ſhould, with your aſſiſtance, communicate to them a remedy for this diſorder, which I have ſeveral times tried, and almoſt always found to anſwer extremely well.

“ Some men, whom I have known to breed and feed a great number of ſheep, have been groſly miſtaken in their comprehenſion of the nature of this diſtemper, which they raſhly judged to be merely cutaneous; whereas, when a ſheep has the ſcab, the blood is always more or leſs affected by it: therefore the outward applications, which are in general alone reſorted to for a cure, do for the moſt part more hurt than good, by driving in the eruption, and making it fix on the internals, thereby often occaſioning the death of the animal.

“ Now the true way to treat this diſorder is, firſt to give the animal ſomething inwardly to drive out the eruption; then comes, with propriety, the outward application, which completes the cure by killing the ſcab.

“ When a farmer has any of his flock afflicted with the ſcab, let him attend to the directions which follow.

“ Take a gallon of ſoft well or pond water, which divide into two equal parts: in one of theſe parts diſſolve eight ounces of old hard ſoap; to which, when it is diſſolved, add two ounces of ſpirits of hartſhorn, and ſeven ounces of common ſalt, with four ounces of roll brimſtone, beat to a fine powder and ſifted: then take the other part of the water, in which put two ounces of tobacco leaf, and one of white hellebore root: boil this ſecond part till you have a ſtrong infuſion, after which ſtrain it clear from the leaves and roots.

“ When you have got thus far in the proceſs, take that part of the water, firſt mentioned, and ſet it over the fire; let it boil for about half an hour, keeping it continually ſtirring with a wooden ladle during that time: in the mean time heat again the other part, in which the tobacco and hellebore were infuſed; and when it is hot, mix the two parts gradually together over the fire, keeping the mixture continually ſtirring till it is taken off the fire, which ſhould be in about a quarter of an hour: when it is quite cold, let it be put into a ſtone bottle, in order to its being kept in a cool place for uſe.

“ Then take four quarts of new ale or beer: put into it twelve ounces of common ſalt, two ounces of bay ſalt, and eight ounces of pounded nitre, together with twelve ounces of pounded roll brimſtone: ſet them over a gentle fire, and when the ale boils, take off the ſcum; let it boil for about half an hour; after which ſet it by till it is cold, and put it into a ſtone bottle for uſe.

“ When you are ſo far prepared, take one quart of ale, ſet it on the fire; mix into it by degrees, three ounces of flour of brimſtone; when it is juſt ready to boil take it off the fire, and let it ſtand to cool; and when it is only blood-warm, give this quantity inwardly to three ſheep, which is to be repeated every ſecond day till they have had three doſes. This will drive out the diſorder, when the firſt mixture is to be rubbed on the diſtempered parts: and two days afterwards the ſecond, and ſo alternately for about eight or ten days, till the cure is effected: ſometimes two rubbings will be ſufficient.

“ I muſt obſerve, that all theſe mixtures will be beſt boiled in well-glazed earthen or iron pots.” *Muſeum Ruſticum, vol.* II. *pag.* 173.

“ The two greateſt enemies the ſheep, ſays another ingenious gentleman, or at leaſt their wool (which is the moſt valuable part of them) have, are the ſcab and fly. I believe they deſtroy more wool than all the other diſeaſes incident to that animal.

“ Mr. Veſey has given us an approved remedy for the ſcab, and at the ſame time enters ſomewhat into the nature of that diſtemper. For my own part, I have not preſumption enough to look into firſt cauſes; ſecondary ones are all I aim at: I always took nature to be a wiſe inſtructor, and the ſureſt guide; but if we will hobble out of the way ourſelves, ſhe is not to blame.

“ I agree with Mr. Veſey, that in this, and every other diſtemper a ſheep labours under, the blood is more or leſs affected and diſturbed; which diſturbance, if I am not miſtaken, the faculty call a fever; therefore it muſt be always conſidered, that a fever is no more than a ſtruggle of nature to get rid of ſome enemy in the blood, by throwing it out by ſome of the outlets of the body, namely, by ſweat, urine, or ſtool; or upon the ſurface of the ſkin; and then ſhe ſeems to ſay, I have thrown the diſtemper out to your view, and there deſtroy it by proper applications.

“ It ſurely is not ſcab until it is thrown out upon the ſkin; and when it is thrown out, what avails it giving internal remedies, to do that which nature has done before? If it be out, there's your ailment; and I think, gentlemen, it is an axiom in phyſic, that when a diſtemper is once known, it is half cured: if it is only coming out, my advice would be, not to diſturb nature, who is always acting for our good, in a wiſer and better manner than we can do ourſelves: ſhe ſometimes indeed is too weak for her office, and ſometimes too ſtrong; in the one caſe ſhe is to be properly aſſiſted, and in the other, prudently reſtrained; and when we do more or leſs, the effects are generally fatal. I hope this will ſatisfy Mr. Veſey, that he is not altogether in the right, any more than his neighbours.

“ To cure an illneſs with a few medicines, is as commendable, as to ſay a great deal in a few words. One great obſtacle to Mr. Veſey's treatment of ſheep with ſcab, is its being too compound, troubleſome, and laborious, ſetting aſide the expence, and, where there are a great number of ſheep, hardly to be practiſed. I would have all remedies for the ailments of ſheep be as ſimple as poſſible; and to be obtained and prepared with as little trouble; for certain I am, gentlemen, when it is otherwiſe, many will let their flocks go neglected, or at beſt leave them to a ſlovenly ſhepherd, who knows very little of the matter; and when clip-day comes, when the poor creatures are out of their wool, (if they had any on before) what a ſight preſents itſelf to view! moſt parts of their ſkins being one continued ſcab, and other parts eat quite through, and deep into the fleſh, by the maggot: this I have ſeen at clip-day, and may ſpeak it; but what muſt I alledge it was owing to? Sorry am I to ſay, to the over credulity of the maſter, who thought he had a ſhepherd who knew every thing; but the event proved the contrary.

“ You muſt not be ſurpriſed when I ſay, what will deſtroy the fly, will alſo cure the ſcab, with little or no alterations: mercury is a mortal foe to both; and the remedy for the fly is as follows.

“ Take of good corroſive ſublimate, half an ounce; diſſolve it in two quarts of rain water; to which add a gill of ſpirits of turpentine: this is the whole of it, which muſt be uſed in the following manner.

“ When the ſheep is ſtruck, the ſhepherd muſt make a circle round the maggots with ſome of the water, by dropping it out of a bottle: this prevents them getting away, for they will not come near the water: then he muſt ſhred or open the wool within the circle, and drop a few drops of the water amongſt them, and rub them about with his finger, and there leave them, for they will all die preſently.

“ I ſpeak this from my own certain knowledge, and many others in this part of the country (Iſle of Ely) can do the ſame.

“ To a quart of the above water I add a pint of the ſimple lime-water of the London diſpenſatory; and I declare it from experience, there is no more certain cure for the ſcab than it: I am ſure it is the cleaneſt, the ſooneſt prepared, and, when ſo, the cheapeſt; which are inducements, I think, ſufficient to have every countryman make uſe of it.” *Muſeum Ruſticum*, *vol.* II. *pag.* 369.

SCABIOUS, the name of a flowering ſhrub cultivated in moſt pleaſure gardens.

All the ſhrubby ſorts of ſcabious may be propagated by cuttings, which may be taken off during any of the ſummer-months, and ſhould be planted in a ſhady border, and duly watered in dry weather, which will promote their taking root; and then they may be potted, and placed in a ſhady ſituation, till they have taken new root, after which time they may be placed amongſt other hardy exotic plants, in a ſheltered ſituation, where they may remain until the end of October, when they muſt be moved into ſhelter. In ſome favourable ſeaſons theſe plants will produce good ſeeds in England, ſo that the plants may be raiſed from theſe, by ſowing them in an open border of light earth about the middle of March; and, if the ſpring ſhould prove very dry, it will be neceſſary to water the ground now-and-then, which will forward the vegetation of the ſeed; ſo that the plants will appear in about three weeks after the ſeeds are ſown. When they come up, they muſt be kept clear from weeds, and in dry weather duly watered; and, when they are ſtrong enough to tranſplant, they ſhould be planted in pots, and managed in the ſame manner as thoſe plants which are propagated by cuttings.

All the ſorts of ſcabious continue a long time in flower, for which they are regarded; for there is no very great beauty in many of their flowers: but, as moſt of the hardy ſorts produce flowers near three months ſucceſſively, ſo they may be allowed a place in the borders of large gardens, becauſe they require very little care to cultivate them. And as the ſhrubby kinds continue in flower moſt part of the year, ſo they make an agreeable variety amongſt hardy exotic plants in the winter. *Miller's Gard. Dict.*

SCALLIONS. *See the article* Escallions.

SCRATCHES, a diſtemper incident to the heels of horſes.

It has ſo much affinity with the greaſe, and is ſo often a concomitant of that diſeaſe, that the method of curing the ſcratches may be ſelected from that article.

The parts affected ſhould be firſt covered with the linſeed and turnep poultice, having a little common turpentine added to relax the veſſels; the green ointment may then be applied to promote the diſcharge, when the ſcratches may be dried up with the ointments and waſhes recommended in that article. *See* Grease.

It is beſt afterwards to keep the heels ſupple, and ſoftened with curriers dubbing, which is made of oil and tallow. This will keep the hide from cracking, and be as good a preſervative as it is to leather; and by uſing it often before exerciſe, will prevent the ſcratches, if care is taken to waſh the heels with warm water, when the horſe comes in. When they prove obſtinate, and the ſores are deep, uſe the following; but if any cavities or hollow places are formed, they ſhould firſt be laid open, for no foundation can be laid for healing, till you can dreſs to the bottom.

> Take Venice turpentine four ounces, quickſilver one ounce; incorporate well together by rubbing ſome time, and then add honey and ſheeps ſuet, of each two ounces.

Anoint with this once or twice a day; and if the horſe is full or fleſhy, you muſt bleed and purge; and if the blood is in a bad ſtate, the alteratives muſt be given to rectify it. *Bartlet's Farriery*, *page* 294.

SCYTHE, Sithe, *or* Sythe, the inſtrument uſed in mowing, being a crooked blade joined at right-angles to a long pole. *See the article* Mowing.

SEAGRIM. *See* Ragwort.

SEAM, tallow, greaſe, hogs-lard.

Seam *of Corn*, a quarter, or eight buſhels.

Seam *of Wood*, a horſe load of wood.

SEAR, dry; oppoſed to green: ſpoken of wood.

SEARCHER. *See the article* Borer.

SEAVES, ruſhes.

SEAVY *Ground*, ground over-run with ruſhes.

SEED, the product of a plant, whereby the ſpecies is propagated.

The choice of the ſeed intended to be ſowed is an object of greater importance than many farmers ſeem to imagine. It is not ſufficient that the fineſt grains be choſen for this purpoſe, unleſs they are likewiſe very clean. Such wheat is not difficult to be had from land cultivated according to the principles of the new huſbandry; but we ſeldom find corn intirely free from ſeeds of weeds when it has been raiſed in the common way.

It is natural to ſuppoſe, that the grains of ſtinted and ſickly corn neceſſarily partake of the weakly diſpoſition of the plant which produced them, and that their productions cannot be ſo fine as thoſe which grow from the ſeeds of ſtrong and healthy plants. For this reaſon Mr. Tull adviſes to take the ſeed corn from a richer ſoil than that in which it is to be ſowed, and rather from ground in perfect tilth, than from land which has been leſs carefully cultivated. This ſeems to be very right (though the contrary opinion is almoſt generally received), becauſe more may reaſonably be expected from the productions of a fine good ſeed, which are full of vigour and well conditioned, than from a poor weak plant.

M. de Chateauvieux, who often ſowed with no other intention than merely to try, for the benefit of mankind, at what time, in what manner, and in what condition it is beſt to ſow wheat, found that this corn ſprouted pretty well even when ſowed ſo green that it had not yet loſt its milky quality; but thinks it much more adviſeable to ſow none but what is thoroughly ripe: becauſe the ſeed has then attained its full perfection, from whence we may moſt certainly expect the beſt and ſtrongeſt plants.

“ The wheat, ſays he, which has been reaped in a warm dry year, ſeems to me fitter for ſowing, than that which has been gathered in a cold wet ſeaſon: for in ſuch a time as this laſt, all the productions of the earth are leſs good; their taſte is leſs ſavoury; and as that corn in particular in which there is moſt moiſture, is moſt difficult to keep, I infer from thence that the formation of its grain muſt be leſs perfect. I ſhould therefore prefer wheat a year old, provided the year it was gathered in was warm and dry, to that which may have juſt been gathered in too rainy a ſeaſon: for the ſame reaſon, I always chooſe for ſowing, wheat of the growth of my high grounds, rather than that which has been produced in flats. The benefit accruing from all this care, may, perhaps, not be extremely great; but at the ſame time it does not coſt any thing. Let us do in agriculture what is done in all manufactures, where the very ſmalleſt profits, the very leaſt ſavings, are not neglected. Thoſe ſmall articles, often repeated, make large ſums in the long run, and are a real gain.

“ Another thing, of greater conſequence, firſt made known to me by chance, but ſince confirmed by repeated experiments, always attended with the ſame ſucceſs, I ſtrongly recommend as extremely ſerviceable to the firſt ſprouting of the ſeed. In my experimental ſowings, I commonly uſed wheat taken from the heap in the granary; and likewiſe, frequently, corn picked out of the ears the moment before I ſowed it. I counted exactly the grains of both ſorts, and ſuppoſe that few will think there could be any difference in their productions. Yet I found a conſiderable one. What was picked out of the ears always roſe extremely well; ſcarce a grain of it ever miſſed; whereas numbers of thoſe which were taken from the heap, never ſprouted at all. I did not perceive this difference at firſt; but at laſt it ſtruck me. I relate the fact as it is, without pretending to account for the cauſe of this difference, which would lead me into too long a digreſſion. The experiment itſelf may be of real uſe, by ſhewing us, that inſtead of threſhing the wheat intended for ſeed at any time, without diſtinction, it ought not to be threſhed till a very few days, at moſt two or three, before it is ſowed. A few hands will be able to ſupply the ſeeds-men with as much as they will want: nor will this method, which may be a means of ſaving ſomewhat in the ſeed, be attended with any extraordinary expence.

“ Perhaps too this practice may be attended with a very valuable advantage. I have not indeed yet made the trials neceſſary to ſatisfy myſelf of what I imagine ; but my deſire to be of ſervice to the public induces me to mention it, that the lovers of agriculture may reflect upon it, and try ſuch experiments as will clear up my conjectures.

“ Threſhing the ſeed only juſt before it is ſowed may poſſibly, in ſome meaſure, or perhaps intirely, prevent the cauſe of ſmut in wheat. By this I mean, that the ſeed which has not been mixed with ſmutty corn, or any way infected by its black powder, will be exempt from that diſtemper. Not that I take black powder to be abſolutely the original cauſe of this diſtemper in corn ; but I believe it is very capable of communicating it to grains which are ſound.

“ That nothing may be neglected which can be of any ſervice to the ſeed, great care ought to be taken in threſhing the corn, eſpecially in the manner that buſineſs is commonly performed, with flails, upon the barn floor : for a great number of grains are frequently ſo much bruiſed thereby, that it is impoſſible they ſhould ever grow. If the wheat thus threſhed for ſeed is not thoroughly dry and hard, the miſchief is ſtill greater ; much more of it being then abſolutely cruſhed by the flail.

“ As ſowing in drills requires leſs ſeed than is uſed in the common method, it will be the eaſier to execute there an operation which might be too long and troubleſome for ſo great a quantity as is uſed in the old way. The method which I adviſe, and which I have practiſed, is this. Let one or two beams, two feet and a half, or three feet thick, be laid a-croſs the barn floor : let the threſhers ſtand on each ſide of the beam, and take out of looſe ſheafs of wheat, one of which ſhould be placed behind every man, a handful at a time, and give it two or three ſtrokes againſt the beam. This will bring out a great deal of grain, which is to be reſerved for ſeed. The ears thus ſhaken may be bundled up again, and afterwards threſhed out with the flail, for other uſes. This method is not ſo tedious as ſome may imagine : we are ſure that not a grain is bruiſed ; and thoſe are the moſt perfect which drop out thus. I think I may compare this operation with what is done in the making of wine, where the firſt running is always the higheſt flavoured and beſt.

Another excellent way to ſeparate the fulleſt, and conſequently heavieſt grains, which are undoubtedly the fitteſt for ſeed, from thoſe which are of leſs value for that purpoſe, and at the ſame time to clear them from many ſeeds of weeds, is, to make a ſtout man, with a broad wooden ſhovel, throw the corn with all his force towards an oppoſite corner of the barn, or rather of a large boarded hall, which generally is the fitteſt for this work. All the light, ſmall, ſhrivelled grain, unfit for ſowing, and the ſeeds of cockle, darnel, &c. not being ſo heavy as the ſound ſolid corn, will fall ſhort, and lie neareſt to the man who throws them ; while ſuch as are large, plump, and weighty, out-flying all the reſt, are ſeparated widely, and may eaſily be gathered up. Experience will ſhew the vaſt advantages of ſowing ſeed thus choſen.

The uſe of ſteeps was introduced very early into huſbandry, not only as a means of preſerving corn from ſeveral diſtempers to which it is ſubject, but alſo with a view to render the ſeed more fruitful. That ſome of them have ſometimes anſwered the former of theſe intentions is undeniable : but with regard to the latter, much ſtronger and oftener repeated evidences than any that have yet been produced, are ſtill wanted to confirm their boaſted efficacy. I ſhall however, give a conciſe account of ſome of the moſt famous of both kinds ; with this previous obſervation, that even ſuch of them as have not ſucceeded in ſome caſes, through cauſes perhaps unknown to us, may poſſibly do well in others, when tried with proper judgment, and attention. Experiments of this kind ſhould by all means be continued on a double account ; firſt, to take off a prejudice which ſeems to gain ground, though it be not founded on any rational principle ; and next, to be well aſſured whether theſe preparations do, or do not, produce any ſenſible effect. Experiments ſeldom prove uſeleſs to careful accurate obſervers. If they do not always anſwer the end propoſed, they at leaſt ſometimes lead the way to other important diſcoveries.

The Romans had their lees of oil, decoction of cypreſs leaves, juice of houſe-leek, &c. on which they have beſtowed full as much commendation as they merit. Lord Bacon ſeems to have been the firſt who paid any attention to this ſubject in England : but he has only pointed out the path to others : nor do I know any author who has yet given us a ſet of experiments with this view, long enough continued abſolutely to determine what effects ſome kind of ſteeps may have towards rendering grain more fruitful.

Van Helmont, and, ſince him, the authors of the Maiſons Ruſtiques, have given many receipts for ſteeps, which they vaunt exceedingly, as increaſing the fruitfulneſs of the ſeed ſteeped in them. But at the ſame time that they recommend theſe receipts, they adviſe ſowing the corn thinner than uſual ; generally one third leſs ; a circumſtance which, alone, will add greatly to the crop, as very many experiments, and particularly all the good trials of the new huſbandry, have evidently demonſtrated. That the compariſon may be juſt, all circumſtances ſhould be alike, as to the goodneſs of the ſoil, the quantity and quality of the ſeed, &c.

M. Duhamel, to ſatisfy himſelf whether any benefit does ariſe from the uſe of ſteeps, by way of giving the ſeed a greater degree of fruitfulneſs, tried the following experiment. He infuſed ſome good wheat in a lye of dung, mixed with lixivial ſalts, nitre, and ſal ammoniac, and ſowed with this grain two beds in his kitchen garden, dug with a ſpade. One of the beds was ſowed very thick, and the other very thin. At the ſame time he ſowed two other beds, exactly like the former, with ſome of the ſame ſeed, not ſteeped, one thick, and the other thin. At harveſt time, the beds ſowed with the ſteeped ſeed were ſo exactly like the others, that it was impoſſible for the eye to diſtinguiſh between them.

A gentleman in his neighbourhood followed exactly the directions given in the Maiſons Ruſtiques, in the uſe of one of their boaſted receipts, which is there ſaid to be of ſuch efficacy, that the land need be plowed but once for wheat prepared with it. He did ſo ; and his crop was ſcarce worth reaping.

On the other hand, M. Duhamel mentions his being informed by M. Peyrol, many years ſecretary to the intendent of Auvergne, that he had made ſeveral experiments in imitation of thoſe mentioned in the abbé de Vallemont's famous book. In the month of May 1755, he planted in his garden (an indifferent ſoil, in a hot expoſition,) four ſmall cabbages, which then had only four leaves. In September following, the ſame cabbages were ſix feet and a half in circumference. Some plants of red wheat, tranſplanted into a bed dug very fine in his garden, bore one hundred and thirty ears a piece, each of which contained from forty to eighty grains. Some plants of white wheat, tranſplanted at the ſame time, produced one hundred and twenty ears, each of which had from thirty to forty grains. Two grains of red wheat, ſowed in the ſame bed, and not tranſplanted, produced each of them one hundred and forty ears, which contained ſix thouſand grains. Five plants of red wheat, diſtant from one another ſix inches, did not branch ſo well, being too cloſe together : but each of them produced from forty to fifty ears, which contained from forty to ſixty grains. Rye, which branches leſs than wheat, produced from thirty to thirty-five ears, each containing from ſixty to ſeventy grains : and the barley of that country, which branches but little, produced however from ſixty to eighty ſtalks, though the ſeed of this laſt had not been ſteeped in any liquor before it was ſowed.

The author of theſe experiments judiciouſly obſerves, that they muſt be repeated and varied, before it can be made to appear that the extraordinary increaſe is owing to the ſteep.

This celebrated liquor of the abbé de Vallemont is made as follows.

Put into a tub, expoſed to the ſouth, one buſhel of horſe-dung, the ſame quantity of cow-dung, half a buſhel of pigeon's-dung, as much ſheep's-dung, as much aſhes, three gallons of ſmall pricked wine, two pounds of ſaltpetre, and as much water as will ſufficiently dilute the whole, ſo as to make it thin enough for uſe. Every time that any of this liquor is taken out to ſprinkle the plants, it is filled up again with water; and as it may be too ſtrong at firſt, it may be weakened accordingly.

It is eſſential to obſerve, that M. Peyrol added to this infuſion frequent digging; for the ground was dug five times between the plants of wheat: and he obſerved that each digging ſenſibly gave freſh vigour to the plants, which grew to the height of ſix feet.

M. Donat, another of M. Duhamel's judicious correſpondents, made trials of theſe mixtures, from the uſe of which ſo much is promiſed: but ſays he thinks them of no other ſervice, than to amuſe the curious, who do not regret expence. As the authors of them boaſt that all kinds of ſoils, whether good, bad, or indiffrent, well or ill plowed, reſted or not reſted, will produce ten times more than in the common way; this gentleman ſowed a large extent of ground, ſome good, ſome bad, ſome well, and ſome ill plowed, &c. He made the ſteep himſelf, was preſent when the ſeed was ſowed, and took care that no circumſtance was neglected. But notwithſtanding all his care, his crop was far from anſwering their promiſes. The good, well cultivated ſoil, produced fine wheat; but not extraordinary in point of quantity. The only advantage was in the ſaving of the ſeed. The poor ill cultivated land, and that which had not been reſted, produced very little grain: and the very bad ſoil, none at all. Theſe experiments convinced M. Donat, that the ſureſt means of obtaining good crops, is, to have the ground in good condition. This is the principle on which the new huſbandry is founded: nor indeed does it offer any thing marvelous, or contrary to the moſt ancient precepts of good huſbandry.

If there be in any of theſe ſteeps, or preparations, a more than common virtue, by which the grain infuſed in them is rendered more prolific than it would otherwiſe be, poſſibly ſome ſuch benefit may accrue from the following practice, which is recommended by the author of the New Syſtem of Agriculture.

"Take, ſays he, the corn which is intended for ſowing, and throw it, by a buſhel at a time, into a large veſſel full of water: let a man ſtir it with a ſtaff, as violently as he can, for a conſiderable while together, and then, giving it a little time to ſettle, ſkim off all that ſwims upon the ſurface: repeat this till no more riſes; then take out the corn which has ſunk to the bottom, and lay it by for ſeed; proceeding in the ſame manner till you have your intended quantity. After this, make a brine of bay-ſalt and rain-water, ſtrong enough to bear an egg. Steep the ſeed corn in this liquor during thirty hours; for leſs time will not have any effect: then take it out, ſpread it upon a ſmooth floor, ſtrew over it a good quantity of fine-ground powder of ſlaked lime, and ſweep the whole up and down till each grain leaves clinging to another, and becomes, as it were, perfectly candied with the lime. It is then fit for ſowing; and will infallibly produce a very abundant crop." Some farmers vary this ſteep, by adding to it a mixture of pigeons, or other dung; and in moſt parts of France, where this receipt is known, they omit the ſalt; perhaps becauſe it is too dear in that country, and ſteep the wheat in lime-water. For this purpoſe they put it into baſkets, and carefully ſkim off all that ſwims on the top, moſt of which would not ſprout, and is only fit to feed fowls.

The ſociety of improvers in the knowledge of agriculture in Scotland, call the following a very promiſing receipt for multiplying corn: but as no experiment that we know of, duly attended to, has yet confirmed that ſurmiſe, we can only ſay, that it may not be wrong to give it ſuch farther trials as will not hurt the experimentor, whether they do or do not ſucceed: a rule which ſhould be conſtantly obſerved in all experiments.

"Take as much water as will fully cover the quantity of grain you intend to uſe; add thereto a reaſonable quantity of a mixture of horſe, cow, and ſuch other dung as you can conveniently get, ſo as not to make the water too thick: add likewiſe for every boll (four buſhels) you are to ſteep, about a peck or ſixteenth part of the ſame ſort of grain as you are to ſteep. Boil all theſe till the grain is reduced to a pulp; keeping the kettle or cauldron cloſe covered, to retain the ſteam. When the boiling is over, pour off the water, and diſſolve in it a pound of nitre, or ſalt-petre, to every four buſhels of corn: then, while it is luke-warm infuſe your corn for three days, after which, drain off the water, ſpread the grain on the floor, mix it with a ſufficient quantity of ſea-ſand, (if ſuch can be conveniently had), and laſtly, with lime, to dry it, as is uſually done in other caſes."

"It ſeems reaſonable to think," ſay the abovementioned ſociety, "that nothing can be more natural for impregnating grain, than the ſtrength and eſſence of itſelf. But, ſince nitre is added, it is beſt to be cautious: for it has been found by experience, that ſalts, though they have the virtues mentioned, kill or deſtroy the vegetative powers, when the application is immoderate, either with reſpect to the quantity, or the time the grain is ſteeped; ſo that there has often been a neceſſity to ſow over again with the ſame, or ſome other grain. To make the better judgment concerning this critical affair, the nature and condition of different grains are carefully to be conſidered; but the moſt certain knowledge and direction are to be obtained by a courſe of obſervations and experience. Mean while, it is beſt to obſerve the maxim, avoid extremes."

In Mr. Houghton's collection of papers relative to huſbandry and trade, are ſeveral experiments on the ſteeping of wheat and barley in a liquor which is there ſaid to have occaſioned a very great increaſe, and is thus made. "Take a quantity of rain-water, and diſſolve in every gallon of it two pounds of ſtone-lime: let it ſtand two or three days, ſtirring it three times a day: then pour off the water into another veſſel, and add to every gallon of it about four ounces of ſalt-petre, and one pound of pigeons dung: mix them well together, by ſtirring them three or four times a day, and then ſtrain off the liquor to keep for uſe." Mr. Everard, who communicated this receipt to Mr. Houghton, ſteeped a handful of wheat in a quart of this liquor, where he let it infuſe eighteen hours: he then took it out, and laid it to dry in the air for the ſpace of one day; and then ſteeped it again in the ſame liquor for about twelve hours, dried it as before, and ſteeped it again a third time, about ſix hours, after which he planted it in his garden, which was but common earth, ſetting it by ſingle grains, about ten inches aſunder, and a finger's length in depth. He could not remember whether every grain ſprouted, but thought that very few failed. Thoſe which did grow, produced an extraordinary increaſe, ſeveral of them yielding from ſixty to ſeventy, ſome of them eighty ſtalks with very large ears full of fine plump corn: many of the ears were ſix inches long, and contained ſixty grains: none had leſs than forty.

He alſo ſteeped peas and beans in the ſame liquor; but could not ſay whether their having been ſteeped two long was the cauſe that none of them came up: but he took the thick ſediment which remained after the liquor was ſtrained off, mixed it with four times the quantity of earth, let it lie all winter in a gravel walk, ſouth of a codlin hedge, then made a row of holes, about four inches diſtant, put a handful of the mixed earth into each hole, with a pea upon it, and covered it with common mould. The peas ſprouted well, ran up the codlin hedge to the height of about nine feet, ſhot out branches in ſeveral places, like vines, and bore ſo many well filled pods, that he judged he had above a buſhel from about three or fourſcore ſeeds.

He tried alſo an experiment on wheat infuſed in lime-water alone, ſome in brandy alone, and ſome in brandy and lime-water mixed, and had a great increaſe from each grain. With ſome of the liquor made with ſalt-petre, lime, and pigeons dung, he watered ſeveral trees in his garden, and found them grow and flouriſh much faſter than any other of the ſame kind which were not watered in that manner. He alſo ſteeped barley in the ſame liquor, and found its increaſe equal to that of wheat.

Whether there be, or be not, any kind of prolific efficacy in theſe, or any other ſteeps, of which great numbers are pompouſly recommended, and which proper experiments can beſt determine; they are at leaſt ſo far ſerviceable to the ſeed corn, that they clear it from filth, from many ſeeds of weeds, and from ſuch poor light and diſtempered grains as are not fit for ſowing, and prepare it in ſuch a manner, that, being already well moiſtened, it will ſhift much better than abſolutely dry grain, in caſe a drought ſhould enſue after it is ſowed.

This thorough cleanſing of the ſeed may probably be, in a great meaſure, the reaſon why corn ſo prepared is leaſt apt to produce ſmutty ears. All the lyes generally made uſe of, certainly preſerve the plants from mouldineſs, and that in which lime is a principal ingredient ſeems to be one of the moſt effectual. But as this part naturally leads to the diſtempers of corn, another very intricate, but highly intereſting ſubject, we ſhall reſume it under that head, to which it properly belongs; and give in the mean time M. Duhamel's farther opinion concerning the pretended prolific virtues of infuſions, with ſome late experiments relative thereto, as delivered in the ſixth volume of his excellent Treatiſe on the Culture of Land, publiſhed laſt year.

We liſten readily to the marvellous, eſpecially when it promiſes any great and ſingular advantage. Such was the abbé de Vallemont's prolific liquor, by means of which the huſbandman was to reap vaſt crops, without manuring, or ſcarcely plowing his land. He was only to ſoak his ſeed in this admirable liquid, which was to open, ſtrengthen, and amazingly fertilize the germe. Improbable as this doctrine is, it was greedily received.---It is known, that a ſeed contains in that part of it which is called the germe or bud, the embryo of a plant, that is to ſay, a plant in miniature, and that the reſt of the ſeed ſerves to feed the young plant, or plantule, till it acquires roots which draw its farther nouriſhment from the earth. As ſoon as theſe roots ſpread, the ſeed is exhauſted, and there remains only its then uſeleſs huſk. What benefit then can be derived from prolific liquors? perhaps they may render the nutritive ſubſtance of the ſeed fitter to ſupport the young plant, which, in conſequence thereof, may appear ſomewhat more vigorous at firſt, and till it has ſtruck out roots: but from the time of its producing thoſe roots, it ceaſes to ſubſiſt upon the lobes of the ſeed. Can it be imagined that a ſingle atom of any prolific liquor exiſts at the diſtance of four or ſix inches from the plants in the earth, where its roots are ſpread, and from whence they draw their ſubſiſtance? Yet, ſuch is the fondneſs of men for projects of this kind, de Vallemont's mixture was extolled as a wonderful diſcovery, indued with a magnetic virtue capable of attracting from the boſom of the air certain principles, which probably do not exiſt in it, and numbers of receipts have been deviſed for making prolific liquors. Writers upon agriculture have ſtuffed their books with them, and vaunted their miraculous effects. A deſire to ſee theſe mighty promiſes fulfilled, paved the way for their reception, and ill made experiments have given a ſanction to the error.

A little corn, impregnated with theſe pratended prolific liquors, has been planted grain by grain in a garden, and its extraordinary increaſe has immediately been imputed to the ſteep. I myſelf was deceived by ſuch trials: but when I extended them to three or four acres of ground, this great fertility no longer took place, and I began to doubt the efficacy of theſe boaſted ſpecifics. About the ſame time, I ſaw a ſingle grain of barley produce 230 ſtalks, without any preparation, and was informed by the Rev. Dr. Hales, that another grain of barley had in like manner, produced one hundred and fifty-four ears. From hence I concluded, that the prodigies of vegetation ſo much vaunted by ſome writers, as the effect of their favourite infuſions, have in fact been owing to the nature of the ſoil, to good culture, and to the grains being at ſuch diſtances from each other, that their roots have had room to ſpread, and thereby collect a great quantity of food. I then had recourſe to new experiments, which confirmed me in this opinion.

We ſee in the political ſtate of England, that a grain of wheat which grew by chance in a bed of onions, and had not received any preparation, produced 5600 grains. Upon which the author of that work remarks (as indeed I had done before in regard to the former of the abovementioned productions), that we muſt not from thence infer that the country where ſuch a thing happens is naturally more fertile than another, or the method of agriculture commonly practiſed in it better than elſewhere; for that the cauſe of theſe prodigious growths is, that the grains ſtand ſingle and in a good ſoil; that the only conſequence which can be drawn from thence, is that the new huſbandry comes neareſt to that ſtate in which theſe ſurpriſing growths are produced; that it certainly muſt increaſe the product of the crops; and that it will probably require leſs ſeed than is uſed in the common way.

Though it was pretty well proved by our experiments, that good culture and proper manures contribute more effectually to the increaſe of crops, than all the boaſted prolific liquors; yet ſeveral perſons, out of zeal for the public good, have publiſhed, ſome the advantages which they think ariſe from the uſe of certain fertilizing ſteeps, and others, receipts for making them.

In this ſpirit, M. de la Jutais has given us a little tract entitled, The true Philoſopher's Stone, according to which, an admirable prolific liquor is to be thus made. Fuſe ſome nitre in an iron veſſel; and when it is hot enough to burn the ſubſtances which are to be added, throw in a ſmall quantity of the ſame kind of ſeed as you intend to ſow: for example, if you would have a prolific liquor for wheat, throw a little wheat upon the nitre; if turnips, put in turnip ſeed, and ſo on. Theſe ſeeds take fire, are conſumed, and incorporate with the melted nitre. Your prolific liquor is then made, and you have only to mix the nitre with water. What reſults from this operation? Nothing more, than that there is in this prolific liquor a great deal of nitre with a ſmall portion of fixed nitre, or alkaline ſalt: whether this nitre be fixed with wheat, barley, turnip ſeed, or powder of coal, all chymiſts allow that the reſult will be the ſame, and that the ſame liquor might be made by mixing a little alkaline ſalt with a ſtrong ſolution of ſalt-petre. The queſtion is, what effect it will have upon vegetables. To try this fairly, two exactly ſimilar fields ſhould be ſowed, the one with wheat prepared with the prolific elixir, and the other with wheat only limed in the uſual way; taking care to ſow an equal quantity in each field: for the ſingle circumſtance of diminiſhing the quantity of the ſeed, may increaſe the crops in years when the corn does not tiller much, and in good ſoils. Many have been deceived by not attending to this circumſtance. The following are well made experiments.

" M. Delu, after trying M. de la Jutais's eſſence three times, with the moſt ſcrupulous care and exactneſs, thinks it of no ſort of ſervice.

" M. Peirol, whom I mentioned before, communicated to me in 1755, ſeveral experiments which he had made with great care, in order to ſatisfy himſelf whether theſe prolific liquors have any virtue; and thoſe trials made him then hope for ſucceſs. I thanked him for his obliging letters, and exhorted him to repeat the ſame experiments with ſome new precautions which I thought important. He did ſo, with all poſſible care; and it is with real pleaſure that I ſhall give a juſt account of them, becauſe they ſeem to me extremely fit to diſſuade thoſe who wiſh well to agricultre, from putting their truſt in ſuch illuſions. Inſtead of running after an empty ſhadow, they may employ their time in uſeful perquiſitions, by which the public will be benefited.

" M. Peirol ſowed, both in his own garden, and in that of the intendant of Auvergne, 1. many-eared wheat; 2. rath-ripe barley; 3. the common red wheat of the country; and had from each of them an amazing increaſe.

" Each plant of the many-eared wheat, had from fifty to ninety-two ſtalks, and theſe laſt yielded 13800 grins.

" Some of the rath-ripe barley had two hundred and forty-four ſtalks to each plant, and yielded 14640 grains.

" Several plants of the red wheat had three hundred ſtalks; but the grains were eaten by birds.

" Theſe were fine productions: but the moſt important thing to be obſerved here, is that M. Peirol ſowed all theſe different kinds of grain, as well in his own garden, as in that of the intendant, on the ſame day, viz. the 8th of September 1756; part of this corn having been ſteeped in the abbé de Vallemont's fertilizing liquor, while the reſt had not been infuſed at all: yet their productions were quite alike, the ground had been prepared exactly in the ſame manner for the ſteeped and the un-ſteeped grain, and both were equally watered from time to time with that prolific waſh. This laſt circumſtance ſpoils the whole experiment: for who can doubt but that this watering of the plants with impregnations of dung, muſt give them great vigour; even more than a conſiderable quantity of dung itſelf would have done? However, the following experiment is, luckily, without that fault.

“ On the 4th of April 1755, M. Peirol divided a pretty large field into five equal parts. The ground was in good tilth, and he ſowed it with barley.

“ The firſt part was ſowed with unſteeped barley in rows a foot aſunder.

“ The ſecond was ſowed with the ſame kind of barley ſteeped in de Vallemont's liquor, and likewiſe in rows a foot a ſunder. Both had a plowing between the rows, towards the end of April.

“ The third was ſowed in broad-caſt according to the cuſtom of the country, excepting that a quarter part of the uſual quantity of ſeed was retrenched: but ſtill it was the ſame ſort of barley, and this had been ſteeped in de Vallemont's liquor.

“ The fourth diviſion was alſo ſowed in broad-caſt, like the former; with this only difference, that the ſeed was ſteeped in a prolific liquor invented by M. Robineau.

“ Laſtly, the fifth part was ſowed intirely in the common way, with the uſual quantity of the ſame kind of ſead, un-ſteeped.

“ The following was the ſtate of theſe five diviſions at harveſt time.

“ The firſt and ſecond, which had been ſowed in rows, with only a quarter part of the quantity of ſeed generally uſed in the common way, but prepared for the one by being infuſed in de Vallemont's liquor, and ſowed in the other without any impregnation, were both very fine, and yielded a great deal of grain.

“ The third and fourth, which had been ſowed in broad-caſt, with an abatement of only a quarter part of the uſual quantity of ſeed, and where the grain for one had been ſteeped in de Vallemont's liquor, and that for the other in M. Robineau's, were middling, and not viſibly different in any reſpect.

“ The fifth ſpot, which had been ſowed intirely in the common way, and with the uſual quantity of ſeed, was the worſt of all.

“ Though M. Peirol was prejudiced in favour of prolific eſſences, he nevertheleſs concludes from this experiment, 1. That the un-ſteeped grain uſed for the firſt mentioned portion of the field, having yielded as fine a crop as that of the ſecond which was ſteeped, infuſing the ſeed does not contribute much to make the plant's tiller.

“ 2. That the products of the third and fourth diviſions being quite alike, M. Robineau's ſteep is not better than de Vallemont's.

“ 3. That the difference between the crop of the fifth, and thoſe of the third and fourth pieces of ground, was probably owing to the different quantity of ſeed.

“ 4. That the ſuperior beauty of the firſt and ſecond, which ſurpaſſed all the reſt, was occaſioned by the grains being ſo far diſtant from each other, that the roots of the plants had ſufficient room to collect their food, and that the huſbandman was enabled to ſtir the ground between the rows, in the ſpring, by which the vigour of the plants was conſiderably increaſed. All this confirms the advantages of the new huſbandry; and M. Peirol is ſo convinced of it, that he has ſowed a very large tract of land, near Riom, in the ſame manner as the two firſt parts of the above-mentioned experiment.

“ He has likewiſe made another trial of de Vallemont's ſpecific, by planting vines in two different places. In one of theſe, where the ſoil was good, the common practice was followed, and the cuttings ſprouted ſoon: in the other, where the ground was leſs good, each cutting was watered with two quarts of de Vallemont's liquor. Theſe laſt ſhot out later, but then grew with great ſtrength, and retained their leaves a long while. It cannot be doubted but that an infuſion of dung will invigorate plants, and make them grow faſter than they would otherwiſe. The owners of vineyards are here to conſider, whether the expence of people to do this buſineſs may not be greater than the advantages accruing from it will repay: but it is certain that by thus watering their newly planted cuttings, eſpecially with a ſtrong infuſion of dung, they will ſecure their taking root.

“ To ſatisfy myſelf in regard to M. Robineau's pretended prolific liquor, I choſe a piece of ground laid out for wheat, and divided it into three equal parts. One of theſe was ſowed in the common way, with ſeeds only limed, and produced one hundred and ninety-two ſheaves to the acre, which yielded ſixty buſhels of corn. Another was likewiſe ſowed in the common way, with ſeed only limed, but two fifths leſs in quantity than is generally uſed, and produced one hundred and ſixty-eight ſheaves, which yielded fifty-four buſhels. The third part was ſowed with the ſame quantity of ſeed as the firſt, but prepared according to M. Robineau's direction. This produced one hundred and fifty-ſix ſheaves, which yielded fifty-four buſhels of grain. From whence it follows, that his method was not of any ſervice to the crop.

“ His liquor, when diſtilled over a very ſlow fire, yields a little brandy; what remains in the matraſs, yields a great quantity of ſalt-petre, and the reſidue is a bitter water which contains a ſmall portion of alkaline ſalt. This is nearly what would be obtained from de la Jutais's liquor.

“ M. Vanduſſel has alſo tried M. Robineau's prolific liquor, and found it attended with no other effect, than that the field where it was uſed had ſomewhat fewer ſmutty ears than other grounds for which the ſeed had not been ſo prepared. But other ſeed which he ſteeped in an infuſion of dung, aſhes, and lime, produced corn totally exempt from ſmut.”

An ingenious correſpondent of the editors of the Muſeum Ruſticum, has given us the following improved method of breeding ſeed-wheat.

“ I join, ſays this Eſſex farmer, with many others in opinion, that it is beſt every year to change one's ſeed-wheat, and this has been my conſtant practice: I have had many a weary ride to get ſeed that would pleaſe me, for I am, and always have been, very difficult in this matter.

“ I have near two hundred acres of land in conſtant tillage: theſe I divide into three portions, ſo that I have every year about ſixty acres in wheat, ſixty more in barley and oats: and the remainder are either fallow, or in beans, peas, or turnips, &c.

“ When I firſt came into my farm, I expended annually, of ſeed-wheat, thirty quarters; for, after the example of my neighbours, I allowed four buſhels of ſeed for every acre I ſowed.

“ Theſe thirty quarters often coſt me above ſeventy pounds; and God knows I could ſometimes but little ſpare ſo much money, after the great annual expence of getting in my harveſt.

“ Some part of my land differs greatly in its nature from the other: near half my farm is a ſtiff deep clay; what bottom it has I know not, as I never could find it in digging my ditches, &c. the other half is a bed of light ſandy loam; with a gravelly hard bottom.

“ This difference in the ſoil of my farm is, on many accounts, a great advantage: particularly, my wheat does not all ripen at the ſame time; I have generally nearly got in that growing on my gravelly land, before that on my clay is fit to cut; and I can beſides plow in all weathers, froſt excepted.

“ But, not to digreſs too much, I took it into my head that, with proper care, I could breed for myſelf, on my own land, as good ſeed-wheat as any I could buy, if not better; and I determined within myſelf to make the experiment.

“ Before I made this experiment, I had reduced the quantity of ſeed I uſed on each acre, to three buſhels, which was a great ſaving to me. I had ſtill occaſion for above twenty quarters.

“ My firſt ſtep was to ſelect ten acres of the beſt land I had; five from the heavy, and as many from the light part of my farm: this land was by nature rich and good; it lay on the gentle ſouthern declivity of a hill, and required very little manure: it lay in two little detached fields, at ſome diſtance one from the other.

“ When I had prepared this land by a winter and ſummer fallowing, in which time the clayey part was plowed ſeven times, and the light land five times, I had both fields ſown with ſome of the beſt wheat I could procure; that for the heavy land I got from Hertfordſhire, the other from a particular friend who holds a farm in Cambridgeſhire.

" When the ſeaſon for ſowing approached, I was mightily pleaſed with the appearance of my two little plots; for they reſembled the beſt-kept gardens, not a weed to be ſeen, and the earth as fine as garden-mould.

" On this occaſion I did not brine my ſeed, but had it put into a large tub: ſome water was then poured on it, and I made a ſtout labourer, with a ſtiff half-worn birchen-broom, ſtir it very briſkly about for near half an hour; this I imagined would waſh off the ſmut, if any there happened to be: the light ſeeds, which were very few, were ſkimmed off.

" I let the wheat afterwards lie three hours ſoaking, when my man again ſtirred it briſkly with the ſame broom, and immediately poured the water off.

" Whilſt yet wet, the ſeed was ſprinkled in the uſual manner with ſlaked lime, in order to prepare it for ſowing.

" My reaſon for not brining it was, that I thought it would bring it too forward; and I rather choſe to ſow it early, which is, I know, in general, a very good practice.

" In ſowing this land, I, in ſome meaſure, followed Mr. Tull's directions; that is, I ſowed my wheat in rows with large intervals in the following manner.

" I had a furrow opened about a rod from the hedge: in this furrow ſome ſeed was by a careful hand very thinly ſcattered, not ſowed in the common way with a fling of the arm.

" It took up time; ſo I had two ſowers to each plow. When the plowman had drawn the firſt furrow, he then opened another, at about ten feet diſtance from the firſt in the land; and ſeed was in the ſame manner thinly ſcattered in this alſo: after this, he returned to the firſt furrow, and drawing another cloſe to it, covered the ſeed; the ſame thing he did by the ſecond furrow: he afterwards went two bouts without any ſeed being ſown in the furrows; but the third bout, ſeed was thinly ſcattered, as before, to form the ſecond row of corn in each bed: another bout was made to cover the ſeed when the two beds were finiſhed, the middle of the interval being left unplowed.

" In this manner both my little fields were ſown, in double rows with intervals about five or ſix feet wide betwixt the beds, and the rows about two feet aſunder.

" The corn came up very well, and preſerved a good wholeſome appearance all the winter.

" Early in the ſpring, that is, in the month of February, I made a careful man ſow the ſpaces betwixt the rows of corn on the heavy land with wood-aſhes, and on the light land with ſoot: theſe were both ſoon waſhed in by the rain, and the effects were ſpeedily to be ſeen in the new-aſſumed vigour of the crops, and this vigour continued till the corn was ripe.

" As ſoon as any weeds appeared, the intervals which were left unplowed at ſeed-time were turned up, and the ſpaces betwixt the rows diligently hand-hoed: this hand-hoeing was ſeveral times repeated, to keep the crop quite clear from weeds, the intervals had alſo ſeveral other ſtirrings; but this work was chiefly done with a very light plow, without an earth-board in the heavy land, and without either earth-board or coulter in the other little field.

" Every thing came very well forward; and when the wheat began to ſpindle, I had the outſides of the rows well earthed-up with a plow, and the inſides with a hand-hoe: the inſides were done firſt.

" At harveſt the fields made a noble appearance: a fine well broke earth ſtriped with rows of healthy wheat.

" The cutting this wheat was very eaſily performed, it ſtood ſo ready to the reapers hands; and when it was houſed and threſhed, it yielded me about four quarters on an acre, one with another, the firſt year, though I have ſince had ſometimes more, ſometimes a little leſs.

" My ten acres then yielded me about forty quarters; and I had occaſion for only about twenty-two to ſow my common wheat-lands: I therefore took only the firſt and prime part of this crop, getting the ſheaves very lightly threſhed; what remained made excellent bread-corn.

" I never ſaw finer ſeed-wheat than mine was this year: my heavy lands I ſowed with the ſeed produced by the light field, and my light lands with that produced by the heavy field.

" As ſoon as I had got in this ſelect crop, I got the intervals in order for ſowing with a ſecond crop, in moſt reſpects continuing the practice of the year before: I had the like ſucceſs, and might, perhaps, with equal advantage, have continued cropping the fields every year in the ſame manner: but, not to depend too much on Mr. Tull, my next crop was a full crop of barley on them, which ſucceeded well: and I ſelected two other plots of ground, of equal goodneſs, for my ſeed-corn huſbandry, as I call it.

" In this manner I have now for ſeveral years paſt managed, growing my own ſeed; and, if any thing, my crops have ſince increaſed: but I have again reduced the quantity from three to two buſhels of ſeed, for each acre of my wheat-land in common: that is, ſuch as I ſow in the ordinary way: on ſome of my rich, ſtrong land, I do not uſe above ſix pecks, and find it anſwer very well.

" I could like to extend this new huſbandry, or this imitation at leaſt of the new huſbandry, over all my lands that are in tillage: but in my method of practiſing, the expence would be too great: my ſowers are well paid; I have enough to do to make my plowmen go out of their ordinary way; and it coſts me a great deal hoeing: yet all this I do not grudge to procure good ſeed.

" By introducing the drill-plow and the horſe-hoe I could ſave a great deal of labour on my light lands; and I may probably ſome time or other attempt it: but, at the ſame time, I am very ſenſible, I ſhall find great difficulty in getting men that will even try to do the work with theſe inſtruments. The common labourers in huſbandry hate novelty: they purſue, without murmuring, the old beaten track; but put them out of it, and thought will become neceſſary: the fact is, they imagine it a very great hardſhip to be obliged to work and think too, and all for the ſame money.

" Without great reſolution, and ſome kind of authority, a farmer will be obliged to let them even dig a ditch their own way: innovation they like not in any ſhape, often making uſe of the expreſſion, that they are too old to learn.

" This, to a man who is very much diſpoſed to lend a helping hand towards the improvement of agriculture, is a mortifying circumſtance: there is ſcarcely any thing ſo difficult as to make an obſtinate man uſeful: if, by dint of authority, you oblige him to go out of his way, he will rather contribute to the loſs of your crop, than not to endeavour to convince you that he is in the right. I have often, to my ſorrow, felt the truth of this obſervation.

" Several reaſons, though I deal not much in them, may be aſſigned for the ſeed-wheat, I raiſe in the above deſcribed manner, being ſo good.

" In the firſt place, I ſow it on land that has not taſted any dung for ſome years, but is, in its own nature, rich and good: to this practice I aſcribe a great deal of its goodneſs. In the next place, as the corn does not ſtand too thick, it enjoys all the benefit it can receive from the ſun and air: by this means it attains a perfect maturity, and is certainly improved both in bulk and quality.

" The ſlight ſpring-dreſſing I give it, of ſoot or aſhes, is of very great ſervice: it warms the roots, and brings the corn forward; it looſens the earth, and either itſelf gives nouriſhment to the plants, or, at leaſt, puts the earth in a diſpoſition to afford it.

" Not a little is to be attributed to the frequent hoeing betwixt the rows and the ſtirrings of the intervals; and I find one very particular and great advantage reſult from it, which is, that it is an excellent means of clearing my land of weeds; for they no ſooner attain a part of their growth, but they are deſtroyed long before they ſeed.

" Farmers in general think their fields cannot in the ſpring be too full of wheat-plants: the ground ſeems covered with verdure, and the blades are, as it were, crouded for want of room: when the weeds begin to get up, they ſend in a parcel of men and women with weeding-hooks, not letting a hoe come near the land to cut them up: they are ſadly afraid they ſhould not have plants enough at harveſt; whereas, if they were to meaſure and mark off a rod ſquare of land in February, and count the plants growing on it then, and afterwards count them in the beginning of Auguſt, it would almoſt always be found, that four parts in five of them had periſhed in the intermediate months, and that what remained were, by far too much crouded ſtill, and had each but few ſtalks.

“ I never weed my corn of late years; for as I allow only two buſhels of ſeed, and often leſs, to an acre, the plants come up thin; and there is of courſe room for a moderate-ſized hoe, which is the inſtrument I clean my land with: and ſo far from being fearful of having my crop injured by this means, I order the workmen, where the plants ſtand too cloſe, to cut them up without mercy, as they would do the moſt pernicious weeds: if there happens by any accident to be a vacant ſpot, they eaſily remove ſome plants to it, with earth about their roots, by the help of their hoe.

“ By this management, I, in ſome meaſure, reap the benefit of the advantages promiſed by the new huſbandry; though I have not ſuch opportunities of ſo often giving the plants a freſh ſupply of nouriſhment, nor of earthing them up when the grain is forming in the ear; for, after the corn has put forth its ſtalks to any conſiderable length, it would not be ſo proper to ſend in the hoers: but all the loſs is the want of earthing up the plants ſo late as I could wiſh; for the weeds will, before this time, be pretty well got under, and few of them will be able to ripen their ſeeds before harveſt, when they will of courſe be deſtroyed by turning in the ſtubble, which I always do as ſoon as poſſible; though many of my neighbours let their ſtubbles lie rough all the winter, for the ſake of feeding a few ſcore of ewes.

“ Every farmer has methods peculiar to himſelf; and they are, for the moſt part, ſuch as were practiſed by their fathers, grandfathers, &c. whom they ſucceeded in the culture of their farms.

“ My methods, as you muſt now be ſenſible, differ from moſt of thoſe uſed by other occupiers of land; and if I cannot ſo well defend them by arguments, an experience of ſeveral years has convinced me that I ought ſtill to perſiſt in the practice of them: they have anſwered all the ends I could wiſh from them; what could I deſire more?

“ I am enabled to raiſe all my own ſeed without the trouble of procuring it from a great diſtance, at a large expence, and with a deal of trouble.

“ My crops are to the full as good as ever they were, and I uſe leſs ſeed by above one half: my manure goes a great deal farther than it uſed to do, becauſe I beſtow more plowing and other tillage on my land; and I am not ſo much peſtered as I formerly was with weeds, for they now very ſeldom are ſuffered to feed on my land.

“ Of this laſt evil, I mean that of weeds, I have not, however, yet got quite rid; for ſuch of my fields as border on my neighbours lands are ſtill often infeſted; ſome of theſe ſame neighbours, I have ſeveral times mentioned, are but ſlovenly farmers, and the weeds which have winged or downy ſeeds, are conſtantly wafted by the wind from their land to mine; ſo that I, in ſome meaſure, am puniſhed for their neglects: thiſtles are this way particularly troubleſome, as the ſeeds of them will ſometimes be carried a very conſiderable way by the wind.

“ I have very little more to ſay at this time, except that I never threſh the ſheaves that are to ſupply me with ſeed-corn till juſt when I want to make uſe of it. I have a notion, that the ſeed keeps better in the covering nature has given it, I mean the chaff, than it would do without it; and I am pretty certain it ſprouts ſooner in the ground, the huſk or bran of the grain being preſerved in a tenderer and more yielding ſtate, than it would be were it expoſed to the open air.”

With regard to the ſeeds of plants ſown in the kitchen-garden, all of them ſhould be gathered in dry weather, when there is not any moiſture upon them; and the beſt way to preſerve them is, to hang them up in bags, in a dry room, where vermin cannot come at them. The temperature of this place ſhould be moderate; leſt either too much warmth, or a too ſtrong current of air, ſhould make them dry, and conſequently decay, ſooner than they would otherwiſe do: and at the ſame time care muſt be taken not to exclude the air totally from them; it having been repeatedly experienced, that ſeeds kept long in bottles cloſely ſtopped have entirely loſt the power of growing. They will keep longeſt in their pods, when they can be ſo laid up, becauſe thoſe coverings not only defend them from the injuries of the outward air, but, ſo long as they are not disjoined from them, continue to ſupply them with a degree of nouriſhment which helps to maintain them in a plump ſtate, fit for vegetation. The ſeeds of all ſoft fruits, ſuch as cucumbers, melons, &c. are of courſe excepted from this general rule; for they muſt be well cleanſed from their ſurrounding pulp, the rotting of which would otherwiſe ſoon corrupt them. Thoſe of melons in particular, are ſo far benefited by being kept in a warmer ſtate than would ſuit any others, that the plants produced from them are thereby rendered the leſs luxuriant, and therefore more fruitful: for which reaſon it is that many people carry them in an inner pocket of their breeches for ſix weeks or two months before they ſow them, in order to exhale part of their moiſture; and in effect, this will weaken them as much as two years keeping them in the common way.

Thoſe ſeeds which ſwim upon the ſurface of water, when they are put to that trial of their goodneſs, ſhould be rejected for ſowing; becauſe, as hath already been frequently obſerved, though many of them will grow, they never produce ſo good plants, or ſo fine fruit, as the fuller, plumper, and more perfect ones, which ſink to the bottom.

The age at which it is beſt to ſow the ſeeds of the plants before treated of, and the time to which they will keep good, are thus aſcertained by Mr. Miller, after many years experience and very accurate obſervation.

The ſeeds of aſparagus, baſil, beans, beet, borage, capſicum, carrots, celeri, chervil, creſſes, endive, fennel, finocchia, hyſſop, kidney-beans, lavender, leeks, lentils, marjoram, marigolds, onions, parſley, parſneps, peas, purſlain, radiſhes, ſavory, ſkirrets, ſpinnage, thyme, and turneps, are beſt ſown the firſt ſpring after they have been ſaved; and indeed many of them will not grow if they are kept longer.

Thoſe of cabbages, colliflowers, endive, lavender, lettuce, muſtard, and ſorrel, will not be the worſe for keeping two years, if they are well preſerved; though all of theſe are equally good for uſe the firſt year.

The ſeeds of cabbages, cucumbers, lettuces, melons, and ſavoys, will grow very well at the end of three years, if they have been properly ſaved and kept. Some of them, and particularly thoſe of cucumbers and melons, are generally reckoned beſt when they are three years old; becauſe, when they are new, the plants produced by them will grow too vigorous, and yield but a ſmall quantity of fruit. However, none of theſe ſeeds ſhould be kept longer than four or five years, though they well grow at the end of nine or ten: but then their plants will be weak, and their fruit ſmall.

The ſeeds of fennel will frequently remain in the earth a whole year, eſpecially if they are ſown in the ſpring; ſo that whenever the plants do not come up the firſt year, the ground ſhould be left undiſturbed till the following ſpring, except only keeping it clear from weeds, and the plants will then appear.

SEEDLINGS, young plants which have not been removed from the beds where they have been ſown. It is alſo uſed to diſtinguiſh plants raiſed from ſeeds from thoſe of the ſame kind which have been propagated by layers or cuttings.

SEED-LIP, Seed-Leap, *or* Seed-Lop, a ſeed-baſket, or the veſſel in which the ſower carries his ſeed, in order to ſow it.

SEELING, a term uſed by horſe-dealers to imply the time when a horſe begins to have white eye-brows; that is, when there grows on that part about the breadth of a farthing, a parcel of white hair, mixed with thoſe of his natural colour. This is a mark of old age, a horſe never ſeeling before he is fourteen, and always before he is ſixteen years old.

SELANDERS. *See* SALENDERS.

SEMBRADOR, an inſtrument uſed in Spain for ſowing corn. *See the article* DRILL-PLOUGH.

SEMIFISTULAR-*Flowers*, are thoſe whoſe upper part reſembles a pipe cut off obliquely.

SEMIFLOSCULOUS-*Flowers*, are thoſe whoſe petals are hollow in their lower part; but in their upper flat, and continued in the ſhape of a tongue.

SEMINARY, a ſeed plat, or place allotted for raiſing plants from ſeed, and keeping them till they are fit to be removed into the garden or nurſery. *See the article* NURSERY.

SERRATED, indented, or notched, in the manner of a ſaw.

SERVICE-*Tree*, the name of a tree that grows naturally in many parts of England; and if ſuffered to ſtand, will become very large. The ſtems are covered with a ſmooth gray bark; the branches, while young, have a purpliſh brown bark. The leaves are winged, ſharply ſawed on their edges; and, during the ſpring, are hoary on their under ſides. The flowers are produced in large branches, almoſt in the form of umbels, at the ends of the branches; they appear in May, and are ſucceeded by roundiſh berries, growing in large bunches, which have a depreſſed navel on the top, and turn red in autumn, when they ripen.

Though the fruit of the ſervice-tree is not much eſteemed in England, it is often ſerved up to the table, as a part of the deſert, in the ſouth of France, and in Italy, where there is no want of a variety of fine fruits. The ſpecies there is indeed much larger than ours: but as Mr. Evelyn has left us no room to doubt that our wilder ſort, which grows naturally in many parts of England, may, like all other plants, be greatly improved by due culture, it is well worth the huſbandman's while to give it a place in his orchard, or other ground. Mr. Miller too gives more than one inſtance of his having ſeen the ſervice-tree brought to great perfection in this country. He has obſerved three ſorts (Mr. Evelyn noted four) of our native growth, the fruit of one of which is ſhaped like a pear, and that of the other like an apple. The former, which reſembles moſt the foreign ſpecies abovementioned, is the beſt and the largeſt grower; for it will ſometimes attain to the height of near forty feet.

It is a common, but a very miſtaken ſaying, that the ſower of theſe trees never ſees the fruit of his labour. This notion may have ariſen from their bearing moſt plentifully when they are very old: but, with proper care, they may be made to produce fruit in a few years, even from the time of raiſing them from their ſeeds; and if they are propagated by layers, or cuttings, they will ſoon begin to repay the pains beſtowed on them.

To propagate them from their ſeeds, of which there are three in each berry, or chequer, as ſome call this fruit, the pulp ſhould be rubbed off clean, with dry ſand, ſoon after the fruit is ripe, and the ſeeds, which are of a hard ſtrong nature, ſhould then, according to Mr. Miller's directions, be ſown in pots, for the convenience of plunging theſe into a moderate hot-bed in the ſpring, in order to forward their growth: for it will be ſufficient to ſhelter them under a common frame during the intermediate winter. When the plants are come up, they ſhould be kept clear from weeds, watered in dry weather, and expoſed to the open air: for a cloſe hot bed would then draw them up ſo weak as to ſpoil them; nor indeed is any thing more intended here by this method of raiſing them, then to make the ſeeds ſprout ſooner than they would do in the common open ground, which, that circumſtance excepted, will do equally well, as theſe plants are very far from being tender. About the middle of October, at which time their leaves will decay, they ſhould be taken out of the pots in the hot bed, and planted in the nurſery, in rows two feet aſunder, and a foot apart in the rows. A little mulch ſhould be laid upon the ſurface of the ground, over their roots, in the winter, to protect them from being injured by froſt before they have well taken root, and in the next ſpring the ground between them ſhould be dug, and the mulch buried therein, with care not to cut or injure their tender roots. With this management, and keeping them conſtantly clear from weeds, they will be fit in three or four years, according to their growth, to be tranſplanted into the places where they are to remain: but previous to this it will certainly be right to graft them, as Mr. Evelyn adviſes, for the greater improvement of their fruit. They take well either on their own ſpecies, or on the white thorn, the quince, or the medlar. The beſt ſeaſon for removing them from the nurſery is in October, or in the ſpring juſt before they begin to ſhoot, and the ſoil in which they thrive beſt, ſooneſt produce fruit, and laſt the longeſt, is a moiſt ſtrong ground, defended from cold wind. However, they will grow even in the moſt expoſed places, and thrive where few other trees will ſucceed; for they are extremely hardy. This renders them well worthy of the huſbandman's attention, as well for their timber (which will be ſpoken of hereafter) as for their fruit. This laſt makes a pretty appearance when ripe; but the black birds and thruſhes are ſo fond of it, that they devour all they can come at. A way, therefore, to draw theſe warbling ſongſters about an habitation, is to plant a quantity of theſe trees for that purpoſe. Like the medlar, this fruit muſt be kept till it is almoſt rotten, before it will be fit to eat.

SETTER, a kind of ſetom or iſſue, made by cutting a hole in the dewlap of an ox or cow, and putting into the wound a ſort of tent formed out of the root of helleboraſter; by which the ill humours vent themſelves.

To SEW, *or go* SEW, to go dry; ſpoken of a cow.

SHAKING, a diſeaſe incident to ſheep, conſiſting of a weakneſs in their hinder quarters, ſo that they cannot riſe up when they are down. No cure is yet known for it.

SHARD, a fragment of an earthen veſſel.

SHARE *of a Plough*, that part which cuts the ground, the extremety forward being covered with a ſharp-pointed iron, called the point of the ſhare; and the end of the wood behind, the tail of the ſhare. *See the article* PLOUGH.

The length of the whole ſhare from point to tail, according to Tull, ſhould be three feet nine inches; at the top of the iron it has an upright piece called the fin; and near the iron at the other end, there is an oblong ſquared hollow, called the ſocket; the uſe of which is to receive the bottom of the ſheat. Near the tail there is a thin plate of iron, well riveted to the wood; by means of this plate the tail of the ſhare is held firmly to the hinder ſheat of the plough by a ſmall iron pin, with a ſkrew at the end, and a nut ſkrewed on it, on the inner or right ſide of the ſheat.

The point of the ſhare is that part in which it does not run up into the fin: this point is generally made of three inches and a half in length, and ſhould be flat underneath, and round at the top, and the lower part of it muſt be of hard ſteel. The edge of the fin ſhould alſo be well ſteeled, and ſhould make an acute angle with the ſhare.

The ſocket is a ſort of mortiſe; it ſhould be a foot long, and about two inches deep: the fore-end of it muſt not be perpendicular, but oblique, conformable to the end of the ſheat which enters into it. The upper edge of the fore-part muſt be always made to bear againſt the ſheat; but, if this end of the ſocket ſhould not be quite ſo oblique as the ſheat, it may be helped by paring off a ſmall part of the wood at the point.

SHAW, a wood that encompaſſes a cloſe.

SHAWLE, a ſhovel uſed in winnowing corn.

SHEARING *of Sheep*, the operation of cutting off the fleece or coat of wool with a pair of ſhears. *See the article* SHEEP.

SHEAT *of a Plough*, that part of the plough which paſſes through the beam, and is faſtened to the ſhare.

The ſheat, or as it is ſometimes called the fore-ſheat, there being another piece of timber behind it called the hinder ſheat, ſhould be ſeven inches wide, and faſtened to the beam by a retch (a piece of iron with two legs) and by a wedge driven by it into the hole of the beam. The angle contained between the ſheat and the beam of the plough ſhould be about forty-two degrees.

SHEAVES, bundles of corn bound up in the field. *See the article* HARVEST.

SHED, a ſlight temporary covering.

SHEEP, *ovis*, in zoology, a well known ſpecies of cattle, and which are kept at the leaſt expence of any to the farmer. They will thrive upon almoſt any ground, and for that reaſon are preferred by many before the larger cattle.

The beſt ſort of ſheep for fine wool are thoſe bred in Herefordſhire and Worceſterſhire, but they are ſmall and black-faced, and bear but a ſmall quantity.

Warwick, Leiceſter, Buckingham, and Northamptonſhire, breed a large boned ſheep, of the beſt ſhape, and deepeſt wool we have got. The marſhes of Lincolnſhire breed a very large kind of ſheep, but their wool is not good, unleſs the breed be mended by bringing in ſheep of other countries among them, which is a ſcheme of late very profitably followed there.

The northern counties in general breed ſheep with long, but hairy wool: and Wales breeds a ſmall hardy kind of ſheep which has the beſt-taſted fleſh, but the worſt wool of all.

The farmer ſhould always buy his ſheep from a worſe land than his own, and they ſhould be big-boned, and have a long greaſy wool, curling cloſe and well. Theſe ſheep always breed the fineſt wool, and alſo are the moſt approved of by the butcher for ſale in the market.

For the choice of ſheep to breed, the ram muſt be young, and his ſkin of the ſame colour with his wool, for the lambs will be of the ſame colour with his ſkin. He ſhould have a large long body, a broad forehead, round, and well riſing, large eyes, and ſtraight and ſhort noſtrils. The polled ſheep, that is, thoſe which have no horns, are found to be the beſt breaders. The ewe ſhould have a broad back, a large bending neck, ſmall, but ſhort; clean and nimble legs, and a thick deep wool covering her all over. To know whether they be ſound or not, the farmer ſhould examine the wool that none of it be wanting, and ſee that the gums be red, the teeth white and even, and the briſket ſkin red, the wool firm, the breath ſweet, and the feet not hot. Two years old is the beſt time for beginning to breed, and their firſt lambs ſhould not be kept too long, to weaken them by ſuckling, but be ſold as ſoon as conveniently may be. They will breed advantageouſly, till they are ſeven years old.

The farmers have a method of knowing the age of a ſheep, as a horſe's is known, by the mouth. When a ſheep is one ſhear, as they expreſs it, it has two broad teeth before; when it is two ſhear, it will have four; when three, ſix; when four, eight; after this their mouths begin to break. The difference of land makes a very great difference in the ſheep.

The fat paſtures breed ſtraight tall ſheep, and the barren hills and downs breed ſquare ſhort ones; woods and mountains breed tall and ſlender ſheep, but the beſt of all are thoſe bred upon new plowed land, and dry grounds. On the contrary, all wet and moiſt lands are bad for ſheep, eſpecially ſuch as are ſubject to be overflowed, and to have ſand and dirt left on them. The ſalt marſhes are, however, an exception to this general rule, for their ſaltneſs makes amends for their moiſture, any thing of ſalt, by reaſon of its drying quality, being of great advantage to ſheep.

As to the time of putting the rams to the ewes, the farmer muſt conſider at what time of the ſpring his graſs will be fit to maintain them and their lambs, and whether he has turneps to do it till the graſs comes; for very often both the ewes and lambs are deſtroyed by the want of food; or, if this does not happen, if the lambs are only ſtunted in their growth by it, it is an accident that they never recover. The ewe goes twenty weeks with lamb, and according to this it is eaſy to calculate the proper time. The beſt time for them to yean is in April, unleſs the owner has very forward graſs, or turneps, or the ſheep are field ſheep, where you have not incloſures to keep them in, then it may be proper they ſhould yearn in January, that the lambs may be ſtrong by May-day, and be able to follow the dam over the fallows, and water furrows; but then the lambs that come ſo early, muſt have a great deal of care taken of them, and ſo indeed ſhould all other lambs at their firſt falling, elſe, while they are weak, the crows and magpies will peck their eyes out.

When ſheep are turned into fields of wheat or rye to feed, it muſt not be too rank firſt, for, if it be, it generally throws them into ſcowerings. Ewes that are big ſhould be kept but bare, for it is very dangerous to them to be fat at the time of their bringing forth their young. They may be well fed indeed, like cows, a fortnight before-hand, to put them in heart. *Mortimer's Huſbandry.*

The feeding ſheep with turneps is one great advantage to the farmers, from the crops they raiſe of them: they ſoon fatten upon them, but there is ſome difficulty in getting them to feed on them; the old ones always refuſe them at firſt, and will ſometimes faſt three or four days, till almoſt famiſhed; but the young lambs fall to at once.

The common way, in ſome places, of turning a flock of ſheep at large into a field of turneps, is very diſadvantageous, for they will thus deſtroy as many in a fortnight, as would have kept them a whole winter. There are three other ways of feeding them on this food, all of which have their ſeveral advantages.

The firſt way is to divide the land by hurdles, and allow the ſheep to come upon ſuch a portion only at a time, as they can eat in one day, and ſo advance the hurdles farther into the ground daily, till all be eaten. This is infinitely better than the former random method, but they never eat them clean even this way, but leave the bottoms and outſides ſcooped in the ground; the people pull up theſe indeed with iron crooks, and lay them before the ſheep again, but they are commonly ſo fouled with the creature's dung and urine, and with the dirt from their feet, that they do not care for them; they eat but little of them, and what they do, does not nouriſh them like the freſh roots.

The ſecond way is by incloſing the ſheep in hurdles, as in the former, but in this they pull up all the turneps they ſuppoſe the ſheep can eat in one day, and daily remove the hurdles over the ground, whence they have pulled up the turneps: by this means there is no waſte, and leſs expence, for a perſon may in two hours pull up all thoſe turneps; the remaining ſhells of which would have employed three or four labourers a day to get up with their crooks out of the ground, trodden hard by the feet of the ſheep; and the worſt is, that as, in the method of pulling up firſt, the turnips are eat up clean; in this way, by the hook, they are waſted, the ſheep do not eat any great part of them, and when the ground comes to be tilled afterwards for a crop of corn, the fragments of the turnips are ſeen in ſuch quantities on the ſurface, that half the crop at leaſt ſeems to have been waſted.

The third manner is to pull up the turneps, and remove them in a cart or waggon to ſome other place, ſpreading them on a freſh place every day; by this means the ſheep will eat them up clean, both roots and leaves. The great advantage of this method is, when there is a land not far off which wants dung more than that where the turneps grow, which perhaps is alſo too wet for the ſheep in winter, and then the turneps will, by the too great moiſture and dirt of the ſoil, ſometimes ſpoil the ſheep, and give them the rot. Yet ſuch ground will often bring forth more and larger turneps than dry land; and when they are carried off, and eaten by the ſheep on ploughed land in dry weather, and on green ſward in wet weather, the ſheep will ſucceed much the better; and the moiſt ſoil, where the turneps grow, not being trodden by the ſheep, will be much fitter for a crop of corn, than if they had been fed with the turneps on it. The expence of hurdles, and the trouble of moving them is ſaved in this caſe, and this will counterbalance at leaſt the expence of pulling the turneps, and carrying them to the places where they are to be eaten. They muſt always he carried off for oxen. *Tull's Horſe-hoeing Huſbandry.*

" It can hardly be doubted, ſays M. de Buffon, but that thoſe animals which are at preſent tame and domeſtic, were formerly wild. Yet the weakneſs and ſtupidity of the ſheep being conſidered, and likewiſe that this defenceleſs animal cannot ſave itſelf by flight; that all carnivorous animals are his enemies, ſingling it out in preference to others, and devouring it for the fineneſs of its fleſh: at the ſame time we muſt remember that this ſpecies is not very prolific, and that each individual is but ſhort-lived: when theſe particulars are conſidered, we ſhould be inclined to think, that from the beginning of things, the ſheep has been committed to the care of man; that his protection is neceſſary to its ſubſiſtance, and his care to its

its multiplying; nor are any deſarts known to afford wild ſheep; but in all places where man does not govern, the lion, the tyger, and the wolf, reign by violence and cruelty; theſe voracious animals live longer, and multiply much faſter than the ſheep: and were we even now to forſake the numerous flocks fed in the paſtures, and on the hills, they would ſoon be deſtroyed before our eyes, and the whole ſpecies extirpated by the number and voracious appetites of carnivorous animals.

“ Thus it appears that this ſpecies is indebted to our aſſiſtance and care for its continuance; for it could not ſubſiſt of itſelf. The ſheep is abſolutely without defence or reſource; the weapons of the ram are but weak; his courage nothing more than a petulance, troubleſome to others, uſeleſs to himſelf, and deſtroyed by caſtration. The weathers are ſtill more timorous than the ewes. It is from fear that they ſo often aſſemble in flocks; the leaſt uncommon noiſe cauſes them to leap over each other, or gather cloſe together; while this fear is attended with the groſſeſt ſtupidity: they have not ſenſe to avoid danger; they even appear not to feel their diſagreeable ſituation; they ſtray wherever they happen to be, whether it rain or ſnow; and ſuch is their obſtinacy, that in order to make them change their place, or follow any road, they muſt have a leader, trained to walk before them, whoſe motions they readily follow ſtep by ſtep. This leader himſelf would ſtir no more than the reſt of the flock, were he not driven by the ſhepherd, or hunted by the guardian dog, which is taught to protect and defend them; to guide, ſeparate, gather them together, and direct them in their motions.

“ Sheep, therefore, of all quadruped animals are the moſt ſtupid, and have the leaſt inſtinct and contrivance. The goats, which in ſo many reſpects reſemble them, have much more ſagacity: they ſtand in need of no guide, they ſhun dangers; new objects ſoon become familiar to them; whereas the ſtupid ſheep neither ſhuns nor approaches: though under the greateſt want of aſſiſtance, they do not approach man ſo freely as the goat; and what in animals ſeems the loweſt degree either of fear or inſenſibility, they ſee their lambs taken away without anger, without reſiſtance, and without expreſſing their grief by any cry different from their common bleating.

“ But this animal, in itſelf ſo deſpicable, ſo deſtitute of ſentiment and internal qualities, is to man the moſt valuable; its utility the moſt immediate and extenſive: it alone ſatisfies wants of the greateſt neceſſity; it furniſhes both food and apparel, beſides the advantages ariſing from the ſuet, milk, ſkin, intrails, bones, and dung of this creature, to which nature ſeems to have given nothing as its property; all is to be delivered up to man.

“ Love, the moſt general and active ſentiment, is alone able to impart ſome vivacity to the ram: he becomes wanton, fights, ruſhes againſt the other rams, and ſometimes even attacks his ſhepherd; but the ewe, when in heat, ſeems not at all the more affected, or the more animated; her inſtinct reaches no farther than not to refuſe the ram's approaches; to chuſe her food, and know her lamb. The inſtinct of this animal is the ſurer, as it is more mechanical; and, if I may be allowed the expreſſion, the more innate. A young lamb will, amidſt a numerous flock, find its dam and ſeize the dug, without ever being miſtaken. Sheep are alſo ſaid to be impreſſed by modulated ſounds, to feed more aſſiduouſly, to be in better health, and to fatten ſooner by the ſound of a pipe; and that they are evidently ſenſible of the charms of muſic. But it is alſo ſaid, and I believe with more truth, that muſic rather ſerves to amuſe the ſhepherd's tedious hours, and that to this ſupine and ſolitary life the origin of that art is owing.

“ Theſe animals, whoſe inſtinct is ſo ſimple, are alſo of a very weak conſtitution; they cannot bear walking any length of time; travelling exhauſts them; running ſoon puts them out of breath; the ſcorching rays of the ſun hurt them equally with the rain and ſnow. Their diſeaſes are many, and moſt of them contagious. The ſuperabundance of their fat often proves fatal to them, and always hinders their fruitfulneſs; they yean with difficulty; they frequently caſt their lambs, and require more care than any other domeſtic animal.

“ When a ewe is near yeaning, ſhe muſt be ſeparated from the flock, and watched, in order to be aſſiſted; the lamb often preſents itſelf a-thwart, or with its feet firſt; and in this caſe, without aſſiſtance, the ewe's life would be in danger. After yeaning, the lamb is raiſed on his feet; at the ſame time all the milk in the ewe's udder is milked out, it being vitiated, and very noxious to the lamb, which is kept from ſucking till the udder is filled with freſh milk: the lamb is kept warm, and for three or four days ſhut up with the ewe, that it may learn to know her, during which time the ewe is fed with good hay, barley-meal, or bran mixed with a little ſalt; and water, whoſe chill is taken off, and mixed with a little quantity of flour, bean-meal, or ground millet, given her to drink. At the end of four or five days ſhe may be gradually fed like the reſt, and ſent with the flock, taking care that ſhe be not driven too far, leſt her milk be heated. Some time after, when the ſucking lamb ſhall have gathered ſtrength, and begins to play, no farther care is requiſite; it may be left to follow its dam to the paſtures.

“ All the lambs of a weakly appearance are generally diſpoſed of to the butcher; thoſe intended to be kept being the largeſt, moſt vigorous, and having the thickeſt fleece. Lambs of the firſt yeaning are never ſo good as the following. To bring up lambs yeaned in the months of October, November, December, January, and February, they muſt be kept in the houſe during the winter, going out only in the morning and evening to ſuck; but in the beginning of April they may be turned into the open fields. Some time before this a little graſs is daily given them, in order to habituate them by degrees to this new food. They may be weaned at the end of one month; but it is better to delay it for ſix weeks or two months. White lambs, without ſpots, are always preferred to the black or mottled; white wool being more valuable than the black or mixed.

“ The proper age for caſtration is at the end of five or ſix months, or even a little later in ſpring or autumn, when the weather is mild. This operation is performed by two different methods; the moſt common is by inciſion, when the teſticles, which are eaſily ſeparated, are drawn out through the wound: the other is performed without inciſion, by tying a ſtring very tight round the ſcrotum above the teſticles: for this compreſſion deſtroys the veſſels which ſupplies them with blood and juices. The lamb, on caſtration, becomes ſickiſh and dull, ſo that it would not be improper to give him, for two or three days, a little bran mixed with a ſmall quantity of ſalt, to prevent a loſs of appetite, which this operation often cauſes.

“ At the end of a year, rams, ſheep, and weathers loſe the two fore-teeth of the lower jaw; and they are known to want the inciſive teeth in the upper jaw. At eighteen months the two teeth joining to the former, alſo fall out; and at three years, being all re-placed, they are even and pretty white. But as the creature advances in age they become looſe, blunt, and afterwards black. The age of the ram is alſo known by his horns, which ſhew themſelves in the very firſt year, and often at the birth, and continue to grow a ring annually to the very period of life. Though ſheep are often without horns, yet they have bony prominences in the ſame places of the head, where the horns of rams appear. Some ſheep however have two, and others four horns, five or ſix inches in length, but leſs twiſted than thoſe of the ram; when there are four, the two outward are ſhorter than the others.

“ The ram is capable of generating at eighteen months, and a ewe may yean at the end of a year; but it is better to delay it till the ewe be two, and the ram three years old. The produce of theſe animals, if too early, and even the firſt, is always weak, and of a bad conſtitution. One ram will be ſufficient for twenty-five or thirty ewes; but he ſhould be remarkable for ſtrength and comelineſs. He muſt alſo have horns; for ſome have none, and ſuch, in theſe climates, are very indifferent. In a good and comely ram, the head muſt be large and thick, the forehead broad, the eyes large and black, the noſe ſhort, the neck thick, the body long and raiſed, the back and rump broad, the teſticles large, and the tail long. The beſt are white, with a large quantity of wool on the belly, tail, head and ears, down to the eyes. The beſt ſheep for propagation are thoſe which have moſt wool, and that cloſe, long, ſilky, and white; eſpecially if at the ſame time they have a large body, a thick neck, and a light method of walking. And it has been already obſerved, that thoſe which were rather lean than fat, bring forth more eaſily than others.

“ The ſeaſon of the ewe's heat is from the beginning of November to the end of April; but they may be brought to conceive in any ſeaſon, by giving them provocative foods, as ſalt water, and bread of hemp-ſeed. Each ewe is covered three or four times, and then ſeparated from the ram, which always prefers the older ſheep, and neglects the younger. In the ſeaſon of copulation they ſhould not be expoſed to the rain or bad weather, wet hindering their retention; and a clap of thunder often produces abortion. A day or two after being covered, they are put again to their common diet, without having any more ſalt water; the continual uſe of which, as well as that of hemp-ſeed bread, and other hot aliments, would infallibly cauſe abortion. They go five months, and yean at the beginning of the ſixth; they ſeldom bring two lambs. In hot climates they yean twice a year: but in France, and the colder countries, only once. Some have the ram given to them about the end of July or the beginning of Auguſt, in order to have lambs in the month of January; but the ram is given to a much greater number in the months of September, October, and November; and lambs are in great plenty in February, March, and April. They are alſo to be had in the months of May, June, July, Auguſt, and September, there being no ſcarcity of them but in October, November and December. The ewe yields, during ſeven or eight months, plenty of milk, which is a good food for children and peaſants. It alſo makes good cheeſe, eſpecially if mixed with that of cows. The time for milking ewes is immediately on their going out to paſture, or on their return; twice a day in ſummer, and once in winter.

“ Ewes fatten very faſt during their pregnancy, as they then eat more than at other times. As they often hurt themſelves, and frequently miſcarry, ſo they ſometimes become barren; and it is not very extraordinary for them to bring forth monſtrous productions. However, when properly tended, they are capable of yeaning during their whole life; that is, to the age of ten or twelve years; but generally, when they are turned of ſeven or eight, they break, and become ſickly. A ram lives to twelve or fourteen years; but after eight is no longer fit for propagation: he ſhould then be knit and fattened with the old ſheep. The fleſh of the ram, though knit and fattened, is but of a bad taſte; that of the old ewe flabby and inſipid; whereas that of the weather is the moſt ſucculent, and the beſt of all common meats.

“ To form a flock, from which a reaſonable profit may be expected, ſheep and weathers muſt be purchaſed, of about eighteen months, or two years old; and one ſhepherd, if careful, and aſſiſted by a good dog, may take care of a hundred. In leading them out to paſture he ſhould go before them, and accuſtom them to know his voice, to follow him without ſtopping, or ſtraying among the corn, woods, aud fallow lands, where they would do damage. The places that beſt agree with them are downs, and ſmall eminencies; low, wet, and marſhy grounds ſhould be avoided.

“ During the winter, they are fed at home with bran, turneps, hay, ſtraw, lucern, ſaintfoin, the leaves of elm, aſh, &c. They are, however, led out every day, unleſs the weather be very bad; tho' this is rather to walk than feed them; and in this inclement ſeaſon, it is always near ten in the morning before they are led out; and after ſtaying four or five hours, they are watered, and brought back about three in the afternoon; whereas in ſpring and autumn, they are led to the field as ſoon as the ſun has diſperſed the froſt or humidity on the graſs, and continue there till ſun-ſet. It is alſo ſufficient for them in theſe ſeaſons, to drink once a day, juſt before they are brought back to the ſheep-houſe, where they muſt always find fodder, though in leſs quantity than in winter. It is only in ſummer that they are to live entirely on the paſtures, whither they are led twice a day, and alſo made to drink twice. They are led out very early in the morning to feed as ſoon as the dew is down, where they continue four or five hours; after which, and being had to the water, they are brought back to the fold, ſheep-houſe, or ſome other ſhady place: about three or four o'clock, when the extreme heat begins to abate, they are a ſecond time led to the paſture, where they continue till the evening; and were it not for the fear of wolves, they ſhould paſs the night in the open air, as they do in England, which would render them more vigorous, clean, and healthy. As too great a heat is remarkably troubleſome, and the violence of the ſun-beams diſorders their heads, and throws them into vertigo's, it is proper to make choice of places ſhaded from the ſun, and in the morning to lead them on eminences expoſed to the eaſt, and in the afternoon on thoſe that are expoſed to the weſt, that when they are feeding, their heads may be in the ſhadow of their body. Laſtly, in order to ſave their wool, they muſt not be led through any buſhy places.

“ In dry and high grounds, eſpecially if the herbage abound in wild thyme, and other odoriferous plants, the mutton is of a much finer quality than that which is fed in moiſt vallies and low plains; unleſs theſe plains be ſandy and near the ſea, the herbage then being ſprinkled with ſalt; and the ſheep are no-where ſo good as on theſe ſalt plains. The ewes alſo fed in them, yield more milk, and of a better taſte. Theſe animals are remarkably fond of ſalt, and nothing is more healthful when given in moderation; and in ſome places it is cuſtomary to put into the ſheep-houſe a bag of ſalt, or a ſaline ſtone, which they all greedily lick one after another.

“ Every year the flock ſhould be examined, in order to find out ſuch as begin to grow old, and are intended for fattening; for as they require a different management from the others, ſo they ſhould alſo be formed into a ſeparate flock. They ſhould be led abroad in ſummer before ſun-riſing, in order to feed on the graſs while moiſtened with the dew. Nothing forwards the fattening of weathers more than a great quantity of moiſture; and nothing more obſtructs it than the heat of the ſun; ſo that about eight or nine in the morning, before the great heat begins, they ſhould be brought back, and ſalt given them to excite thirſt. About four in the afternoon they ſhould be led a ſecond time into cool and moiſt places; and after two or three months of theſe little cares, they will have all the appearance of being full of fleſh: indeed they are generally fattened as much as they can be; but this fat proceeding only from the great quantity of water they have drank, may be ſaid to be no more than an œdema, or bloated humour, which would in a ſhort time turn to the rot, and can be prevented only by killing them while in this ſtate of fatneſs. Even their fleſh, far from being firm and juicy, is extremely inſipid and flabby: in order, therefore, to make good fleſh, beſides letting them feed on the dew, and giving them a great deal of water, they ſhould have, at the ſame time, more ſucculent food than graſs. They may be fattened in every ſeaſon, by only keeping them a-part in a ſheep-houſe, and feeding them with the meal of barley, oats, wheat, beans, &c. mixed with ſalt, for making them drink more copiouſly. But in whatever manner, and in whatever ſeaſon they are fattened, they muſt be immediately diſpoſed of; for they cannot be fattened twice, and they will die by diſeaſes of the liver.

“ Worms are often found in the livers of animals; and a deſcription of thoſe found in the liver of ſheep and oxen, may be ſeen in the journal de Scavans, for the year 1668, and Ephemerides of Germany, tom. v. 1675, 1676. Theſe worms were thought to be peculiar to ruminant animals; but M. Daubenton has found the very ſame in the liver of the aſs; and it is probable the like may be found in the liver of other animals: but it is alſo affirmed, that moths have been found in the liver of ſheep.” M. Rouille, ſecretary of ſtate for foreign affairs, was ſo kind as to communicate to me a letter to him, from a doctor of phyſic at Montiers, in the duchy of Taranteiſie in Savoy, from whence I have made the following extract. “ It has for a long time been obſerved, that the ſheep of our Alps, which are the beſt in all Europe, ſometimes fall away ſurprizingly. Their eyes become white, ſunk, and blared; their blood ſerous, with ſcarce any redneſs to be ſeen in it; their tongue dry and ſhrivelled; their noſe ſtuffed with a yellow, viſcid and putrid mucus; an extreme debility, though they eat a great deal; and, in fine, the whole animal ſyſtem viſibly decaying. After ſeveral cloſe enquiries, theſe animals were found to have in their liver white papilios, with proper wings; their heads of a ſemi-oval form, bilous, and of the bigneſs of thoſe belonging to the ſilk-worm. I have been convinced of the reality of this fact, by ſqueezing above ſeventy out of the two lobes; and, at the ſame time, all the convex part of the liver became lacerated. They have been found in the veins only, without a ſingle inſtance of their being in the arteries. In the cyſtic duct ſmall ones have been found, together with ſmall maggots. The vena porta, and the capſula of Douglas, which are viſible there as in man, yielded to the ſofteſt touch. The lungs and other viſcera were ſound." It were to be wiſhed that the doctor had given us a more circumſtantial deſcription of theſe papilios; that theſe animals which he ſaw may not be ſuſpected to be no other than the common worms found in the liver of a ſheep, which are very flat and broad, and of ſo ſingular a figure, that they would rather be taken for leaves than worms.

" Every year the whole flock, weathers, ewes and lambs, are ſheared. In hot countries, where the creature may without danger be laid bare, the wool is not ſheared, but plucked off; and often they yield two fleeces in a year. In France, and the colder climates, it is cut only once a year with large ſhears, ſtill leaving the ſheep part of their fleece, as ſome defence againſt the ſeverity of the climate. The ſeaſon for this operation is in the month of May, after thoroughly waſhing them, that the wool may be as clean as poſſible. In the month of April it is too cold, and if delayed till June or July, the wool would not grow ſufficiently during the remainder of the ſummer, to ſecure them from the winter's cold. The weathers have generally more wool than the ewes, and it is alſo better. That of the neck, and the top of the back is the prime; that of the thighs, tail, belly, throat, &c. is not ſo good; and the worſt is that taken from dead beaſts, or ſuch as are ſick. White wool is alſo preferred to the grey, brown, and black, as it may be dyed of any colour. Strait wool is better than curled; and it is even ſaid that the weathers whoſe wool is too much curled, are not in ſo good a ſtate of health as the others. A conſiderable advantage may alſo be drawn from ſheep by folding them; that is, by leaving them for a proper time on lands intended for improvement. In order to this, the ground muſt be incloſed, and the flock ſhut up in it every night during the ſummer. By this means the dung, urine, and heat of the body of theſe creatures, will in a ſhort time bring the ground into heart, whether exhauſted, or naturally cold and barren. A hundred ſheep will in one ſummer meliorate eight acres of ground, which will continue its fertility ſix years.

" We are told by the ancients, that all ruminant animals have ſuet, though this is ſtrictly true only of the goat and ſheep; and that of the ſheep is in greater quantity, whiter, drier, finer, and of a better quality than any other. Fat differs from ſuet, as continuing always ſoft; whereas ſuet hardens as it grows cold. It is chiefly about the kidneys that the ſuet is found; and the left has always more of it than the right. There is alſo a great deal of it in the caul, and about the inteſtines; but this ſuet is far leſs firm and good than that of the kidneys, the tail, and other parts of the body. Weathers have no other fat than ſuet; and ſo predominant is this fat in their conſtitution, that all the extremities of their fleſh are covered with it. Their very blood is not without it; and the ſeminal lymph is ſo ſaturated with it, as to appear of a different conſiſtence from that of other animals. The lymph of the human ſpecies, that of the dog, the horſe, the aſs, and probably of all animals without ſuet, liquifies by cold, rarifies in the air, and becomes the more fluid from the time it was ejected from the animal's body. On the contrary, the ſeminal liquor of the ram, as well as that of the goat, and probably other animals that have ſuet, inſtead of rarifying in the air, hardens like ſuet, and, with its heat, loſes all its liquidity. This difference I have perceived by microſcopical obſervations on theſe ſeminal lymphs. That of the ram coagulates in a few ſeconds after its leaving the body, and to perceive the living organical moleculæ, of which it contains a prodigious quantity, the object plate muſt be heated, in order to preſerve it in a ſtate of fluidity.

" The taſte of the fleſh, the fineneſs of the wool, the quantity of the ſuet, and even the ſize of theſe animals, differs very greatly in different countries. In France they chiefly abound in the duchy of Berry; thoſe in the neighbourhood of Beauvais, and ſome other parts of Normandy, are the largeſt, and the fulleſt of ſuet. In Burgundy they are very good; but the beſt are thoſe that feed on the ſandy coaſts of our maritime provinces. The wools of Italy, Spain, and England, are finer than thoſe of France. In Poitou, Provence, the neighbourhood of Bayonne, and ſome other parts of France, there are ſheep which ſeem to be of a foreign breed; they are ſtronger, larger, and have a great deal more wool than thoſe of the common breed. Theſe ſheep are alſo more prolific than the other, it being nothing extraordinary with them to have two lambs at a time, and yean twice a year. The rams of this breed, engendering with the common ewes, produce an intermediate breed, partaking of the two from whom it proceeds. In Italy and Spain, the number and variety in the breeds of ſheep is ſtill greater; but all muſt be conſidered as forming one and the ſame ſpecies with our ſheep; tho' this ſo numerous and diverſified ſpecies hardly extends beyound Europe. Thoſe long and broad tailed creatures ſo common in Africa and Aſia, and by travellers called Barbary ſheep, ſeem to be of a ſpecies different from ours, as well as the American, Vigonia, and Llama.

" White wool being much more eſteemed than black, ſpotted or black lambs are almoſt every where ſold to the butcher; though in ſome places the far greater part of the ſheep are black; and for black lambs to be produced by a white ram and ewe, is a phænomenon common in every country. In France there are only white, brown, black, and ſpotted ſheep; Spain has dun ſheep; in Scotland there are yellow; but all theſe differences and varieties in the colour are no more fortuitous than the differences and varieties of the breeds, which are, however, wholly owing to the effects of the food, and the difference of the climate." *Buffon's Hiſtoire Naturelle, tom.* v.

The reader is indebted to the ingenious Mr. Irwin for the following obſervations relating to the management of ſheep in Ireland.

" Of all the quadrupeds, ſays he, the ſheep perhaps is the animal beſt adapted by Providence to pay the rent. It requires great attention to it; but, at the ſame time, little bodily trouble. The chief care ſhould conſiſt in their cantonment for food, in which our Iriſh farmers are extremely negligent (I mean thoſe of them that have abilities to be otherwiſe); for they ſtation them promiſcuouſly over the land, encloſing only the fattening grounds, which is done but badly, and other cattle ſuffered to mix with them; whereas ſheep, in their rearing and fattening ſtate, ſhould be by no means ſuffered to perambulate a variety of paſture. For this reaſon,

" Moſt cloſes, or encloſed fields, have ſome herbage, beſides the common graſs, predominant in them; and where ſheep are ſuffered to run over too many of theſe at once, the different mixtures in ſuch extenſive paſtures have, I am convinced, from repeated experimental obſervations, very unfavourable effects on this tender and delicate animal, both as to rearing and fattening, or as to bone and growth.

" It actually gives, or inclines them to a ſcower (and other diſorders well known to the ſhepherds) oftentimes not leſs prejudicial than that which they never fail getting in low ſwampy grounds, which always proves mortal to ſheep that are ſuffered to remain ever ſo ſhort a time in ſuch places; for though the noxious inſane effects of ſuch paſture may not immediately appear, or operate on them, it never fails bringing on the rot in the end, which manifeſts itſelf by the ſcower, and other unhealthful ſymptoms.

" A gentleman in my neighbourhood, who occupies ſeveral thouſand acres of deep, rich ſoil, ſuffered a conſiderable loſs of ſheep, particularly ewes, in the ſpring of 1759, (I think it was) and that ſeaſon was far from being inclement, eſpecially wet, which is the moſt unfavourable weather to that kind of ſtock.

" I made cloſe enquiry into the cauſes of this uncommon mortality, for ſuch it appeared to me at that time.

“ The common reaſons for this deſtructive peſtilence were indeed given; but from ſome obſervations I made from appearances, I did not judge them ſatisfactory.

“ It ſeemed to me that a too extenſive run of over fertile, luxuriant ſoil, little or no ſhelter, negligence in folding, and other care not difficult to be taken, but abſolutely neceſſary to the well being of this delicate animal, had brought on a deadly and general rot.

“ Many were with difficulty ſaved, only to languiſh away, in all probability, the ſucceeding winter; for though a ſheep, the firſt time it is tainted with the rot, whether in winter or ſummer, may for that ſeaſon, with great care and difficulty, be preſerved, it nevertheleſs ſeldom happens that any amelioration of paſture will make it a long liver; for when it is once touched with this diſorder, a cure may (as in many human chronical diſeaſes) be patched up; but it will never get thoroughly clear of it. Hence the generality of our farmers, though they may think otherwiſe from their practice, appear to me to be in great error in this reſpect.

“ But their ſtock is commonly too large, and they are continually buying in, or ſelling out; ſo that by not keeping them for any length of time they have not proper opportunities to explore rightly the effects of the cauſes we are now inveſtigating.

“ The largeneſs of their ſtock, I ſay, prevents them from looking minutely into theſe neceſſary matters, which is not in general the caſe in England. Beſides, from the great numbers they oftentimes poſſeſs, they are ſo accuſtomed to loſſes in this way, and ſo little attendant to phyſical cauſes, that they are things of courſe with them; neglects I call them, that a little attention would eaſily remedy, were the flocks never ſo large: and in this reſpect indeed it muſt be admitted, cuſtom erroneouſly commits too many to the care of one ſhepherd in a country not yet thoroughly improved.

“ Through the lazineſs or inattention of the herd (for careleſs they almoſt all are) many caſualties they pretend ariſe from the unimproved ſtate of the farm, and eaſily impoſe them as ſuch on their employers, whereas they ſolely proceed from their own neglect.

“ To remove ſheep often is an excellent temporary preventative againſt the rot, and moſt other diſorders incident to them; but to fold them dry a-nights is ſtill more infallible; that is, to keep them from rain; but the largeneſs of the flocks in Ireland, moſt people imagine, is an abſolute bar againſt this ſalutary expedient.

“ This is an ill-founded ſurmize. If they would divide their ſtock into ſmaller proportions, that is, to limit their ſheep-walks to one or two hundred acres at moſt, under the care of one man; to allow to theſe proportions (the land being, we will ſuppoſe, of no more than a middling good ſort) three ſheep *per* acre in ſummer, and one and a half in winter, in the rearing or breeding way; and to erect on every ſuch farm proportionable ſhelter-houſes to a ſouth, or ſouth-by-eaſt aſpect, (but never to the north or weſt, the winds blowing, eſpecially from the latter point, too long and cold) there would not be one third of the annual dearth of ſheep there is; and in this computation I fancy the proportion is exceeded.

“ Thoſe who hold very extenſive tracts, may ſay this ſimple expedient is not practicable; but it certainly is, both to the conſiderable and inconſiderable farmer, even in parts where timber is not eaſily had, which ſeems to be the chief difficulty. Suppoſe now (to give a very feaſible hint) a houſe made of turf (if no ſtone or brick could be conveniently had) one hundred feet long, about fourteen wide, and the wall about five feet high, with four large doors or openings to the aſpects before mentioned; ſlight and cheap timber girthing, eaſily carried from afar, would do for this buſineſs as well as the beſt; the thatch, whether ſtraw out of the barn, or ſtubble, which laſt is far the beſt, we know, is of trifling value in thoſe parts, and ought to be well ſowed on with ropes, which makes it effectually reſiſt ſtormy weather; and the erecting the wall of turf, or, which is much better, with clay-mortar, well mixed with ſtraw-rubbiſh, we alſo know; cannot coſt much, where labour is but from a groat to ſix-pence a day.

“ In ſhort, I could erect one of theſe houſes in this manner on every hundred acres, which is the quantity of land that ought to be allowed to each, for fifteen pounds, Iriſh money, or, at moſt, twenty. The land, ſpoiled by digging off the ſods, would be ſoon reſtored by the treading of the ſheep. The hay-yard, of courſe, to be adjoining this houſe.

“ All the objection I think can be made is, the not being able to move theſe houſes, thereby to ameliorate different ſpots of the farm, as they do in Switzerland their wooden houſes that run on wheels.

“ Conveniencies in countries are different: in Switzerland there is plenty of wood; in many parts of Ireland the length and difficulty of carriage renders a ſufficiency of it for this purpoſe impoſſible to be had: beſides, moving houſes, for aught I know, may do well in Switzerland, or in England; but ſuch as I mention would anſwer extremely well in Ireland.

“ In this way I am ſenſible the winter-mucking would be almoſt always on one ſpot; but it would make much dung, which might be removed to great advantage; and if it had not, is it not evident that it would be much more beneficial to loſe the night-mucking, during the three or four moſt inclement months of the year, than treble the worth of it of one's ſtock? Moreover, I am not clear, but the dung being preſerved from the froſt would go farther than if ſcattered by the ſheep about the land in hard weather: and, though it is much the cuſtom to turn out dung in that ſeaſon, I am certain, (and many phyſical cauſes will demonſtrate it) the ſooner afterwards it is mixed with the land, the more of its virtue it will retain.

“ But before I quit the article of ſheep: as I ſaid before, countries and circumſtances differ; for though I do not approve of extenſive unencloſed paſtures in Ireland, it ſeems in Spain they do well enough: the flocks there are ſmall, as in France; but they have a right of commonage in that country, perhaps not in any other civilized one that we know of.

“ There it is a conſtant practice with the ſhepherds, ſoon after ſhearing time, to ſet out with their flocks, generally conſiſting of about an hundred each, and to paſs from one province to another, feeding them promiſcuouſly both on ley and corn lands, the meadows, and ſome other particular encloſed lands, as parks belonging to the nobility, and clergy eſpecially, only excepted.

“ Theſe itinerant ſhepherds often travel three or four hundred miles from their habitation with their ſmall flock: they ſometimes take part of their family, a good deal of proviſions, a tent, and ſome well-trained dogs, and are never ſtopped if they keep their ſheep on the open lands, and often do not return home till after lambing-time.

“ They generally have one third, or half the profit of the flock for their hire.” *Muſeum Ruſticum, vol.* I. *pag.* 449.

“ I think, ſays another writer in the Muſeum Ruſticum, that early ſhearing ſhould be preferred on many accounts: ſome defer this work till at or after Midſummer; but this ſhould be avoided as very bad conſequences often enſue. By this late ſhearing, the maggot has an opportunity of breeding in their ſkins; and this frets them in ſuch a manner, that they often pine away, and loſe all their fleſh.

“ This is eaſily prevented by early ſhearing; and, therefore if the weather be any thing tolerable, I generally do this work about the middle of May, and ſometimes the beginning of that month: by this method the new growth of the wool has time to get a-head, ſo as to ſecure the ſheep from the attack of the fly. It is true, that at this time of the year the weather is often cold, and chilling rains fall, which might endanger my new-ſhorn ſheep, was no farther care taken of them: but this danger I always guard againſt, by waſhing my ſheep, after ſhearing, with ſalt-water taken from the Medway: this is of great ſervice in killing any vermin that may harbour cloſe to their ſkins; and, beſides this advantage, the penetrating quality of the ſalt ſo warms this animal's maſs of blood, that it is a great means of preſerving it from many diſorders to which it is fatally ſubject; ſuch as the gripes, ſcab, red-water, rot, &c. &c. &c. This, I ſay, has been my practice ever ſince I have lived in Kent; but before that time, when I was not within diſtance of the ſea or Medway, to get ſalt-water from thence, I always made a brine of a proper ſtrength with common ſalt and ſoft water, and applied it to the ſame uſe with equal benefit, though it coſt me, to be ſure, ſomewhat more. When my ſheep have ſores, either by the bite of flies, or by ſcratching, &c. I find the beſt remedy to be that which is commonly in uſe, viz. a little tar applied to the wound: many, if you aſk their advice, will, by way of ſhewing their judgment, preſcribe to you complicated mixtures, which have no other merit but being more expenſive: but be aſſured, the more ſimple the remedy, the ſpeedier the cure.

"Many farmers ſuffer great loſſes by buying ſheep that are rotten; for which reaſon, every prudent man ſhould, when he buys a lot of ſheep, agree with the ſeller, that he ſhall warrant them ſound for a month at leaſt: this would prevent many heavy loſſes, and be a means of guarding honeſt men from being impoſed on. If ſheep are the leaſt inclinable to the rot, the beſt remedy is to drive them directly into a dry upland paſture.

"Though I ſhear my ſheep ſooner than moſt of my neighbours, I ſhould alſo have obſerved, that I always ſhear my fat weathers firſt, as they are beſt able to bear the cold; and I reſerve my poor ſheep till laſt, as the cold and chilling rains pinch them more than the others." *Muſeum Ruſticum, vol.* I. *page* 210.

I never uſed, ſays Mr. Liſle, "to ſhear till the Monday before Midſummer-day; but I now (anno 1714) find I was in an error in ſo doing; and that, as my keeping is very good, by which means the wool grows the larger, and heats the ſheep the more, and their fleſhineſs being ſuch as to bear the cold the earlier in parting with their fleeces, I ought to begin to ſhear the firſt week in June; and the ſheep would not only thrive much the better, when the load of their wool was gone, but their new wool would alſo have more time to grow againſt Wayhill fair, which would make the ſheep look more burly." *Liſle's Huſbandry, vol.* II. *pag.* 275.

We cannot but in general approve of the early ſhearing of ſheep, beginning with the fatteſt; but no certain day can, with reaſon, be fixed for doing this work; for our ſeaſons differ ſo much in various years, that next year, in the beginning of May, the weather may be ſo warm as to be very proper for the work; and in the following year, the middle of the ſame month may, on account of the cold, be too ſoon to begin. The beſt regulator for this work, as well as many others, would be the ſtate of vegetation, from repeated obſervation of ſome particular tree or plant, on a particular ſoil and expoſure; for to bring plants to a certain ſtate, requires always a certain degree of heat, and this is ſooner or later, according to the ſeaſon. Every work of huſbandry, in ſpring at leaſt, might be regulated in the ſame manner, and that to great advantage, for nature is an unerring guide.

The ſheep of the Ardennes, a foreſt in Lower Germany, are every where celebrated for the exquiſite delicacy of their fleſh; and, from a particular method of ſhearing them, their wool alſo is in no leſs eſteem.

"Amidſt all the accidents and diſtempers to which ſheep are liable, ſeldom any of them are known to die, certain innocent remedies ſoon reſtoring them. I have obſerved, every where elſe there is a fixed ſeaſon for ſhearing ſheep; and accordingly I have ſeen not a few, after being ſhorn, ſhivering with the ſharpneſs of the air; whereas, in the Ardennes, if the month of April or May be too hot or too cold, the ſhearing is delayed; and it is not often they ſet about it before the middle of ſummer. If, when bared, they are found to have received any wound in the ſhearing, it is rubbed over with a liquid pitch, and all the reſt of the body well waſhed with wine or oil.

"In ſome part of the Ardennes, the wine is mixed with oil-lees, or an ointment is made of wine, oil, and virgin-wax; and this precaution is ſaid not only to thicken their wool, but alſo preſerves them from ſores and the ſcab. They are never ſheared in the morning, it being a proverb in the country, that wool is to be ſheared, as fruits deſigned for keeping are to be gathered, when the dew and coolneſs have been exhaled by the heat of the ſun. If ſheep are ſheared when ſweating, the wool, by imbibing the ſweat, becomes the ſofter and better coloured.

"Sheep are ſubject to a kind of diſtemper, which, within two or three weeks, frequently ſweeps away a whole flock; but, to prevent ſuch a fatality, the Ardennes ſheep, at the beginning of the ſpring, have a certain potion given them.

"The flock is firſt carefully examined, and the ailing ſheep ſeparated from the ſound; an excellent method! yet is the Ardennes the only place where I ever ſaw it practiſed: after this, the juice of wild ſage and hore-hound, well cleanſed, is mixed in their drink, and this continued for a fortnight ſucceſſively. In autumn this medicament is repeated; and thoſe which are ſick likewiſe go through the ſame courſe during a fortnight, and generally with a very happy effect.

"Upon being ſeized with the ſcab, which the negligence of the ſhepherds does but too often occaſion, an ointment is prepared for them of the juice of any kind of ſage, mixed up to a conſiſtency with pulveriſed ceruſs and freſh butter: with this the ſheep are rubbed, and, three days after, waſhed with the urine of a ſhe-aſs, which cures them.

"If the exceſſive heats have ſo affected them, that they grow ſickly and faint, and even to a total loſs of appetite, the juice of wild beets is mixed in their drink, and endeavours are uſed that they ſhould eat them, which if they can be brought to, they are the ſooner upon their legs; but if any aſthmatic ſymptoms appear in the ſheep, the tip of their ears is cut off, after which the paunch of a ſheep being thoroughly boiled in wine, a ſpoonful of the liquor is given to every ſheep; and this never fails, in a very little time, to ſet them to rights.

"The cough is ſo common a diſorder among ſheep, that one ſeldom paſſes near a flock without hearing it in ſeveral: yet in the Ardennes it is otherwiſe; for upon their firſt coughing, a radical cure is wrought by ſyringing, during ſix or eight days, up the ſheep's noſtrils, blanched almonds pounded in wine.

"It ſometimes happens that ſheep feed in paſtures intermixed with noxious herbs, which not ſeldom occaſion their belly to ſwell; and this, without a ſpeedy remedy, proves fatal; but, upon the firſt appearance of it, they are bled in the lip, and a ſpoonful of man's urine adminiſtered to them, which makes a perfect cure.

"If along with the graſs they have eat any worms or leaches, olive-oil, mixed with warm vinegar, is poured down their throats: this not only cures them of the preſent evil, but preſerves them from ſeveral other accidents.

"An abſceſs, or impoſthume, in the ſheep, is cut, and ſalt, well pulverized and burnt with liquid pitch, ſtrewed over the inciſions.

"In order to make the ſheep good nurſes, ſo that they may be able plentifully to ſuckle two lambs, all they do is to bind dittany (in ſome places called pepper-wort) and trefoil to their bellies.

"Upon the lambs being ſick, a few ivy-leaves are given them to eat, which after a week ſo well reſtore them, that they ſuck very vigorouſly." *Muſeum Ruſticum, vol.* IV. *pag.* 420.

"There are, ſays Mr. Mills, in this kingdom, vaſt tracts of ground, known by the name of downs, on which are chiefly fed large flocks of ſheep. Experience has abundantly evinced, that though the graſs there is naturally ſhort, it is an excellent food for ſheep; and as the welfare of theſe creatures is of the utmoſt conſequence to one of the moſt eſſential branches of the commerce of England, very great caution ſhould be uſed in making any alteration in their diet, till it be well proved, by fair experiments, that a richer paſture does not injure their fleeces. I would therefore recommend, in the ſtrongeſt manner, to gentlemen who have eſtates bordering on ſuch downs, particularly on that extenſive tract called Saliſbury Plain, which reaches from the weſtward of Malborough to the ſea, to bring ſome of their ſheep into rich paſtures, of different graſſes, as well natural as artificial, and to keep them there for ſome generations, in order to aſcertain with certainty, what the effect will be.—The word generations, may, perhaps, here terrify at firſt, as implying a long ſpace of time for theſe experiments, thoſe who do not immediately conſider in how few years this ſucceſſion may take place.—A lamb reared from its birth on, for inſtance, burnet, will, in two years, bring a lamb, which, in two years more, brings young, and the ſixth year may ſee the third generation: ſo that by the end of ſeven or eight years the fact may be aſcertained.

“If ſheep will be equally benefited by richer paſture, then the farther improvement of theſe downs muſt become a matter of great concern, both to individuals and to the public; becauſe, granting that they may be improved with ſafety, the number of our ſheep may be greatly increaſed: but if ſuch improvement ſhall be found in the leaſt detrimental to their wool, inſtead of being encouraged, it ſhould be forbidden, even by law.” *Mills's Huſbandy, vol.* III. *pag.* 379.

SHEEP's-DUNG. *See the article* DUNG.

SHEEP's-*feſcue-graſs*. *See the article* GRASS.

SHEEP-LEASE, *Sheep-ſlate*, or *Sheep-walk*, paſture-land, appointed to the feeding of ſheep.

SHEER, pure, clean, unmixed.

SHELLS, a hard, and as it were ſtony-covering, with which certain animals are defended, and thence called ſhell-fiſh.

The vaſt beds of foſſile ſhells found at great depths in the earth, as well as thoſe found lying on the ſea-ſhore, make an excellent manure for cold clayey lands. *See the article* CLAY.

SHEPHERD's-*Needle*, the name of a plant, ſo called from the remarkable ſhape of the ſeeds, with their appendage, reſembling the crane's bill.

SHIPPEN, a cow-houſe.

SHOEING *of horſes*, the operation of faſtening a piece of iron on the bottom part of a horſe's hoof.

The affair of ſhoeing horſes, is ſo important in its conſequences, both for the preſervation of the foot, the ſafety of the legs, and the eaſe of their motion, that we cannot be too attentive to any innovations, that may be recommended to us in this reſpect; we ſhall therefore give Mr. La Foſſe's ſentiments on this ſubject, with ſuch animadverſions as have occurred to us.

In order to underſtand this new method of ſhoeing, it is neceſſary firſt to premiſe the following obſervations, and attend to the anatomical plates before referred to.

It is moſt certain, that all horſes, except ſuch as have their feet overgrown, or ſuch as may have a particular occaſion of being ſhod, to preſerve the ſole, may, at any rate, go without ſhoes; and there are many examples, without mentioning the cuſtoms of Arabia, or Tartary, of horſes who are at daily work, without the leaſt need of ever being ſhod: but as we employ all our care, and addreſs, to hollow the foot, by paring it even to the quick, and to form an exact fine frog, it becomes abſolutely neceſſary to ſet ſhoes on them.

The original deſign of ſhoeing horſes, was undoubtedly intended as a preſervative of the hoof, and a defence of the ſole; but no one ſure could think it neceſſary to pare away, what he wanted to preſerve by the uſe of the ſhoes; becauſe that would be to act contrary to his firſt principles, and deſtroy his own work.

This precaution could never be recommended, but in caſes where the horny ſole is uneven, inſomuch, that the ſhoe could not bear equally upon it, which would take off from its neceſſary firmneſs; in ſuch a caſe, it may be reaſonable, otherwiſe it would be very abſurd.

Let us now obſerve the going, as well as the external, and internal ſtructure of a horſe's foot.

The horſe then who draws, preſſes firſt on the toe, then ſucceſſively on the ſides, to eaſe the toe; then the horſe's heel yields upon the heel of the ſhoe, from which it immediately riſes again.

The ſaddle, or pack-horſe, places the toe but lightly, ſo that the point of ſupport, is fixed neither upon the heel, or toe, but between both; which it is eaſy to demonſtrate anatomically.

Thus the cannon-bone preſſes on the paſtern, this on the coronary, the coronary upon the coffin, or foot-bone, and upon the nut-bone.

By this deſcription of the bones, we may obſerve two eſſential things, which lay open the faults in the preſent method of ſhoeing, and point out the means of being able to remedy them for the future; one is, that the effort of the weight of a horſe, does not bear, either upon the toe, or heel, but on the middle, between both; the other ſhews, the greater the diſtance of the ſole from the ground, or from whatſoever point of ſupport, the more the puſhing the coronary-bone upon the nut-bone, will fatigue the nerve, or tendon upon which it reſts, by the inordinate diſtenſion it undergoes at every ſtep the horſe takes.

Thus we ſee, that by hollowing away the ſole in paring, the horſe is ſuſtained only upon the walls of the hoof, which having no aſſiſtance of ſupport from the horny ſole, is immediately worn, and battered by the weight of the horſe's body; and the ſooner he treads upon any hard ſubſtance, the ſooner he grows quite lame.

For by the connection, thickneſs, and flexibility, as well as contexture of the horny ſole, it ſeems to be wholly deſtined by nature, to ſerve, as a cuſhion to the fleſhy ſole, and tendon, which reſts upon it, in order to break the violent ſhocks of a pavement, ſtone, or any kind of ſtump, or external violence; but by paring it away in the cuſtomary manner, the horſe loſes his defence of nature, againſt ſtumps, nails, glaſs, &c. and thus the fleſhy ſole becomes eaſily bruiſed, or wounded.

It is obſervable, that a horſe ſeldom goes eaſy, or eſcapes being ſoon jaded, if the frog does not bear upon the ground, as it is the only point of ſupport to the tendon; ſo that if you keep it at any diſtance from the ground, by paring it away, an inordinate diſtenſion will happen to the tendon; which being repeated at every ſtep he goes, fatigues it, and cauſes an inflammation; whence alſo relaxations, defluxions, and tendinous ſwellings, eſpecially after long journeys, or hard riding, which are occaſioned more by the paring of the ſole, than the length of the journey; experience has ſhewn, that the frog neither ſuffers, or has ſhewn the leaſt ſign of fatigue, or ſenſibility, by being thus expoſed; and indeed from the ſtructure of it, it is ſcarce poſſible; for being of a ſoft ſpongy flexible ſubſtance, by its natural elaſticity, it yields to the weight of the body, the inſtant the horſe preſſes his feet to the ground, and immediately recovers it again; however, there is one caſe, whereby the frog may occaſion lameneſs, which is when it grows hard or dry; but by taking off the little end of the frog, this diſorder is ſoon remedied.

As the bad conſequences of paring away the ſole and frog, have been pointed out, and, I think, evidently proved, let us obſerve now, the ill effects of modern ſhoeing; for it is upon the form of the ſhoes, and manner of ſetting them on, that not only the preſervation of the foot, but alſo the ſafety of their legs, and the eaſe of their motion depends.

In effect, the more eaſy our ſhoes ſet upon us, the more active we are; ſo a large, long, thick ſhoe ought to have the ſame effect upon horſes, that wooden ſhoes have upon us; that is, make them heavy, unweildy, and hobling.

A long ſhoe is not only perfectly uſeleſs, but it is even prejudicial; for the horſe's heels coming to ſink upon thoſe of the ſhoes, the longer the lever, the greater will be the drag upon the clinches of the nails of the toe; and thus horſes will be more apt to ſtrike them off on many occaſions; eſpecially when they are apt to over-reach.

The longer the ſhoe is, and the more it covers the ſole, the more liable the horſe will be to fall, trip, and hobble in his walk; particularly if he goes on a pavement; becauſe the ſurface being formed of round parts, and the ſhoe having a large uniform hard face, he can ſcarce have above two or three points of ſupport.

It is thought by ſome, that ſtrong ſhoe-heels are an eaſe to the weak heels, and fetlocks of horſes; as if the body of the ſhoe was flexible enough to yield to the horſe's heel; and under this notion, they raiſe the ſhoe-heel, and leave a vacant ſpace between that and the horſe's heel; but the direct contrary happens, for it is the hoof, that by its flexibility yields to the ſhoe-heel, which is quite inflexible: the thicker the ſhoe-heel is, the more ſubject that of the horſe is to meet it, and inſtead of being eaſed, the horſe's heel becomes more compreſſed, as if in a conſtant vice, becauſe it has always the ſame point of ſupport.

By this means, they deprive them of the liberty of going with eaſe upon a pavement; becauſe the ſhoe does not bear upon a level, and produces an effect, like that of a pivot, upon the middle of the ſhoe-heels, and the vault, or hollow.

To obviate theſe inconveniencies, M. La Foſſe propoſes the following method of ſhoeing; that neither the ſole, or frog ſhould be pared at all; for neither will ever become too large by its growth; but in proportion as it grows, it will dry, ſcale, and fall off in flakes; that the edge of the hoof, if thought too long, ſhould be taken down as uſual; and then a ſhoe, in form of a half moon, ſet on, reaching the middle of the hoof; the heels may be thinned, and the ſhoes made a little longer for ſuch horſes as have weak hoofs.

Eight ſmall nails, made in the old way, that is, having very ſmall heads, are incruſted in the holes, which are made, as the head is, in an oblong form; the figures both of the ſhoe and nail, are to be ſeen in the plate. This is the whole myſtery.

By this method, the ſole is preſerved, and conſequently the foot defended againſt hard, or ſharp bodies, which the horſe may chance to tread on; thus inflammations, and dangerous compreſſions are avoided, and the many inconveniencies already mentioned, from the lodgment of ſand, gravel, or ſtones.

Another advantage ariſing from this method of ſhoeing, and preſerving the ſole, that natural defence againſt external injuries, is, that in not paring away the ſole, nor ſetting on any more ſhoe than is neceſſary to preſerve the horny ſole; the horſe will not be ſubject to ſlip, either on the winter's icey pavement, or the dry ſmooth one of the ſummer.

For by making a horſe walk upon the frog, and partly upon the heel, the former being ſtrongly rubbed, and puſhed againſt the ground, or pavement, impreſſes itſelf, as it were, by the weight of the horſe's body, into the inequalities, and interſtices it happens to meet in its way; by this means, the foot reſting on a great many more parts, which mutually eaſe it, by multiplying the points of ſupport, gives the animal a ſtronger adherence, and more ſecurity upon the place he goes.

By paring away the ſole, the air when it is in this thin ſtate, penetrates, and dries it to ſuch a degree, that by its contraction, it compreſſes the fleſhy ſole, ſo as to lame the horſe.

By this means, alſo ſand, and gravel get in, and are ground between the ſole, and ſhoe; and again between the horſe's heel, and thoſe of the ſhoe; which not readily coming out again, cauſe compreſſions, inflammations, &c. which laſt accidents are very often the effects of a ſtone's being wedged in between the ſhoe-heels.

To recapitulate the whole.

The weight of the ſaddle horſe, does not preſs upon the toe, or heel, but on the middle between both; ſo that the greater the diſtance of the ſole from the ground, or from whatever point of ſupport, the more the great tendon will be fatigued, by the inordinate diſtention it undergoes at every ſtep.

The more the ſole is covered by the ſhoe, the more the horſe will ſlip, ſlide, or fall; becauſe the ſurface being formed of round parts, and the ſhoe having a large uniform hard face, he can ſcarce have above two or three points of ſupport; ſo that the greater contact the horſe's foot has with the ground, the more points are multiplied; and the ſafer of conſequence he goes.

By ſhoeing, no other intention could be expected, but preſerving the hoof, after paring away its luxuriancy.

That long ſhoes, and raiſing the ſhoe-heel, is a very pernicious cuſtom.

By paring away the horny ſole, it hardens in proportion to its being thinned, and by compreſſing the fleſhy ſole, makes a horſe lame; he loſes alſo the defence of nature againſt external bodies, by which means, the fleſhy ſole becomes often wounded, bruiſed, &c.

By paring the frog ſo much away, that it is not in contact with the ground, the tendon will be inordinately diſtended: by which means, it becomes ſubject to inflammation, relaxation, defluxion, and rupture.

Laſtly, It appears from the anatomy of the foot, that horſes are chiefly lame in thoſe bones and its tendon; that the preſent method of ſhoeing contributes greatly thereto, by paring away the horney ſole, and hollowing the foot; by which means, the fleſhy ſole becomes more expoſed to accidents, and the tendon fatigued, ſtrained, and ruptured; its ſupport being taken away by paring the frog.

We may learn alſo from hence, that no more of the toe ſhould be pared away, than to keep the foot uniform with the ſhoe; that the ſhoe ſhould be made flat, in order to adapt itſelf the better to the foot; not made too thick, or hollow, nor projecting beyond the horſe's heel.

This is the ſubſtance of M. La Foſſe's new method of ſhoeing; which from its ſimplicity, and the great eaſe of performing it, ſeems to demand our regard and attention: but though it appears well calculated for the flat pavements, and roads of France, yet we doubt its general ſucceſs with us; eſpecially in ſome of our rough ſtony countries, where the heel, and frog, being left ſo intirely defenceleſs, might be liable to frequent injuries from ſuch irregular looſe bodies, as flints, looſe ſtones, &c. We ſhould ſuſpect alſo its ſucceſs, on moiſt, greaſy, and ſlippery ſoils, or chalks; where the ſhoe heel, or cramps, ſeems of great uſe, to ſupport a horſe, by the impreſſion it makes in the ſurface; how inconvenient ſoever it may be in other reſpects; tho' it muſt be confeſſed, from our method of ſhoeing race horſes, where the whole foot comes into immediate contact with the ground, notwithſtanding the courſe they run over is often very ſlippery, yet they ſeldom fall.

But though this method may not be ſo generally adopted by us, in its utmoſt extent, for the reaſons above given; as well as from the different texture of horſes feet, which in ſome will always demand a particular method of ſhoeing; yet it undoubtedly may ſuit many horſes, and many different parts of the kingdom; and this particular advantage every one may reap from it, viz. to pare away as little of the ſole and frog as poſſible, even in the old method of ſhoeing: the many inconveniencies of which, we apprehend, have been ſufficiently pointed out, and amply explained; and would by this means, be in a great meaſure obviated.

EXPLANATION of Fig. 1, 2, 3, 4, Plate XXIV.

Fig. 1. repreſents the bottom of a horſe's foot.

a. a. a. is the horny ſole.

b. the frog.

2. The hoof towards its lower edge, called by the author the wall of the foot.

Fig. 2. ſhews the horny ſole *a.* raiſed from the fleſhy ſole *c. c. c.* round which is the enchannelled fleſh, 6. placed in the ſulcus of the inner ſurface of the hoof: 5. the horny part of which is ſoft and white.

Fig. 3. repreſents the under part of the fleſhy ſole *c.* raiſed from the foot-bone, or what Gibſon calls the coffin-bone *d. d. d.* *g.* the covering or ſheath of the Tendo Achillis. 2. The cartilage. 6. The edge of the fleſhy ſole confined in the furrow of the channelled horny ſubſtance. *Bartlet's Farriery, pag.* 352.

SHOODS, oat hulls.

SHOVEL, a well known inſtrument, conſiſting of a long handle, and a broad blade, with raiſed edges.

SHOWEL, a blind for a cow's eyes.

SHROUD, a ſhelter, or harbour.

SHUCK, a huſk or ſhell.

SICKLE, a toothed hook, with which corn is reaped.

SIEVE, hair, lawn, or baſket-work, ſtrained on a hoop, for ſeparating the flour from the bran, the duſt from corn, &c.

SIG, urine, chamber-lie.

SIKE, a little rill, a water furrow, a gutter.

SILK, an extremely ſoft and gloſſy thread, ſpun by a ſmall animal called a ſilk-worm.

It has long been a diſpute whether ſilk can or can not be produced to advantage in England; we ſhall therefore lay before our readers the following account, which we hope will not prove diſagreeable.

“ Could ſilk be produced in England ſo as to furniſh the whole, or great part of what we now conſume, it would, perhaps, be more advantageous to the community, than any other ſubject whatever, of produce or manufacture. And there is great reaſon to believe, as well from the authority of the beſt judges, as from concluſions drawn from the circumſtances of the thing itſelf, that it is far from being impracticable.

“ As the production of ſilk at home does not, however, ſeem to be attended to at preſent, in the degree, I conceive, it merits, it is my intention here, to ſet both the utility and practicability of it in a juſt and full light: the firſt ſtep towards the eſtabliſhment of any undertaking, which requires numbers, being to incite numbers to attempt it.

“ In examining into the importance of producing raw ſilk in Great Britain, we muſt conſider it, as a commodity we at preſent wholly purchaſe of foreigners: as one of which we ſo purchaſe to an extreme great amount, that lies almoſt entirely againſt us in the balance of trade with the countries of whom we take it:—as one, the price of which is now ſo high, as to bring the moſt perplexing diſtreſs on our manufacture of wrought ſilk, by the temptation it gives to the contraband importation of that of the French, an evil, which muſt continue unleſs ſome extraordinary remedy be found for it:—and as one, of which the future ſupply is precarious, and may ſo fail, as to occaſion hereafter the abſolute ruin of our manufactories of wrought ſilk. The prohibition of the exportation of this article from China, whence we before obtained part of what we uſe, which has had a great effect on the general price of ſilk here, evinces the ground there is for the laſt of theſe conſiderations, as the ſame, or other cauſes, may, from various events, deprive us of the reſources we yet have for the procuring what we want. The reſt of the conſiderations are founded on ſuch notorious facts, as render any proof of, or argument for their truth unneceſſary; and take away all occaſion to expatiate further on the matter in this view.

“ There is, nevertheleſs, another principle of equally intereſting conſequence, from whence the importance of producing ſilk in England may be deduced. This is, the employment it may afford to idle hands, and the diſtreſſed poor. To judge properly of the extent of this benefit, it is requiſite to enquire into two points: how many and what ſort of perſons theſe hands would be? As to the firſt of theſe points, or how many people might be employed in the buſineſs relative to the production of ſilk: could the matter be at all carried on with profit to the undertakers, the number of hands that might be enlarged in the various offices of tending the worms, and winding the ſilk, would be extremely great; far beyond what thoſe of any other manufacture or culture could equal. As to the ſecond point, or what kind of perſons might be proper for this work: it would happily be, for the moſt part, women and children, whoſe preſent idle and unemployed ſtate is not leſs the ſource of vice, than it is of miſery. This is a conſideration of the moſt moment to our country in its preſent ſituation, of any other whatever. Since to eſtabliſh the habit of induſtry in females, and the youth of both ſexes, is the only means to check the growth of that licentiouſneſs and depravity of manners in the lower people, which ſeems to threaten the deſtruction of all civil order among us. Nothing can more conduce to reform, as well as to enrich Great Britain, than the finding out the means of ſettling to work all the idle youth, women, and poor of both ſexes.

“ In every light, the introduction of this moſt valuable produce, appears of ſuch conſequence to us, as renders it highly worthy the diſquiſition, how far there is a probability the obtaining it could be effected. In order to this, it is proper to examine into four ſeveral circumſtances, the right concurrence of all which is, indiſpenſibly, requiſite. The firſt is, whether the climate of this country will agree ſufficiently well with the ſilk-worms, to admit of their being duly propagated, and preſerved while they are making the ſilk: the ſecond, whether the proper food can here be provided for them: the third, whether the preſent rate of labour and other attendant charges, would not raiſe the expence of producing the ſilk beyond the due bounds: and the fourth, whether the knowledge neceſſary to the performing this matter, as a practical art, is to be obtained here by thoſe who may be diſpoſed to attempt it. To ſome, or all of theſe circumſtances, the objections muſt relate, which are brought againſt the practicability of our producing raw ſilk with profit: and I ſhall, therefore, conſider them ſeparately, in order to weigh more juſtly the force of what is alledged with regard to each.

“ As to the firſt circumſtance, that is, whether the climate of this country will agree ſufficiently well with the worms, to admit of their being duly propagated and preſerved, till they have made the ſilk: the negative of it has been generally ſuppoſed; and offered as a principal reaſon againſt the practicability of our producing ſilk with profit. But this notion does not appear to be well founded, when the facts, which juſter obſervations and experience in the right method of treating the worms, have brought to light, are well attended to. It is true, that if the ſame method, with relation to the time of hatching the eggs, &c. was purſued here as in the more ſouthern countries, deſtructive accidents would frequently occur: but it is now well underſtood how to retard the hatching, &c. and keep back the otherwiſe too forward vital progreſs of this animal through its ſeveral ſtages; to accommodate it to the peculiar circumſtances of this climate: by which the hazard may be avoided. And if it be ſaid, that, after all, moiſt hot weather will ſometimes kill the worms, the ſame may be affirmed in a greater degree of the ſtrong heats in Piedmont, Lombardy, and other parts of Italy; ſo that the argument deduced from this fact, would prove too much: ſince it would equally or more forcibly operate againſt the practicability of producing ſilk in thoſe countries, where it actually is produced in the greateſt quantities. Theſe tender animals ſuffer in every climate from unfavourable weather; and more generally in ſome ſeaſons in the ſouthern countries than with us, provided we uſe the due precautions; but this is a diſadvantage and not a total obſtacle to the production of ſilk with profit, as we ſee by the abſolute fact itſelf. The principal ground of this opinion, of the unfitneſs of our climate for producing ſilk, aroſe from the improper treatment of the worms here; owing to the ignorance of a better method; as trials made in a more judicious manner, have experimentally ſhewn.

“ As to the ſecond circumſtance, or whether the proper food can be provided for ſilk-worms here: it has alſo been denied, but with leſs foundation than the foregoing. The mulberry-tree, particularly the black kind, the leaves of which are the food of ſilk-worms, flouriſhes as well, and is as hardy here as moſt other trees; and the white kind, though ſomewhat more tender, is yet eaſily cultivated even by ſets or cuttings. But the black affords, in general caſes, as proper food for the ſilk-worm, as the white; and is indeed, in ſome ſilk countries, the kind in common uſe. There is, however, an advantage in intermixing ſome of the white, which is, that the buds open earlier, and the leaves are tenderer, and conſequently furniſh food for the young worms ſooner, and more kindly to them, than the black. As theſe trees can, therefore, be eaſily propagated in any number, here as well as elſewhere, even from cuttings, there can be no want of means of producing food for the worms, and at the ſame expence, as in other places. It muſt be allowed indeed, theſe trees come into leaf later here, and conſequently do not afford the food ſo ſoon as in the ſouthern countries; but the progreſs of the worm to the ſtate, which renders it neceſſary, may, as I obſerved above, be correſpondently retarded, and then this objection ceaſes. There is, moreover, one circumſtance peculiarly favourable to us in this point: which is, that the leaves of the mulberry-tree never blight here after the buds are opened: an accident to which they are greatly ſubject in ſome of the parts of Europe, where moſt ſilk is produced, to the great embarraſſment of thoſe concerned in it. In this particular of the proviſion of food for ſilk-worms, we ſtand therefore on at leaſt as good a footing as any of our rivals in it: and conſequently no juſt objection can lie on this head.

“ As to the third circumſtance, whether the preſent rate of labour, and other attendant charges, would not raiſe the expence of producing the ſilk beyond the due bounds; it muſt be admitted, that the whole ſtreſs of uncertainty muſt reſt here, and that it is not ſo eaſily to be cleared up, as in the other three points. It is by no means, however, evident, that the price of labour would be an invincible impediment to the produce of ſilk, if we conſider, that the far greateſt part of the work may be done by women and children, and ſome of it even by perſons aged and infirm. And as, in a great many towns and villages, numbers of hands of this kind, are at preſent wholly unemployed, they could afford to work at very low rates, and yet with great advantage to themſelves. For where perſons, whoſe ſtrength, either in conſequence of youth, old age, diſeaſe, or want of habit of working, are not fit for common labour, and lie a dead weight on their families or pariſhes, every conſtant aid becomes of great conſequence to their comfortable and better ſupport. The argument drawn from the high rate of labour does not, therefore, hold good, with reſpect to undertakings, where thoſe are to be employed, who earn nothing at preſent: becauſe the price of ſuch labour cannot be taken into the compariſon, in this view, betwixt country and country, as it has in fact no price any where, and this principle is moſt manifeſtly verified, by experience at Birmingham. In that town, great numbers of women, children, and infirm perſons, even moſt of thoſe in the pariſh work-houſe, having been engaged in the manufactures, the undertakers have reduced to a ſurprizing degree the price of every article they have taken in hand. The people of Geneva, one of the cheapeſt and moſt induſtrious places of Europe, were beat by them out of the manufacture of enameled toys, which they had for a long time monopolized: the founding, gilding, and laquering ornamental articles in metal, have been carried by them over all other places in a moſt extraordinary manner, and proves that where waſte hands are employed, the common high rate of labour in the country becomes no obſtacle to the eſtabliſhment of any manufacture. That there is not any want of ſuch hands in moſt places of Great-Britain, is too regretfully obvious; and that they may, by proper degrees, be brought to work, where opportunity, example, and encouragement are duly given, is evident from the inſtance of the town here mentioned. The argument, therefore, from the great price of labour in England, againſt the production of raw ſilk, however ſpecious, on a ſlighter view, ſeems to vaniſh, when theſe particulars are brought into conſideration: and perhaps, the dearneſs of all the neceſſaries of life, which tend to the injury of thoſe manufactures, where ſtrong and able hands only can be employed, may, in a ſhort time, conduce to the promoting thoſe, which may be carried on by the weak, and leſs able: as diſtreſs is the moſt fertile parent of induſtry, and even women and children, though habituated to ſloth, may be brought to work, when they can no longer find the means of eating without it. Though there are, indeed, too many inſtances, in ſome counties, which ſhow, that the habit of idleneſs is proof againſt nakedneſs. Mr. Pullen in his ingenious treatiſe, of which it will occur to take further notice below, ſays, that "he takes it for granted the culture of ſilk-worms cannot be performed by the lower claſs of people." But he explains, that he only means, they cannot be undertakers of it, becauſe the worms require proper rooms, fires, mulberry-trees, &c. But this by no means makes againſt their being employed by thoſe who have ſkill to direct them; and a very moderate fund to provide theſe conveniencies. As to the other attendant charges, they would, in a large concern, be very moderate. A plantation of three thouſand mulberry-trees, which might occupy three acres of ground when in maturity, or in proportion while they are younger, would provide for as many worms, as would produce in ſilk of good quality, twelve hundred pounds ſterling in value or upwards. The reſt, beſide the labour, would be ſlight buildings, fire, ſtands, baſons ſet in brick-work, reels, and ſome other trifling implements. But I cannot give a juſter view of the ſmall compaſs, the whole might be reduced to, than by quoting Mr. Pullen's obſervation on this point: who ſays: "When it can be ſhewed, that two or three large mulberry-trees, or a proportional number of ſmall ones, will feed a ſufficient number of worms to make a pound of ſilk: that the ſtand, which holds theſe worms, will not take up a yard ſpace in a room: that one perſon, ſkilled in reeling, can, with the help of a boy to turn the reel, wind off two or three pounds of ſilk in a day: that one pound of this ſilk will make near five yards of paduſoy: that the whole time, from the hatching of the eggs to the reeling of the ſilk, amounts to no more than ſix weeks: that a ſmall part of each day is ſufficient for the proper attendance: and that, beſides all this, it can be done with much leſs trouble than is generally undergone. Theſe things, I ſay, being conſidered, and, as I hope, ſhewn in the progreſs of the inſtructions given in this book, then the managing of the ſilk-worm will appear in a more inviting light, and be looked upon as an entertainment, neither unpleaſing nor unprofitable."

"This may ſerve to give a general view, how eaſy and moderate the expence of labour, &c. would be, if women and children were employed in a large manufacture of raw ſilk; and how ſmall the other diſburſements would be in proportion to the return: ſo that, perhaps, there is no undertaking of equal conſequence and extent, which could be carried on with a more moderate capital than this.

"As to the fourth circumſtance, or whether the knowledge neceſſary to the performing this matter, as a practical art, is to be obtained here by thoſe, who may be diſpoſed to make ſuch an attempt, it may be now ſafely anſwered in the affirmative, though till lately great difficulties aroſe on this head; as neither the art of breeding and managing the worms, in a manner ſuitable to this climate, nor that of winding off or reeling the ſilk, were well underſtood. But at preſent the proper treatment of the worms is well known: and not only models of the reel uſed in Piedmont, the beſt hitherto brought into practice, are to be eaſily obtained: but Mr. Pullen has conſtructed a very good one, different from what are in uſe elſewhere, and very well adapted to the purpoſe. He has, alſo, publiſhed a treatiſe on this ſubject, where all the principles are well inculcated, and many juſt inſtructions given for performing the particular offices, both with regard to the treatment of the worms, and the cocoons or ſilk balls. It muſt, indeed, be allowed, that ſome of the methods he teaches, are rather accommodated to the purſuit of this matter as an amuſement than as an article of commerce; ſuch as hatching the eggs in the boſoms of living perſons, the keeping them in bed-chambers, and the killing the worms by the heat of the ſun, or the ſteam of water; all which, together with the preſervation of a due heat and dryneſs in the room, where the worms are to inhabit, might be performed by ſtoves regulated by thermometers, in large manufactories: but this will be eaſily allowed for by thoſe, who ſtudy his book with a view to applying it to practice in large. This treatiſe, therefore, if well underſtood, will furniſh ſufficient knowledge to any intelligent perſon, to begin this work, as to the management of the trees, worms and ſilk; and the ſociety for the promoting arts, &c. have, in their poſſeſſion, both one of Mr. Pullen's, and one of the Piedmont reels, by which any perſon may, on application, have either kind made. And I doubt not, gentlemen, but that your Muſeum will be an open channel of communication, to the diſplaying or removing any difficulties that ſhall offer to ſuch as may engage in this work: as I know ſome gentlemen, who are extremely well verſed in the matter, that will be very ready to lend their aid, by furniſhing all the requiſite information, to any who ſhall publickly call upon them for it.

"The practicability of producing ſilk in Great-Britain with profit to the undertakers, may therefore be very reaſonably preſumed, from what has been here advanced. But it muſt be acknowledged there are ſome difficulties which ſtand in the way of our expectation, that we ſhall not ſoon ſee the matter accompliſhed.

"In the firſt place, though it is the pooreſt people, who muſt be employed in this undertaking, as to the actual labour, yet it is by no means they, who muſt begin it. A capital is wanting; and alſo a liberal turn of mind and docility, not belonging to the loweſt claſs of people, to learn a new art, and conduct the ſeveral parts of it, till it is ſo eſtabliſhed, that imitation may afterwards be a ſufficient guide. A plantation of mulberry-trees is firſt requiſite, after that, proper buildings, with the utenſils, and other apparatus for breeding, feeding, and preſerving the worms, and for winding the ſilk. For though, after the eſtabliſhment of ſeveral large manufactories of this kind, the production of the cocoons or ſilk balls, and the winding of the ſilk, may be ſeparate undertakings; yet in the infancy of an attempt to produce raw-ſilk, and indeed, till conſiderable quantities of cocoons are produced in the ſame neighbourhood, they muſt be carried on conjointly. It is neceſſary, likewiſe, that ſome ſagacious, ſenſible perſon enterprize the ſuperintendance and direction of ſuch a work, till the inferior hands are rendered capable of acquitting themſelves well in their reſpective office; and that extraordinary attendance and care be obſerved, till both the ſkill of performing properly, and habit of attending diligently, are acquired, by all who are concerned in the management of the worms; but, if a number of perſons were once duly initiated into the knowledge, and habituated to the practice, they would ſoon be capable of leading and teaching others.

“ The reaſons here advanced, for the practicability of producing ſilk in Great-Britain, are founded on the ſuppoſitions, that the methods now practiſed are to be purſued. But a much more favourable proſpect of ſucceſs preſents itſelf, when it is underſtood, that very great improvements may be made, in every part of this art, which regards the treatment of the worms, on principles that are inconteſtable. In large concerns, all the diſadvantages, ariſing from change of weather, may be totally removed, and the deſtruction of the worms, from that cauſe, much more effectually provided againſt, than they can in hot countries. Since it is much more practicable to procure a due degree of conſtant equal heat in colder climates, than to prevent too great a one in hotter. By means of tin pipes, diffuſing the moſt regular heat from ſtoves, and of proper ventilators, the air may be always kept of an exact temperature, and yet continually changed at diſcretion, ſo that neither cold, moiſture, nor ſtagnation, may affect the worms: and this may be done with a ſmall comparative expence, either with regard to the conſtruction of the apparatus, or proviſion of fuel. The hatching, and killing the worms, may, in like manner, be performed by ſtoves, with much greater eaſe and certainty, than by any of the methods uſually practiſed. By the ſame means, it is alſo practicable, to have a ſecond product from the ſame breed in one ſeaſon; as well here, as in the ſouthern countries: an advantage never hitherto brought into conſideration by thoſe, who have taken their notions only from a view of the preſent methods, and the accidents attendant on the natural ſtate of the air in our climate. The certainty with which I ſpeak of a ſecond product the ſame year, is not the reſult of ſpeculation only; but of poſitive information. For a gentleman of unqueſtionable veracity, who reſided ſome time in China, and was at a conſiderable expence in diving into all the myſteries of the Chineſe methods of the treatment of the ſilk-worms, even ſo as to procure operators from a diſtant part of the country, to perform the whole in his own houſe; aſſured me, that they had the art to breed, hatch, and ſet to work the worms, as many times repeatedly in the year, as they choſe, allowing the due time for the progreſſion from the new-laid eggs, to the time of breeding in each ſucceſſion. This gentleman is now abroad; but he told me, before he went, that he had communicated the whole of the Chineſe method, to a very great perſonage, in order to its being rendered of public utility. It is, therefore, to be hoped, the particulars will in due time be laid open, and ſome lights thence gained, that may conduce to the further improvement of this art. The great perfection to which the conſtruction of cloſe ſtoves, conductory warming pipes, and ventilators of every ſize, is now brought, renders the application of proper heat to any of the purpoſes, reſpecting the management of ſilk-worms, much more eaſily and accurately practicable than it would have been formerly: and the improvements of the reel, and the methods of winding off the ſilk, equally facilitate that part of the work to thoſe who are to learn it.

“ From a juſt view of all theſe circumſtances, it may be reaſonably inferred, that there is no natural nor œconomical cauſe of impediment to the production of raw ſilk in Great Britain, as an article of commerce, and that the importance of ſuch an undertaking is, as above obſerved, ſo great, as to merit every public and private encouragement. It may, nevertheleſs, be objected by ſome, that this article ſhould be left to North America, where the government has appointed aids for it, and where ſome beginnings have been actually made. But to this, I anſwer, that the very ſlow progreſs, or rather the preſent retrograde ſtate of the undertakings there, though puſhed forwards by very extraordinary encouragements, as well from the London ſociety for promoting arts, as the government: who, beſides the giving a large bounty, have erected a public filature, ſhew the great difficulties they labour under; and the little proſpect there is, that the conſumption at home ſhould be provided for from this quarter. Indeed, it ſeems very apparent that this concern is not ſuited to colonies, where there is neceſſarily a want of thoſe unemployed hands, which are alone proper to be employed in it. The number of thoſe poor families, where the women and children live on the earning of one man, paid only as a mere labourer, are very few in ſuch places, compared to what they are with us: and yet the work muſt be done by ſuch women and children, to put the undertaking on a footing with thoſe of other countries, whence we now take the raw ſilk, where this is entirely the caſe. If America, therefore, has ſome advantage in the warmth of the climate, an advantage, perhaps, that does not avail over a proper uſe of ſtoves and ventilators, as above intimated; yet in this other point, of being provided with proper hands, we have an infinitely greater advantage over them: and there can be no reaſon we ſhould neglect or ſacrifice it to the ſpeculation of ſerving them, in a matter where the event is ſo precarious. It would be a great length of time before they could find hands, ſhould they ſucceed at all in this attempt, to produce the great quantity of raw ſilk we uſe in our manufactures, which is indeed ſufficiently large to find work for very great undertakings both there and here. And there is no reaſon of policy, why we, in a matter which may be ſo properly conſidered in the light of a manufacture, ſhould give them the preference.” *Muſeum Ruſticum, vol.* VI. *pag.* 89.

SILVER-WEED, or *wild Tanſey*, a ſpecies of cinquefoil which grows naturally upon cold ſtiff land in moſt parts of England, and is a ſure mark of the ſterility of the ſoil. Its ſtalks ſpread upon the ground, and ſend out roots from their joints; by which means, and by the frequent ſhedding of its ſeeds, for it flowers during the whole ſummer, it ſoon over-runs, and fills the land to a great diſtance. The leaves of this plant are compoſed of ſeveral lobes or wings, which are generally placed along the midrib, and terminated by an odd one: they are jagged at their edges, and are of a ſilvery colour, eſpecially on their under ſide. The way to deſtroy this kind of growth has been already pointed out. Mr. Ray ſays, that the root of wild tanſey, which is ſomewhat of the parſnip kind, is good to eat, and that hogs are very fond of it.

SIMPSON, groundſel.

SIT-FAST, a part of a horſe's hide turned horny, and which if it cannot be diſſolved, and ſoftened by rubbing with mercurial ointment, muſt be cut out, and afterwards healed as a freſh wound. It generally proceeds from a warble. *See the article* WARBLE.

SIZZING, yeaſt, or barm.

SKID, the chain by which the wheel of a waggon is faſtened, ſo as to prevent its turning round, upon deſcending a ſteep hill.

SKILLING, an iſle, or bay of a barn.

SKIRRETS, a kind of parſnep, which thrive beſt in a light and moiſt ſoil. They are propagated either by ſeeds, or by ſlips from the root, which is compoſed of ſeveral fleſhy fibres, about the thickneſs of a man's little finger, terminating in one head. This root, for which only the ſkirret is cultivated, is reckoned wholſome and nouriſhing: but it is flatulent, and too ſweet taſted for many palates. The ſeeds of this plant, which generally produce larger roots than the ſlips, ſhould be ſown about the end of March or the beginning of April, and if they are good, the plants will appear in five or ſix weeks. When they have put out their leaves ſo as to be well diſtinguiſhed from weeds, the ground ſhould be carefully hoed; and this ſhould be repeated three ſeveral times, in the ſame manner as is practiſed for carrots. In theſe hoeings, which ſhould be performed in as dry weather as poſſible, the better to deſtroy the weeds, the ſkirrets, whether ſown in broaſt caſt, or in drills, ſhould be thinned to the diſtance of at leaſt three inches from each other. In autumn, when the leaves begin to decay, the roots will be fit for uſe. Theſe may be preſerved all the winter, and till they begin to ſhoot in the ſpring, when they will become hard and ſticky. So will alſo thoſe which run up to ſeed the firſt ſummer, and which ſhould therefore be pulled up and thrown away.

The ſeaſon for propagating ſkirrets by offſets is in the ſpring, before they begin to ſhoot. The old roots ſhould be dug up then, and the ſide roots ſhould be ſlipped off with an eye or bud to each. Theſe ſhould be planted four inches aſunder, in rows ſufficiently diſtant to leave room for digging between them.

SLAB, the out-ſide plank of a piece of timber when ſawn into boards.

SLECK, ſmall pit-coal.

SMALLAGE, or water parſley, a plant growing naturally by the ſides of brooks and ditches in many parts of England, and is rarely cultivated in gardens. Thoſe however, who are fond of it in their pottage, may raiſe it in a moiſt ſoil, either by ſlips, or from ſeeds ſown in March. This ſeed is reddiſh, and pretty big, of a roundiſh oval ſhape, a little more full and riſing on one ſide than on the other, and ſtreaked lengthwiſe.

SMUT, a diſtemper incident to corn, and which, according to M. Duhamel, may be diſtinguiſhed by the following marks.

“ 1. This diſtemper deſtroys entirely the germe and ſubſtance of the grain.

“ 2. It affects not only the ear, but alſo, in ſome degree, the whole plant, when it has made a great progreſs.

“ 3. It very ſeldom happens but that when one ſtalk is ſmutty, all the ears of the other ſtalks from the ſame root are ſo too.

“ 4. So early as in March or April, upon opening carefully the hood or blades which cover the ear, and examining the young ear, then not above the ſixth part of an inch in length, and almoſt cloſe to the roots, I found this embryo already black, and attacked with this diſtemper. Perhaps it may not always ſeize the plants ſo early.

“ 5. When the diſtempered ear comes out of its coverings formed by the blades, it looks lank and meagre; the common and immediate coverings of the grains are in this caſe ſo very ſlight and thin, that the black powder is ſeen through them; and from this time nothing is found, in lieu of grain, but a black powder, which has a fetid ſmell, and no conſiſtency. As this powder, of which the conſtituent particles have but very little coheſion, and of which the coverings are deſtroyed, is eaſily blown off by wind, or waſhed away by rain; the huſbandman, in houſing theſe plants, houſes only ſkeletons of the ears. If any impreſſion of this powder remains, it is eaſily taken off by ſifting: but I have not experienced it to be contagious, like that of burnt-grain.

“ M. Tillet, who gained the prize propoſed by the Academy at Bourdeaux for the beſt account of what renders black the mealy ſubſtance of grain, has obſerved that theſe corrupted ears are often found to be vitiated even in the hood, though this laſt looks as green and perfect as if nothing ailed the corn within. The upper part of the ſtalk of a ſmutty plant is not, commonly, quite ſtrait, from within about half an inch below the ear. If ſuch a ſtalk is ſqueezed there, it ſcarcely yields at all to the preſſure. If it be cut aſunder at about a ſixth part, or a quarter of an inch, below the ear, it will be found to be almoſt entirely filled with pith, in ſuch manner that only a very ſmall opening can be perceived in the heart of this ſtalk, inſtead of the large pipe that is in healthy ſtems. M. Tillet concludes from hence, that the circulation of the juices is obſtructed in the upper part of the ſtalk of ſmutty plants.

“ Bearded wheat is apt to be ſmutty, as that which is not bearded; but neither M. Tillet nor I have ever met with a ſmutty ear of rye.

“ Cauſes of ſmut.—The ſmuttineſs of corn cannot be owing to a want of fecundation, as many have hitherto miſtakenly imagined; ſince it affects and deſtroys the organs of both ſexes long before the time of that fecundation.

“ It cannot be imputed to the ſettling of wet upon the ears, or to fogs, or to a violent impreſſion of the ſun; ſince we have ſeen the ears ſmutty long before they ceaſed to be covered with the blades, which continue green till the diſtemper has made a great progreſs.

“ The ſame obſervations refute abſolutely the opinion of thoſe who ſuppoſe the cauſe of the ſmut to be in the grains, after they are formed, and before they are paſt their milky ſtate.

“ The ſmut of corn has been alſo aſcribed to the moiſture of the earth: but we do not ſee more ſmutty plants in the loweſt, and conſequently wetteſt parts of a field, than in the higheſt and moſt dry. Beſides, why ſhould there be a ſingle ſmutty plant in the midſt of numbers of ſound ones? However, as it appears that corn is more frequently attacked with this diſtemper in wet years, than when the ſeaſons are dry; too much moiſture may perhaps, without being the immediate cauſe of the ſmut, favour its progreſs more than drought would do.

“ Some naturaliſts have aſcribed this diſtemper to inſects. If I am not authoriſed abſolutely to deny this, I can at leaſt aſſert that, after having been of this opinion for ſome time, all my endeavours to eſtabliſh it by facts have proved ineffectual. Some obſervers have indeed ſhewn me different inſects in ſmutty grains; but as I found the very ſame kinds likewiſe in ſound ears, I believe, with M. Tillet, that they are not in any manner the cauſe of this diſtemper. We know that the corn-caterpillar devours the mealy ſubſtance of the grain: but it does not occaſion ſmut. Numbers of flies lay their eggs upon theſe ſeeds; and the worms and maggots which proceed from them, eat the ſeeds: but this does not occaſion any thing like ſmut. The Reverend Dr. Hales, to ſatisfy himſelf whether the ſmut of corn might not proceed from the ſeeds being bruiſed by the flail, took a number of grains of different ſizes, and bruiſed them with a hammer. They grew well, and bore ears which were not ſmutty. Thus his own experience convinced this ſkilful philoſopher, that he had conceived a wrong idea of the cauſe of this diſtemper.

“ Several cultivators have thought that pigeons dung and that of ſheep render corn ſmutty: but this is a groundleſs notion. We have large pigeon-houſes, the dung of which is ſtrewed upon our wheat lands: the ſame is done with the dung of our ſheep, and we even fold our flocks upon thoſe lands: yet we do not find that theſe fields are more infected with ſmut than others. This allegation is therefore abſolutely deſtitute of proof.

“ Wolfius was of opinion that the ſmut of corn proceeds from a monſtroſity of the embryo: but M. Aimen has refuted that ſuppoſition, by ſhewing that the male flowers of certain kinds of plants are attacked with this diſtemper: now the flowers have not any embryo.

“ M. Aimen, M. D. has very judiciouſly obſerved, that the ſmut of corn cannot derive its origin from a defect in the ſap; as all the parts of the plant, except the ear, look healthy, and there are plants whoſe roots are perennial, which appear vigorous, though their ſeeds are ſmutty every year. He is of opinion, that whatever weakens the plant is apt to bring on the ſmut, and inſtances, as a proof of this, that it is a frequent cuſtom in his country to cut rye as ſoon as it ſpindles, for food for their cattle; and that this rye generally produces other ears, which ſeldom contain any but diſtempered grain: to which he adds, that ſeed-corn which has been pricked or run through with a needle; or which is not throughly ripe, and that which produces lateral or ſecond ears, is ſubject to the ſmut.

“ The ſame obſerver, who has made ſeveral careful reſearches into what is properly called the ſmut of corn, holds that this diſtemper proceeds from an ulcer which attacks firſt the parts that ſuſtain the ſeeds, and afterwards ſpreads to the reſt of the flower. But, ſome will ſay, what is the primary cauſe of that ulcer? In order to diſcover it, M. Aimen examined ſeveral grains of barley with a microſcope: ſome of them were bigger than others: ſome were very hard; and others yielded to the preſſure of his nail: ſome were of a deeper, and others of a lighter colour; ſome longer, and others rounder, than they ought to have been: their rind was ſometimes wrinkled in ſeveral places, whereas in its natural ſtate it is ſmooth: and laſtly, he perceived upon ſome of them black ſpots, which, when examined with a magnifying glaſs, appeared to be covered with mould. Theſe grains were ſeparated carefully, according to their ſeveral conditions, and ſown apart, though in the ſame ground. All the mouldy grains produced ſmutty ears, the ſhrivelled, the parched, and thoſe that were attacked by inſects, either did not grow at all, or did not produce any ſmut.

“ He then ſingled out a parcel of ſound grains, ſowed them, and ſome time after took them up in order to examine them again with a magnifying glaſs. He found ſome of them mouldy, replanted them all, and obſerved that the mouldy grains produced ſmutty ears.

“ M. Aimen, without pretending that this is the only cauſe of the ſmut of corn, concludes from theſe experiments, that mouldineſs is a cauſe of this diſtemper.

“ It is very hard to conceive how mouldineſs can produce this diſtemper; for as ſoon as the ſeed has ſprouted and produced its plant, the whole ſubſtance of the grain is conſumed. Whether the hulls or coverings grow mouldy or not, ſeems to be a circumſtance quite immaterial to the plant, which ceaſes from that time to ſubſiſt on what the ſeed had ſupplied it with till then. We readily conceive that if this mouldneſs attacked the plant, it might either kill it or render it poor and weak: but we cannot imagine how this mouldineſs ſhould affect only the organs of fructification, and entirely deſtroy them, without doing any viſible injury to the other parts of the ſame plant, even though it be a perennial. However, M. Aimen relates facts; to account for which one might conjecture, ſuppoſing the increaſe of plants to be only an extenſion of the embryo, that the organs of fructification which exiſt in imperceptible miniature in the ſeed, were already affected by the mouldineſs before the grains were depoſited in the earth. But let us abide by well obſerved facts: it being of more importance to collect them, than to be in a hurry to explain them by conjectures hitherto attended with little probability.

"Means of preventing this diſtemper.—M. Aimen is of opinion, that, to prevent this diſtemper, the fineſt and ripeſt corn ſhould be choſen for ſeed, that it ſhould be threſhed as ſoon as poſſible, and that it ſhould be limed immediately after, as well, ſays he, to keep it from growing mouldy, as to deſtroy the mould already formed, if any ſuch there be; adding, that every method he has tried to make corn ſo prepared grow mouldy, has been ineffectual, and that he has never known it produce ſmutty ears."

According to this principle, the preparations which have been experienced to be ſerviceable in the caſe of burnt-grain, and particularly M. Tillet's lye, may be equally beneficial to guard againſt ſmut. But we ſhall not attempt, continues M. Duhamel, to make any addition to M. Aimen's advice, becauſe we have not ſtudied the diſtemper properly called ſmut, ſo much as we have that far more dangerous one which we diſtinguiſh by the name of burnt-grain. According to ſome experiments made by M. Tillet, the black powder of ſmutty corn does not appear to be contagious. However, we ſhould ſpeak more affirmatively on this point, if we had been able to collect a ſufficient quantity of that powder: but, as was ſaid before, the wind and rain carry it away, and but very little of it is found in granaries. We exhort thoſe who wiſh to contribute to the progreſs of agriculture, to make farther trials, in order to aſcertain whether the ſmut of corn be really contagious or not: but at the ſame time we caution them to be careful not to confound this diſtemper with the uſtilago, or burnt-ear; for want of which diſtinction ſeveral philoſophers have hitherto been miſled.

As weak plants are moſt ſubject to ſmut, M. Aimen recommends good tillage, as a ſure means of giving them ſtrength and vigour. It is probably for this reaſon that corn is very ſeldom ſmutty when managed according to the new huſbandry.

He obſerves, that all the lyes generally made uſe of, preſerve the plants from mouldineſs; and of all of them, lime ſeems to him the moſt effectual.

"M. de Lignerolle ſays, that the ſureſt means of avoiding ſmut, and that which he has practiſed with ſucceſs ever ſince the year 1739, on upwards of three hundred acres of land, is, to change the ſeed every year, to be very careful that the ſeed-corn be well dried and thoroughly ripe, and that it be not ſmutty, nor have any ſmutty powder ſticking to it. He then pours boiling water on quick-lime, in a large tub; and after the ebullition is over, as much cold water as there was hot, and ſtirs it all ſtrongly together, in order to diſſolve and thoroughly mix the lime. The quantity of wheat intended to be ſowed is ſprinkled with this lye, and then well ſtirred with a ſhovel, and laid in as high a heap as poſſible. It is beſt to keep the grain for a week after this preparation, turning it every day; for otherwiſe it would heat ſo as to deſtroy the germe. By theſe means he has not had any ſmut, when the fields around him have been infected with that diſtemper.

"M. Donat, near Rochelle, thinking the ingredients commonly employed in ſteeps too dear for the uſe of farmers, ſtudied for ſome years to find out ſomething cheaper, eaſy to be had every where, and therefore better calculated to be of general uſe. "I have had, ſays he, in a letter to M. Duhamel, the good fortune to accompliſh what I wiſhed; for I now uſe only pidgeons-dung, quick-lime, aſhes, and ſea-ſalt, where this laſt can be conveniently had. I have ſometimes made with theſe ingredients, ſteeped in water, ſo ſtrong a liquor, that it has even deſtroyed the germe of the grain. But there will be no danger of that, if care is taken to obſerve the following directions, which are the reſult of ſeven years ſucceſsful experience, even at times when farmers who have neglected to follow my example, have had ſuch wretched crops as have not paid the charge of reaping.

"Take quick-lime and pigeons-dung, of each twenty-five pounds, forty pounds of wood-aſhes, and twenty-five pounds of ſea-ſalt, or ſalt-petre. Put all theſe into a tub large enough to hold half a hogſhead of common water added to them. Stir them all well with a ſtick, till the lime is quite diſſolved. This lye will keep ſome time without ſpoiling. It muſt be ſtirred again juſt before the corn is ſteeped in it. The grain is then put into a baſket, and plunged in the lye, where it remains till it has thoroughly imbibed it; after which it is taken out, and laid in a heap, till it is quite drained of all its moiſture: or, which is a ſtill better way, take a maſhing-tub, fill it with grain to within four inches of the brim, and then pour in the lye well ſtirred beforehand. When the tub is full, let the lye run out at the bottom, into ſome other veſſel, in order to uſe it again for more corn. Let the grain be then taken out and laid in a heap to drain; and continue in this manner to ſteep all your ſeed-corn. The wheat thus prepared may be ſowed the next day, and muſt not be kept above five or ſix days, for fear of its heating. This I ſay from experience. The quantity of lye above preſcribed, will ſerve to prepare twenty buſhels of wheat.

"Mr. Tull obſerves, that brining, and changing the ſeed, are the general remedies for ſmut. The former of theſe, he had heard, was diſcovered about ſeventy years before he wrote, by the ſowing of ſome wheat which had been ſunk in the ſea, and which produced clean corn, when it was a remarkable year for ſmut all over England: but he afterwards doubts whether this might not happen by its being foreign ſeed, and therefore a proper change for our ſoil. He tells us that two farmers, whoſe lands lay intermixed, uſed ſeed of the ſame growth, from a good change of land, and that the one, who brined his ſeed, had not any ſmut, whilſt the other, who neglected that precaution, had a very ſmutty crop —But again he doubts whether this ſeed might not have been changed the year before, and ſo might not be greatly infected; or at leaſt not more than the brine and lime might cure. He adds, that ſmutty ſeed-wheat, though brined, will produce a ſmutty crop, unleſs the year prove very favourable; for that favourable years will cure the ſmut, as unkind ones will cauſe it: but above all, he aſſures us, that the drill-huſbandry is the moſt effectual cure."

"Count Ginanni, a patrician of Ravenna, who has favoured the world with a very accurate and ingenious treatiſe on the diſtempers of corn in the blade, deems the ruſt incurable, after it has once taken place. He has prevented it by ſprinkling the plants, before their ears were formed in their hoods, with a ſolution of ſal ammoniac or ſalt-petre in water mixed with ſalt of tartar, and with other alkaline ſubſtances; but obſerves, that ſuch preparations are too dear for the uſe of farmers. He thinks, that ſowing thin and keeping the corn quite free from weeds, will generally be a good preſervative, as he himſelf has frequently experienced."

"The ſmut in wheat, ſays a writer in the Muſeum Ruſticum, is an evil which has long been complained of, and many methods tried to prevent it, all of which have proved ineffectual, or, at beſt, but a mitigation of the diſeaſe; which methods I need not here enumerate, as they are generally known, or are to be met with in various authors who have wrote on agriculture: ſome of them being calculated to forward vegetation, and ſtrengthen the plant, ſuch it will be adviſeable to continue in the practice of.

"But amongſt all the authors who have wrote on this ſubject, I do not remember to have ſeen one who has pointed out a probable conjecture with reſpect to the cauſe of this malady, ſo as to be ſupported by any tolerable degree of reaſon. And inaſmuch as natural hiſtory has been, and is my favourite ſtudy, (of which I take agriculture and a knowledge of cattle to be no ſmall part) I have frequently employed ſome leiſure hours, to endeavour to aſſign cauſes for various diſeaſes, to which the productions of the earth are ſubject; among which, this of ſmut in wheat is one. And being deſirous to improve my knowledge, I am willing to communicate, that if any thing worth notice might come from me, I may have the pleaſure of doing ſomething for the public good, and thereby induce others to make their diſcoveries known, from which myſelf, as well as many more, may reap ſome advantage.

" I remember to have read a little treatiſe, wrote ſome years ſince, by James Logan, (chief juſtice, and preſident of the council, of the province of Penſylvania) on the generation of plants, containing obſervations made on the maize, by which he diſcovered that plant to be (what Linnæus calls monoecia, or) a plant bearing male and female flowers, and, as ſuch, capable of being impregnated with a fructifying duſt from another plant of the like kind.

" I own, the reading this pamphlet firſt gave me the hint of the generation of vegetables, from which I continued my obſervations reſpecting other plants, and among the reſt to wheat, and the like; though this is not of the ſame claſs with maize, but of the claſs triandria of Linnæus, and is hermaphrodite, yet, nevertheleſs, equally ſubject to be impregnated by duſt from another plant, as well as with duſt from itſelf.

" Having frequently obſerved amongſt wheat, while green, (though ſhot up into ſpindle) ſeveral black, blighted ears, I examined them, and found theſe were ears in which, by ſome accident, the intention of nature was prevented; I ſuppoſe, by being detained too long in the hoſe, and by the natural humidity of the plant, a fermentation promoted in its ear, deſtroying the ſmall veſſels through which the corns were to receive nouriſhment; by which means their contents became black, dry, and duſty: theſe ears, growing up with the others, imbibe moiſture ſufficient to cauſe the duſty particles in the grains in them to expand, and burſt the fine ſkin which contained them: being thus ſet at liberty, the air, if it happens to be a dry ſeaſon, dries them again; by which means they become light enough to float therein, when ſeparated from the ſkin which held them. If this happens when the wheat is in bloſſom, which it often does, part of this duſt enters the ſtygma of healthy corns, and thereby infects them: the pulp in thoſe becoming black, a fermentation is raiſed therein, which deſtroys the life of the grain thus impregnated: hence the diſagreeable ſmell is acquired peculiar to this diſeaſe (the ſmell in a grain of ſmut being the ſame as in a black blighted ear.)

" From hence it is eaſily accounted for, why, often, a few grains in an ear are ſmutty, and the others good.

" Some may perhaps object, if this be the caſe, why are not barley and oats ſubject to the like diſeaſe, ſince both theſe are ſubject to the black blight as well as wheat? Such objectors would do well to obſerve, that theſe have a more tough ſkin than wheat, which does not burſt till after the blowing of theſe ſorts of corn is over; therefore, when it does burſt, the duſt can do no harm.

" Having thus pointed out the cauſe, I now proceed to preſcribe the remedy, which is, when the corn is ſhot into ſpindle, and the ears begin to appear, let ſome perſons go along each furrow in the field, and carefully break off all ears of the black kind, (not pull them up, becauſe often from the ſame root grow ſeveral others, which are good and ſound ears) and when broke off put them into a bag, and carry them away; for ſhould they be thrown on the ground, there may ſtill be danger of infection from them; and as, 'tis poſſible, there may be ſome of theſe diſeaſed ears, which are not burſten, and therefore may eſcape being gathered, theſe may be known by the ſtalk at the neck being crooked, and bent in the length of three or four inches backward, and forward five or ſix bends, and the hoſe nearer to the head of ſuch than the ears which are good.

" The ſeaſons in which wheat is moſt liable to be ſmutty are, it is well known, ſuch in which it happens to be dry weather and windy at the time of blowing; but if it happens to be wet during that time, it is very rare to ſee a ſmutty ear in a field." *Muſeum Ruſticum, vol.* II. *page* 19.

" As the ſmut in wheat, ſays another writer in the ſame work, is an evil greatly complained of, and not without reaſon, among farmers, I have no doubt but your readers will be well pleaſed to be informed of a means of preventing the damage which is annually experienced in this reſpect.

" As I write from experience, what I communicate may be depended on; and I have great foundation for thinking it will be found of particular ſervice to ſuch of your readers as are practical farmers, and who yet are unacquainted with the method I intend to recommend.

" I have, for many years paſt, eſcaped having ſmutty crops, by a proper care of the ſeed-wheat before it is put into the ground; and the method I purſue, though efficacious, is in itſelf ſimple and cheap.

" I take four buſhels of pigeons dung, which I put into a large tub: on this I pour a ſufficient quantity of boiling water, and, mixing them well together, let them ſtand ſix hours, till a kind of ſtrong lye is made, which, at the end of that time, the groſſer matter being ſubſided, I cauſe to be carefully drained off, and put into a large keeve, or tub, for uſe.

" This quantity is ſufficient for eighty buſhels of ſeed-wheat.

" My next care is to ſhoot into this ſteep a manageable quantity of my ſeed, which is immediately to be violently agitated, with either birchen brooms, or the rudders that are made uſe of in ſtirring the malt in the maſh-tub in a brewing-office. As the light grains riſe, they muſt be diligently ſkimmed off; and after the ſeed has been agitated in this manner for the ſpace of perhaps half an hour, it may be taken out of the ſteep, and ſown out of hand, with great ſafety: and I can venture to ſay, that if the land is in good heart, and has been properly tilled, it will not, when ſown with theſe precautions, produce a ſmutty crop." *Muſeum Ruſticum, vol.* III. *page* 81.

Another gentleman, who ſigns a Norfolk farmer, declares he always obſerved, that if the ſeed was well waſhed it never failed: that he took the hint, and waſhed ſome ſeed which he knew to be ſmutty, in a large tub filled with plain ſimple water, ſtirring it violently with birchen brooms, taking care, from time to time, to ſkim off the light. This anſwered very well, and he has ever ſince continued the practice.

" I read, ſays another gentleman, the above account with ſome degree of ſatisfaction, but am ſorry that your correſpondent ſhould be ſo much a lover of brevity, as to ſay no more on a ſubject of ſuch infinite importance.

" The truth is, we Engliſh farmers have hitherto known very little of the nature of this diſeaſe in wheat, imagining that whenever the corn was black it was infected with the ſame diſorder; but this is far from being the caſe, as any of your readers may ſee, by referring to a piece written by Monſ. de Gonfreville of Normandy, publiſhed in the ſecond number of the Foreign Eſſays on Agriculture, &c. (which I cannot but eſteem a very uſeful work) and containing a detail of a number of experiments made by the above gentleman to aſcertain the cauſe of the ſmut.

" I was not a little pleaſed to find that the method preſcribed in this invaluable Eſſay, for guarding againſt this diſtemper, does not materially differ from that above recommended.

" Both theſe gentlemen depend on the clean waſhing of the ſeed, and the trials of both met with the wiſhed-for ſucceſs."

We ſhall conclude this article, with the following method of preventing this deſtructive diſtemper, ſent us by the ingenious Mr. Bromwell Powell, of Green's Forge, near Stourbridge in Worceſterſhire, dated September 1766.

" I have here, ſays he, ſent you an infallible remedy againſt the ſmut in wheat, a thing ſo prejudical to the community in general, and which I myſelf have made uſe of for ſeveral yeers paſt, and have ſown ſmutted wheat, prepared as under directed, and have not had one ſmutted ear from the produce; and am well aſſured if the farmers will obſerve the under direction, they never will have any. Now as the coating of wheat with brine and lime, is ſo well known to the farmers in general, I need ſay no more on that ſubject, as you have directions from many authors concerning it: but when wheat is ſo prepared with brine and lime as is uſual, then to every ſtrike of wheat ſo prepared, add one pound and an half of red lead, by putting it into a cullinder and ſhaking it gently over the prepared corn, and ſometime ſtirring the corn with a ſhovel, that every corn may have a ſpot or two of the lead adhere to it, which when ſo done is an effectual preſervative againſt the above malady, nor will any fowls lie upon it after ſo prepared.

“ By the above method ſeveral of the penurious farmers will look upon it to be a great expence, as the lead will coſt, bought in ſmall quantities, three-pence per pound; but admit every ſtrike was to coſt ſix-pence per ſtrike, it would greatly anſwer the farmer's purpoſe: I therefore have ordered as ſmall a quantity as can be complied with; but if more was added it would ſtill be a greater preſervative. As the time of ſowing is now near at hand, I hope the gentlemen will apply to ſome farmer, whom they can depend upon, to try the experiment of one ſtrike ſo prepared; and, if they can readily procure it, let half a ſtrike of it be ſmutted corn when ſown, and to that half ſtrike would adviſe one pound of the lead to be applied, which will be a convincing proof of the utility of the above.”

SNAIL-COD, or *Snag-greet*, a name given by Mr. Worlidge, to a ſpecies of manure, found at the bottom of deep rivers. It is a kind of mud or ſludge, very ſoft, full of wrinkles, and intermixed with many little ſhells and ſnails, to which it is thought to owe a great part of its fatneſs.

SNATHE, the handle of a ſcythe.

SOAP-ASHES. *See* ASHES.

SOIL, a general name for all ſorts of land. *See the articles* EARTH *and* GROUND.

Soils are divided by our farmers into nine ſorts, viz. the ſandy, the gravelly, the chalky, the ſtony, the rocky, the hazely, the loamy, the marſhy, and the clayey. *See the articles* SAND, GRAVEL, CHALK, &c.

SOOT, a fuliginous ſubſtance formed in chimnies.

Soot, either of vegetables or of coal, is good both for corn and graſs, eſpecially on cold moiſt grounds, or lands apt to be over-run with moſs. Many have found their account in ſtrewing it early over their grean wheat and barley: but Mr. Ellis ſays neither of them ought to be ſooted after the 25th of April, becauſe the wheat, and generally the barley, have then done gathering and branching, and are upon the ſpindle. He likewiſe thinks it proper to be ſown over young turneps, juſt after they have appeared. But care ſhould always be taken not to ſtrew it too thick, leſt its hot nature ſhould hurt the plants. Mr. Worlidge ſeems to think wood-ſoot the beſt: but Mr. Mortimer prefers that which is made from ſea-coal, of which about forty buſhels are commonly allowed to an acre; though ſome grounds will require more: to which he adds, that it produces a very fine ſweet graſs, and deſtroys worms and weeds; and that it ought not to be ſown upon wheat till Candlemas, becauſe the long cold rains and ſnows are apt to waſh it in too ſoon: nor is it ſafe to lay it on later, leſt a drought ſucceed and burn it up. *See the article* COAL-SOOT.

SORREL, a well known plant propagated in kitchen-gardens.

Sorrel is uſed for many purpoſes in the kitchen, and they who are fond of acid herbs in their ſallets cannot well have one whoſe tartneſs is more agreeable. The two ſorts chiefly cultivated in the kitchen-gardens here are, the common ſorrel, which has longiſh and ſharp pointed leaves, and the round-leafed garden, or Roman ſorrel. Both of theſe are perennial; but the round-leaved ſort is moſt eſteemed.

This is propagated by its creeping roots, which may be tranſplanted either in ſpring or autumn; but the autumn is beſt for dry ground. The diſtance between them ſhould be at leaſt two feet every way; for this plant ſpreads pretty far, and increaſes greatly, eſpecially on ſtony land; for its natural growth is upon rocks. It ſeldom produces good ſeeds; and hardly any at all when it is ſet in a light ſoil.

The common ſorrel, which grows naturally in paſture lands in moſt parts of England, and which is conſiderably improved by culture in the garden, is multiplied either by its ſeeds, or by parting of its roots. The former of theſe methods produces the largeſt and moſt ſucculent plants, if they are allowed ſufficient room: but in whichever way they are raiſed, they ſhould ſtand at leaſt ſix inches aſunder, in rows ſo far diſtant from each other as to admit of digging the ground between them every ſpring, if not oftener, eſpecially in the hot months, beſides hoeing up the weeds whenever theſe are numerous, or begin to grow tall. Autumn is the beſt time for ſowing of theſe ſeeds upon dry land, and alſo for parting or tranſplanting the roots, which, with the above management, may ſtand un-removed for two or three years.

The ſeeds of the annual ſorts of ſorrel ſhould be ſown about the latter end of March, on a bed of common earth, in rows a foot and an half aſunder; and when the plants are come up, they ſhould be thinned to the diſtance of four or five inches from each other. This, and keeping them clean from weeds, is all the culture that they will require: but both their ſize and their goodneſs will certainly be increaſed by a good ſtirring or two of the ground, which may eaſily be given at the time of weeding; for both ſhould be done in dry weather. Theſe plants will flower in July, and their ſeeds will ripen in autumn.

SOUR LAND, a cold clayey ſoil. *See the article* CLAY.

SOW, the female of the ſwine. *See* HOG.

SOWING, the action of ſcattering the ſeeds of plants in the ground.

Writers of different countries mention the uſual ſeaſons for ſowing their ſeveral kinds of grain, but do not take notice of any ſign by which the huſbandman may be directed when to ſow his corn with the greater chance of ſucceſs. For a rule of this kind we are indebted to the juſtly celebrated Linnæus, a man truly great, not only for his unequalled knowledge in natural hiſtory, and his indefatigable induſtry in the purſuit of that ſcience; but even ſtill more ſo for his diſintereſted zeal to turn the reſult of his ſtudies to the advantage of his country. Far ſuperior to that mean jealouſy which little minds are apt to entertain on their diſcoveries, he nobly calls forth every aſſiſtant, and invites each of them to become his rival in promoting the general welfare of mankind, as we are particularly informed by one of his diſciples.

“ It is now the fourth year, ſays the ingenious Mr. Harald Barck, a member of the Swediſh academy, ſince our illuſtrious preſident exhorted his countrymen to obſerve with all care and diligence, at what time every tree expands its buds, and unfolds its leaves; imagining, and not without good reaſon, that our country would, ſome time or other, reap ſome new, and perhaps unexpected benefit, from obſervations of this kind made in different places.”

As one of the apparent advantages, he adviſes “ the prudent huſbandman to watch with the greateſt care the proper time for ſowing; becauſe this, with the divine aſſiſtance, produces plenty of proviſion, and lays the foundation of the public welfare of the ſtate, and of the private happineſs of the people. The ignorant farmer, tenacious of the ways and cuſtoms of his anceſtors, fixes his ſowing ſeaſon generally to a month, and ſometimes even to a particular day, without conſidering whether the earth be prepared to receive the ſeed: from whence it frequently happens, that the fields do not return what might be expected, and that what the ſower ſowed with ſweat, the reaper reaps with ſorrow. The wiſe oeconomiſt ſhould therefore fix certain ſigns whereby to judge of the proper time for ſowing. We look up to the ſtars, and without reaſon, ſuppoſe that the changes on earth will anſwer to the heavenly bodies; entirely neglecting the things which grow around us. We ſee trees open their buds and expand their leaves, from whence we conclude that ſpring approaches, and experience ſupports us in this concluſion: but no body has hitherto been able to ſhew what trees Providence intended ſhould be our calendar, ſo that we might know on what day the countryman ought to ſow his grain. No one can deny but that the ſame power which brings forth the leaves of trees, will alſo make the grain vegetate; nor can any one juſtly aſſert that a premature ſowing will always, and every where, accelerate a ripe harveſt. Perhaps therefore we cannot promiſe ourſelves a happy ſucceſs by any means ſo likely, as by taking our rule for ſowing from the leafing of trees. We muſt, for this end, obſerve in what order every tree puts forth its leaves, according to its ſpecies, the heat of the atmoſphere and the quality of the ſoil. Afterwards, by comparing together the obſervations of ſeveral years, it will not be difficult to define, from the foliation of trees, if not certainly, at leaſt probably, the time when annual plants ought to be ſown. It will be neceſſary likewiſe to remark what ſowings made in different parts of the ſpring produce the beſt crops, that by comparing theſe with the leafing of trees, it may appear which is the moſt proper time for ſowing: nor will it be amiſs in like manner to note at what times certain plants, eſpecially the moſt remarkable in every province, blow; that it may appear whether the year makes a quicker or ſlower progreſs. In upland, the ſowing of barley nearly coincides with the foliation of the birch."

Mr. Stillingfleet, who has given us a judicious tranſlation of ſome ſelect pieces publiſhed by ſeveral ingenious members of that great, and hitherto unrivalled ſchool of natural hiſtory, the univerſity of Upſal in Sweden, under the preſidence of the excellent Linnæus, was told by a common huſbandman in Norfolk, that when the oak catkins begin to ſhed their ſeed, it is a proper time to ſow barley: " and why," adds he, very properly, " may not ſome other trees ſerve to direct the farmer as to other ſeeds. The prudent gardener never ventures to put his houſe plants out, till the mulberry leaf is of a certain growth." Heſiod, continues this gentleman in his ingenious note on M. Barck's foliation of trees, began to fix the proper ſeaſons for plowing, ſowing, &c. by the appearance of birds of paſſage, or of inſects, or by the flowering of plants; but I do not find that this method was ever after attended to till Linnæus wrote. Heſiod ſays, that when the voice of the crane is heard over-head, then is the time for plowing; that if it ſhould happen to rain three days together when the cuckow ſings, late ſowing will then be as good as early ſowing; that when ſnails begin to creep out of their holes, and climb up the plants, it is time to leave off digging about vines and take to pruning. There is a wonderful coincidence, which probably takes place in all countries, between vegetation and the arrival of certain birds of paſſage. Linnæus ſays, that the wood-anemone (in Sweden) blows from the arrival of the ſwallow: and Mr. Stillingfleet finds by a diary which he kept in Norfolk for the year 1755, that the ſwallow appeared there on the 6th of April, and the wood-anemone was in bloom on the 10th of the ſame month. Linnæus obſerves, that the marſh-marygold blows when the cuckow ſings; and Mr. Stillingfleet finds by his diary, that the marſh-marygold was in bloſſom on the 7th of April, and the cuckow ſung the ſame day.

A due temperature of the ſeaſon, with reſpect to heat or cold, drought or wet, for all theſe greatly influence the ſtate of the earth, is eſſentially neceſſary, and ſhould be carefully attended to by the huſbandman when he ſows: but the preciſe time moſt proper for this work, cannot, by any means, be invariably fixed, becauſe it will always depend on the concurrence of a variety of circumſtances. The ſeaſons are more or leſs forward, and the ground is more or leſs dry, in ſome years, than in others. A proper ſeries of well made obſervations would furniſh the beſt of rules in this reſpect, but certainly would not fix the time of ſowing to any particular day, or week, for years to come. Linnæus's method, of carefully obſerving the foliation of trees, &c. would determine the proper times for ſpring ſowing; and Pliny, after mentioning the ſeveral conſtellations by which farmers were guided in his time, inſtructs the huſbandman with regard to autumnal ſowing, upon a principle ſimilar to that of our great modern naturaliſt. " Why," ſays he, " does the huſbandman look up to the ſtars, of which he is ignorant, whilſt every hedge and tree point out the ſeaſon by the fall of their leaves? This circumſtance will indicate the temperature of the air in every climate, and ſhew whether the ſeaſon be early or late. This conſtitutes an univerſal rule for the whole world; becauſe trees ſhed their leaves in every country according to the difference of the ſeaſons. This gives a general ſignal for ſowing; nature declaring, that ſhe has then covered the earth againſt the inclemency of the winter, and enriched it with this manure."

I therefore can only ſay, in general, that it is better to ſow early in autumn, than too late, provided the ſeaſon will admit of it; becauſe the plants are better able to reſiſt the ſeverity of the winter, after they have acquired a certain degree of ſtrength; and their roots being then longer, and conſequently better fixed in the earth, they will be leſs liable to be thrown out by froſt. For this reaſon, in particular, perhaps the colder the climate is, the earlier the wheat ſhould be ſowed. Some lands are of ſuch a nature, that they ſwell greatly in hard froſts, and, ſubſiding again upon a thaw, leave the roots of plants quite bare upon their ſurface. There have, indeed, been years in which fields ſowed very late, for inſtance in December, have done extremely well: but that ought not, on any account, to be made a rule; experience ſhewing that ſuch late ſowings very ſeldom anſwer. On the other hand, the corn is likewiſe expoſed to many dangers when ſowed too early: for the ſtalks which ſhoot up before winter cannot well bear hard froſts, though wheat would not be hurt by them when only in the blade.

M. de Chateauvieux, than whom we cannot have a better guide, is clearly of opinion, that, though the proper time of the year for ſowing be come, the corn ſhould not be put into the ground if the temperature of the ſeaſon be not favourable, and that on the contrary the ſowing of it ought to be deferred, in hopes of a change. " If, ſays he, the weather is very hot, and the earth extremely dry, it will be abſolutely neceſſary to wait till ſome rain has fallen; for otherwiſe the ſeed will riſe but very imperfectly. This I am ſure of, by which I contradict the common ſaying of ſome farmers, that the earth is the beſt granary to keep the corn in. Full of this notion, whenever the ſtated time comes round, they ſow without diſtinction, in wet land or in dry: even heat does not hinder them: they think their ſeed will certainly ſprout well after the firſt rain: but I have always experienced that the plants have come up thin.

" To ſatiſfy myſelf ſtill farther in this point, I tried an experiment, purpoſely to know whether corn can be ſowed, with any reaſonable expectation of ſucceſs, when the weather is very hot, and the earth very dry. Upon reading Mr. Duhamel du Monceau's excellent Treatiſe on the Preſervation of Corn, I obſerved, that he had found by his experiments, that wheat dried in a ſtove heated to ſixty degrees of M. de Réaumur's thermometer, had loſt its faculty of growing. From thence I conjectured, that wheat which ſhould undergo a heat, for example, of thirty degrees, during a longer time, would be equally parched up, and rendered incapable of vegetating. I conſidered the earth, when hot and dry, as a kind of ſtove, in which the ſeed, if it remain too long without receiving any moiſture, may become ſo dry, that the greateſt part of it will never be able to ſprout. This reaſoning is juſt, and I therefore determined to have recourſe to that truſty guide, experience.

" On the 18th of July, 1754, at four o'clock in the afternoon, I placed M. de Réaumur's thermometer two inches deep in the earth, and ſcreened it from the immediate impreſſion of the rays of the ſun. The liquor roſe to the thirty-firſt degree, which ſhewed me the heat of the earth.

" The thermometer being afterwards expoſed to the ſun, the liquor roſe to thirty-ſix degrees.

" The ſame day, I ſowed eighty grains of wheat in this ground. The heat continued nearly the ſame during the reſt of that month, and almoſt all Auguſt. On the 31ſt of July, only ten grains had ſhot up, and on the 16th of Auguſt there were in all ſixteen; after which, not one more roſe: conſequently ſixty-four grains out of the eighty never ſprouted at all.

" On the 28th of July I ſowed fifty grains. Only four of them roſe by the ſixteenth of Auguſt, and not one after. Here were again forty-ſix grains which did not grow at all.

" The ſame day, I ſowed ſixty grains in another place. On the 16th of Auguſt only ſix grains had ſprouted, and not one plant more ever appeared after: conſequently here too were fifty-four grains which never grew. All theſe grains were ſowed in my garden, in exceeding good mould.

" I was ſure that the wheat which I ſowed was perfectly ſound, and in every reſpect capable of growing. It was therefore quite clear, that ſo great a number of grains out of the whole, which did not ſprout at all, had loſt the faculty of growing, by their being parched up by the heat and dryneſs of the earth. To be ſtill more certain of this, three weeks after I had ſowed theſe grains, I watered half of them ſeveral times; but to no purpoſe: not one of them roſe, and I found ſeveral of them quite whole in the earth where I had ſowed them.

" After this experiment, on the 11th of Auguſt I ſuſpended the ſowings I had begun on the 8th, and did not reſume them till the 26th, after ſome rain which fell on the 22d and 23d. Theſe laſt ſowings roſe much better than the firſt."

Upon the whole, M. de Chateauvieux concludes from his own repeated practice, that the beſt time for ſowing in ſuch a climate as Geneva (which differs very little from ours,) is, from the 20th of Auguſt to the end of September; and thinks that even the firſt fortnight in October may be taken in, if the land cannot poſſibly be ſowed ſooner. But he allows of this only in a caſe of neceſſity, and judges that, rather than ſow later, it is beſt to ſtay till ſpring.

" Thus, ſays he, it is that experience and obſervation teach us to leave off bad cuſtoms, of ſuch as are not founded on principles with which a man of ſenſe can reſt ſatisfied."

It is of the greateſt conſequence to farmers that every ſeed be placed in the earth at a proper depth, and in the beſt manner: but experiments are yet wanting to determine with due exactneſs, what is the depth which beſt ſuits each kind of grain, in different ſoils,

The method which Mr. Tull propoſes, is a very good and eaſy way to aſcertain this point for each particular ſowing. Take, ſays he, twelve ſticks, or gauges; bore a hole in one at the diſtance of half an inch from the end, in the ſecond at an inch, and ſo on, increaſing half an inch to each of the twelve. Drive a peg into each of theſe holes: then, in the ſame ſort of ground as you intend to plant, make a row of twenty holes with the half inch gauge; put therein twenty good ſeeds; cover them up, and ſtick the gauge at the end of that row; then do the like with all the other eleven gauges. This will determine the depth at which moſt ſeeds will come up; and the drill, if that inſtrument be uſed for the ſowing, muſt be ſet accordingly.

Upon the ſame principle, M. Duhamel dug a trench twelve feet long, ſloping it gradually from the ſurface at one end, to the depth of two feet at the other. He then ſowed different ſeeds in this trench, and, having put the earth into its former place, obſerved, 1, That hardly any ſeeds riſe when buried deeper than nine inches: 2, That ſome ſeeds riſe extremely well at the depth of ſix inches; and 3, That other ſeeds do not riſe at all when they are above one or two inches deep. Experience ſhews, that the ſame ſeeds may be ſowed deeper in a light, than in a heavy ſoil; that grains which lie too deep in the earth to ſpring up in a dry year, may riſe in a warm and moiſt ſeaſon; and that others which are buried ſtill deeper in the ground, will ſometimes remain there ſound and unaltered for ten or twenty years, at the end of which they will grow extremely well, and produce their proper plants, if they chance to be brought to the ſurface, by moving the earth, as was mentioned before.

The uſual way of ſowing in broad caſt cannot anſwer all the intentions of placing the ſeed properly in the earth, and muſt be attended with ſeveral inconveniencies; ſuch as, the ſeed's becoming the prey of various birds and animals; its being laid ſo ſuperficially, that the ſun often parches it up, or a long continued rain, inſtead of promoting a kindly vegetation, ſoaks into the grains and burſts them; the ſeed is very unequally ſowed, becauſe of the inequality of the handfuls which different ſowers graſp: and great part of it neceſſarily falls together into hollows, where the ſurface of the ground is at all unequal, &c.

Senſible of theſe diſadvantages, farmers have, eſpecially for their winter grain, adopted the method of ſowing under furrow, that is, ſowing one half of the ſeed in broad caſt, and then plowing it in, and afterwards ſowing the other half, which is covered by harrowing. But this method is alſo liable to almoſt as many objections as the other: for the quantity ſown in each particular ſpot, and the equal diſtribution which ought to take place throughout the whole, cannot but be even more uncertain than in the broad caſt, where the whole is ſowed at once; nor dares the farmer, in this ſowing under furrow, to omit ſowing the ſecond quantity, leſt great part of what has been plowed down be buried ſo deep that it cannot riſe, eſpecially if the ſoil is at all ſtrong.

Another general fault in the common ways of ſowing, is, that too much ſeed is employed; partly, becauſe cuſtom has eſtabliſhed a kind of rule in that reſpect, and partly on account of the allowance which it is neceſſary to make for what the birds eat, and for what lies too deep ever to riſe; circumſtances by which a very great quantity of corn is abſolutely loſt.

Theſe inconveniencies are prevented by the drill, which, 1, drops the ſeed at whatever depth and diſtance experience has ſhewn to be fitteſt for the particular kind which is ſowed; 2, fills all the furrows with earth, ſo that none of the grain remains uncovered; and 3, lets fall into each furrow the exact quantity of ſeed which has been found to be moſt proper. By this means every ſeed is ſo rightly placed in the earth, that we may be confident they will all do well, if they are not hurt by inſects. But as this inſtrument ſows only the abſolutely neceſſary quantity of ſeed, the huſbandman ought to be certain of the growth of every grain: becauſe it often happens, that part of the ſeed is imperfect and does not ſprout at all. As the eye cannot diſtinguiſh its quality, he ſhould aſſure himſelf of it, by previouſly ſowing fifty or an hundred grains taken by chance, but exactly counted: when theſe ſpring up, the number of plants will ſhew what proportion is deficient, and the quantity of the ſeed ſhould be increaſed accordingly. To know what ſpace ſhould be left between each ſeed thus planted in the furrow, for that ſpace ought to be different according to the nature of the plant, it will be neceſſary to obſerve how much ground a ſtrong and vigorous plant of the ſame kind takes up when arrived at its greateſt perfection, which it will moſt probably attain when cultivated according to the new huſbandry; and the drill may then be ſet ſo as to drop each grain at a due diſtance.

Beſides leaving ſtated diſtances between each of the ſeeds which the drill depoſits in the furrow, a farther eſſential object in the new huſbandry, is to leave proper ſpaces between the rows of corn, which, in this method, are ſowed with the greateſt regularity, nearer together, or farther aſunder, according to the nature of the plants intended to be cultivated. Some do beſt in ſingle rows, others in double, others again in triple rows, and others in quadruple; as will hereafter be more fully ſhewn by ſeveral experiments. *See the article* DRILL-PLOUGH.

SOW-THISTLE, a ſpecies of thiſtle common in cornfields and paſtures.

SPADE, a well known inſtrument uſed in digging.

SPANCEL, a rope to tye a cow's hinder legs.

SPATLING-POPPY. *See* CHICKWEED.

SPARSED-LEAVES, are thoſe which are placed irregularly about the ſeveral parts of a plant.

SPAVIN, a diſeaſe in horſes, being a ſwelling in or near ſome of the joints, and cauſes a lameneſs.

There are two kinds of ſpavins, called a blood-ſpavin, and a bog-ſpavin.

A blood-ſpavin is a ſwelling and dilatation of the vein that runs along the inſide of the hock, forming a little ſoft ſwelling in the hollow part, and is often attended with a weakneſs and lameneſs of the hock.

The cure ſhould be firſt attempted with reſtringents and bandage, which will contribute greatly to ſtrengthen all weakneſſes of the joints, and frequently will remove this diſorder, if early applied: but if, by theſe means the vein is not reduced to its uſual dimenſions, the ſkin ſhould be opened, and the vein tied with a crooked needle and wax thread paſſed underneath it, both above and below the ſwelling, and the turgid part ſuffered to digeſt away with the ligatures: for this purpoſe, the wound may be daily dreſſed with turpentine, honey, and ſpirit of wine, incorporated together.

A bog-ſpavin is an encyſted tumor on the inſide the hough, or, according to Dr. Bracken, a collection of browniſh gelatinous matter, contained in a bag, or cyſt, which he thinks to be the lubricating matter of the joint altered, the common membrane that incloſes it, forming the cyſt: this caſe be has taken the pains to illuſtrate in a young colt of his own, where he ſays, When the ſpavin was preſſed hard on the inſide the hough, there was a ſmall tumor on the outſide, which convinced him the fluid was withinſide the joint: he accordingly cut into it, diſcharged a large quantity of this gelatinous matter, dreſſed the ſore with doſſils dipped in oil of turpentine, putting into it, once in three or four days, a powder made of calcined vitriol, allum, and bole: by this method of dreſſing, the bag ſloughed off, and came away, and the cure was ſucceſsfully compleated without any viſible ſcar.

This diſorder, according to the above deſcription, will ſcarcely ſubmit to any other method, except firing, when the cyſt ought to be penetrated to make it effectual; but in all obſtinate caſes that have reſiſted the above methods, both the cure of this, and the ſwellings called wind-galls ſhould, I think, be attempted in this manner. If, through the pain attending the operation or dreſſings, the joint ſhould ſwell and inflame, foment it twice a day, and apply a poultice over the dreſſings till it is reduced.

SPAYING, the operation of caſtrating the females of ſeveral kinds of animals, as ſows, bitches, &c. to prevent any farther conception, and promote their fattening.

It is performed by cutting them in the mid flank, on the left ſide, with a ſharp knife or lancet, taking out the uterus and cutting it off, and ſo ſtitching up the wound, anointing the part with tar, and keeping the animal warm for two or three days. The uſual way is to make the inciſion aſlope two inches and a half long, that the fore finger may be put in towards the back to feel for the ovaries, which are two kernels as big as acorns on both ſides of the uterus, one of which is drawn to the wound, the ſtring thereof cut, and thus both taken out.

SPELT, the name of a ſpecies of grain, which though commonly reckoned a ſummer corn, is ſowed either in autumn, or in the ſpring, at the ſame time as wheat and rye. This grain, of which there are two ſorts, one with a ſingle, and the other with a double chaff, though both have always two ſeeds in each huſk, was formerly much eſteemed in Italy and Egypt, and is now very common in Germany, where they make of it bread, which is very nouriſhing and well taſted, but hard to digeſt. They likewiſe brew beer from it in ſome places. It was of this grain that the ancients made their frumenty, of which they were very fond. Though commonly ranked as a ſpecies of wheat, which it is not unlike when growing, its grain is ſmaller and of a blackiſh hue, its ſtalk thinner and leſs firm, and its ear flat and bearded, with ſeeds only on each ſide. Some writers diſtinguiſh a third ſort, by the name white-rye, which they take to be the olyra of the Greeks and Latins; and ſeems to be what Mr. Mortimer calls taitico-ſpeltum, a ſort of naked barley, or wheat barley, cultivated in Staffordſhire, ſhaped like barley, but with a grain like wheat. It is much ſown at Rowley, Hamſtal, and Redmore, where they call it French barley. It makes good bread, and good malt, and yields a good increaſe; and therefore would do well to be tried in other places. It ripens early, does beſt in a dry ſoil, and is not apt to be much hurt by birds, from which its beard and double huſk preſerve it.

SPIKY-ROLLER, a very uſeful inſtrument in huſbandry, lately introduced by the ingenious Mr. Randall, of York, who has alſo obliged the world with the following account of it.

" I think, ſays Mr. Randall, it was in the ſpring of 1752, when I had fifty acres of ground, deſigned to be ſowed with barley, at one particular farm; but the weather had been ſo unfavourable, and the ſpring ſo extremely dry, that there was no ſuch thing as preparing the ground for the reception of the ſeed: and this was the caſe with the whole country, in theſe parts of England. On looking, one morning, at a barley roller, they laid juſt before me, I recollected, that Mr. Ellis, in one of his eight volumes in Huſbandry, made mention of a ſpiky roller, and referred the reader to another volume for its plate and deſcription, which were no-where to be found. I immediately ſent for ſome workmen, and produced this uſeful inſtrument againſt the next morning, as the ſeaſon was far ſpent, and much ground was to be ſowed, in ſeveral farms, with this grain.

" On this morning, a neighbouring, ſubſtantial farmer, paſſed by us, with half the country for clotters, as we were going to put the horſes to the roller, as he had no longer patience to wait for rains, to reduce the rough ſtate of his ground, deſigned for barley-ſeed: he gazed at the roller, ſmiled, and went his way, with his troop. They, after clotting two acres, all returned the ſame way at night; their maſter rolled his eyes all over a field of about twenty acres, ſaw it perfectly fine (as the roller came back upon the ſame ground it went down), and, after a pauſe, ſaid, that was a good hedgehog, for doing ten times more in one day than all his troop together, and ten times finer, than a thouſand clotters could do, in the ſame time. This was the firſt time this farmer ever could be brought to ſay a civil thing of any uſeful inſtrument, though common ſenſe would pronounce the utility of this on his firſt ſeeing it; but the truth is, nothing but ſuch glaring effects can ever convince theſe people, as they have the great art of deſpiſing what they do not underſtand, or have not had in practice for ten centuries.

" While the ſame man was going over the other ground that ſtood in equal need of the roller, the ploughs were ſet on to turn up the ground he had rolled; and, when all was thus ploughed, the roller went again over the whole, to cruſh the clots, thus turned up, and made all as fine as before, by going twice in a place: then they ploughed for a ſeed furrow, ſowed the ſeed in the uſual way, and harrowed it in; then the roller, with a thorn buſh faſtened behind, went over again, once in a place, and left all exceeding fine, which even would not have diſgraced a gardener in his manner of preparing the ground for the garden culture in general.

" The conſequence of this lucky hit was, that, before the country could get their ſeed into the ground, my barley was fairly up, went forwards, and did extremely well; while, in general, my neighbour's barley made but a ſorry appearance, ariſing from the rough ſtate of the ground, which they could not bring into that fine order this grain requires, notwithſtanding all their toil and expence. This atchievement of the ſpiky roller eſtabliſhed its reputation, among the neighbouring farmers; but ſtill they could not prevail on themſelves to be at the expence, which indeed was not ſmall, in having one made for their own uſe. The reſult of all was, that I had other rollers made for the ground in other parts belonging to me, only they were made heavier, and both longer and larger, the better to ſuit the ſoils that were much ſtiffer.

" From this time we never ſowed any ſeed in the common form, but the ſpiky roller, and thorn buſh at its tail, followed the harrows; as it effectually buried the ſeed, and left the ground in a fine ſtate. It may eaſily be conceived, that this operation is of conſequence to vegetation: for the fine mould, being thus ſwept into the holes made by the irons, and where the ſeed was buried, muſt needs greatly promote their growing ſoon, and nouriſh them well above-ground; as it is well known, the finer the mould is, where the ſeed is depoſited, there vegetables are puſhed on to their deſtined maturity, if all other requiſites concur. And upon this principle it is, that if the corn in the ſpring is rolled once in a place in like manner, the owner will be far from having any cauſe to complain of the practice, provided the weather, and ſtate of the ground, will or ought to bear the tread of the horſes, and weight of the ſpiky roller.

" I am very ſenſible this will appear ſtrange to many perſons, as it looks like ſending a herd of rapacious wolves to nouriſh a flock of tender lambs, or tearing, bruiſing, and throwing all the corn up from their very roots, and bringing on a general deſolation over all the ground. This is like Siſyphus in Homer: we crop the ground with much ſweating and tugging, and then ſuffer all to be deſtroyed again, by this ponderous, grinning creature. But it may not, perhaps, be ill expreſſed, when we ſay, that, in order to come at the truth of things in farming, we muſt, according to the Greek epigram, aſcend downwards, and deſcend upward: the moſt triumphant ſucceſs, in the true bias of nature, in eſtabliſhing agriculture, riſes ſafely and ſurely on the foundation laid by bold experiments, that ſeem to contradict ſuperficial reaſon.

" Let us now conſider the effect of this terrible deſolator, as it goes over the young corn. If we conſider the ſyſtem of irons on the roller, they muſt leave ſome of the corn untouched by them, and then this is only rolling the corn in the common way, as it is only ſqueezed by the roller, and not bruiſed by the irons: ſo far there is no harm done. There muſt be corn, you will ſay, that is cruſhed and bruiſed, if not quite deſtroyed, by the violence of the irons: but ſuppoſing the corn loſt, whereever the irons pitch, which is very far from being the caſe; yet the untouched corn will be ſo improved, by this ſhattering and looſening of the ſoil about their roots, and ſcraping of the mould by the thorn buſh, and ſhaking and tearing the tender blade, that the owner will judge for himſelf, whether the Greek epigram ought to have a place among the paradoxes in agriculture. However, it can do no gentleman much harm to let the roller go down in one place, and up again in another, and give over; and this ſingle trial is all that the author pleads for, and that the weather and ſtate of the ground be ſuch, as will ſafely admit of the experiment.

“ The uſe of the roller, in making the fallows, and preparing the ground to a requiſite degree of fineneſs, in the old, new, and what this Treatiſe calls the Semi-Virgilian Huſbandry, is, by this time, pretty evident to the reader, and needs no more inſtances, where ſuch perfection is deſired. We come now to ſpeak of its uſe on graſs-land, where the ſwarth is worn out by age, ſpoiled by moſs, or a bad ſort of graſs; or defective in any ſhape, from ſome cauſe or other, and yet it is very dangerous to plough it up, and lay it down better, on account of its ſituation, or it is not convenient, perhaps, for other reaſons, to diſturb it with the plough: whatever the caſe is, the owner, undoubtedly, would be exceeding glad to have a better burden of graſs on the ground, for the maintenance of his live ſtock, or for the pleaſure of ſeeing his ground, about his houſe, put on a better appearance.

“ Here, then, there muſt be ſome compoſt prepared; that is, a mixture of the dunghill, ſods, aſhes, lime, mould, ſoap-aſhes, and ſuch like ingredients, or as many of them as can be conveniently procured, laid up in a heap, in this manner: a ſtratum of mould, about half a foot deep, then dung, then ſods, then ſoap-aſhes, then common aſhes, then lime, then dung; and to cover all with mould, about half a foot deep. When theſe have laid ſome time, that the dung may communicate its juice to the ſtrata beneath, the heap may be thrown down with ſpades, ſo as, in the operation, theſe ingredients, being mixed together, the firſt ſtratum, of half a foot, of the new heap, may be compoſed of all the ingredients; and ſo, in like manner, all the reſt of the ſtrata, till the new heap is compleated; and after theſe have laid ſome time, they will be very mellow, and fit for uſe the Michaelmas after the winter when the firſt heap was formed.

“ We muſt now ſuppoſe the cloſe, whoſe ſwarth is to be improved, to have been laid down even, and not in ridges; and that between Michaelmas and Martinmas, the ſooner after the former the better, the ground is to be ſo moiſt, as to admit the irons of the ſpiky roller, but not the horſes feet; that is, the irons will penetrate three inches, or thereabouts, and the horſes feet make little or no impreſſions. Here, then, the roller muſt go up and down, till the ſwarth and ground are pretty well broken up: this being done, the ſeeds of clover, trefoil, and rye-graſs, or any other mixed with them, muſt be ſown, in the uſual way, and quantity: then the compoſt muſt be ſpread over the ſeed, ſo as to cover them, and a common barley roller, with a thorn buſh faſtened to it, muſt follow, and the ground ſhut up, leſt cattle ſhould do harm, by treading the ground. A gentleman, making this experiment, will have great cauſe to be pleaſed with what he has done; and will, alſo, ſee the neceſſity of laying down his ground as even as poſſible for the future, that he may increaſe the burden of his graſs, whenever it falls ſhort of a proper quantity, or quality.” *Randall's Semi-Virgilian Huſbandry*, *Append. page* 1.

We have added the figure given of this uſeful inſtrument by the above ingenious gentleman, on Plate XXIV. Fig. 5.

A correſpondent of the editors of the Muſeum Ruſticum, who calls himſelf a clay farmer, has made the following obſervations on the ſtructure and utility of the ſpiky roller.

“ Give me leave, ſays he, to communicate, to my brother farmers, a moſt uſeful implement in huſbandry, which has but of late been introduced amongſt us. It is ſo very efficacious, and its powers ſo much ſuperior to all other inſtruments yet contrived for the reduction of ſtrong land, that, I think, there is not any poſſeſſor of ſuch ground (who has no objection to a fine ſeed furrow) that will be without this inſtrument. This laſt autumn it has been of the greateſt utility. For whilſt the neighbouring farmers were waiting for rain, ſo that they might with their own rolls and harrows bring their land to that degree of fineneſs they could wiſh to have their ſeed ſown in: thoſe who were poſſeſſed of the ſpiky roller, (for that is the name of the implement I am going to give ſome faint idea of, as it is impoſſible by letter to make any body more fully acquainted with it) had their fallows in ſuch a degree of fineneſs, as I never before ſaw that kind of land in; and had finiſhed the whole of their ſowing, before the others ever thought of taking their ploughs, &c. into the field.

“ To begin then with the beſt deſcription I can give of the moſt complete I have yet ſeen. The roller is of oak, ſix feet three inches long, ſeventeen inches diameter, hooped with iron at each end; the circumference divided into eighteen equal parts, where rows of iron ſpikes are ſet (in the quincunx order) at ſix inches diſtance, one from the other, in the rows: ſo that there are thirteen ſpikes in one row, and twelve in every other throughout the circumference. The number of the ſpikes is two hundred and twenty-five. They are to project four inches and a half from the roller, and to be one inch by three quarters of an inch ſquare at that part of the ſpike next the roll, tapering off to three quarters of an inch by half an inch at the top part. The whole length of the ſpike, with what is driven into the wood, will be about nine inches long. And I would adviſe the falling ſide at the end of each ſpike to have a ſtroke or two with the hammer, that they may be a little more pointed to give them greater facility in penetrating the very hard clots they are deſigned to break. Every ſpike will weigh about one pound and a quarter, which will be of ſufficient ſtrength.

“ The frame ſhould be made for horſes to draw a-breaſt, or with a pole for oxen. For by the horſes, &c. drawing double, the roll is more eaſily turned; and, beſides, it is likely to prevent the end of the roller from going over the driver, if by chance he ſhould fall. That it may with greater eaſe and conveniency be conveyed from field to field, or to any diſtance, an axis is fixed upon the frame immediately above the roll with wheels; ſo that by turning the frame, the wheels take up the roll, and away you may drive. And, when you have brought it to the field, in order to make uſe of it, by turning the frame back again, you let down the roll, and then the wheels are carried by the roller.

“ Since making of the above deſcription, I have talked with the wheelwright, who tells me, he could greatly improve the manner of fixing the wheels, by making them run within the frame: for as they now run without, it ſets the wheels at ſuch a diſtance, as makes it difficult to paſs through gates made only the common width. And likewiſe ſays, that great care muſt be taken in fixing that part of the frame which the gudgeons of the rolls runs in: for by that means the roll will be let down with greater eaſe; which will not be the caſe, if regard is not paid to that particular. The roller, frame, wheels, &c. are, together, about eleven hundred weight.

“ If your land, by once paſſing over it with the roller, is not ſo fine as you could wiſh to have it, let a large harrow be faſtened to the frame of the roller, which will pull up the remaining clots, and thereby give the roller a better chance for breaking of them the ſecond time going over. Four able horſes are equal to this work.” *Muſeum Ruſticum*, *vol.* V. *page* 372.

Theſe obſervations induced the inventor, Mr. Randall, to ſend the following letter to the editors of the Muſeum Ruſticum.

“ In your Muſeum for laſt December, ſays he, I obſerve my name mentioned concerning the ſpiky roller. Without making any comment on the clay farmer's dimenſions, for conſtructing this implement of huſbandry, I beg leave to tell him, and the reſt of your readers, that the length of mine, which was the firſt I ever ſaw or heard of, except what the late Mr. Ellis mentioned to ſo little purpoſe, was ſeven feet, the diameters of the ends eigh-

PLATE XXIV. *Facing* Spiky-Roller.

Fig. 1.

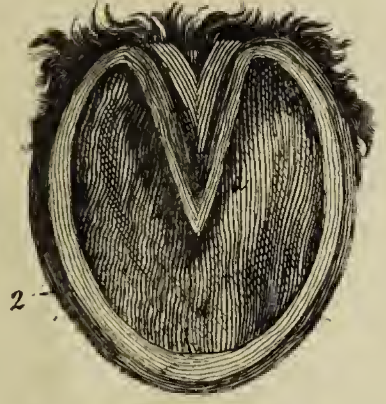
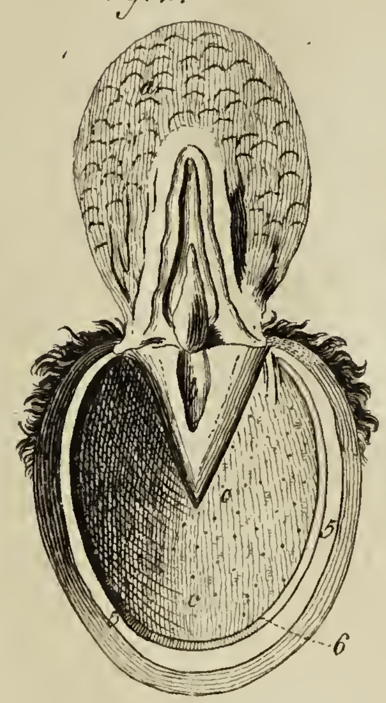


Fig. 2.



The new half-Moon Shoe. Fig. 4.

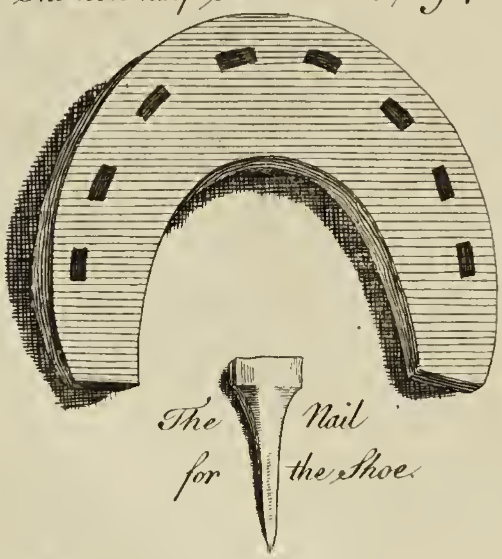


Fig. 5. Spiky-Roller.

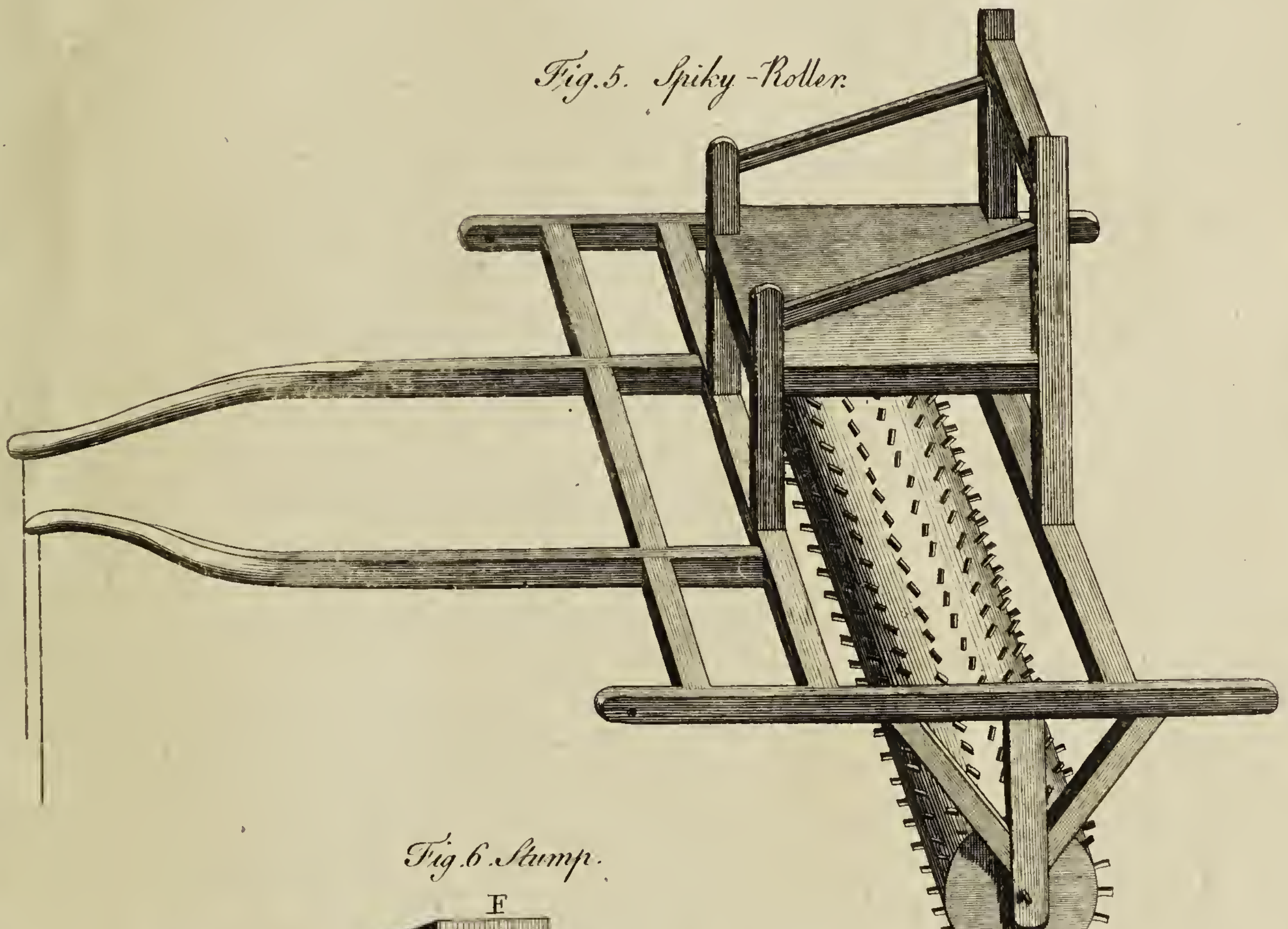


Fig. 6 Stump.

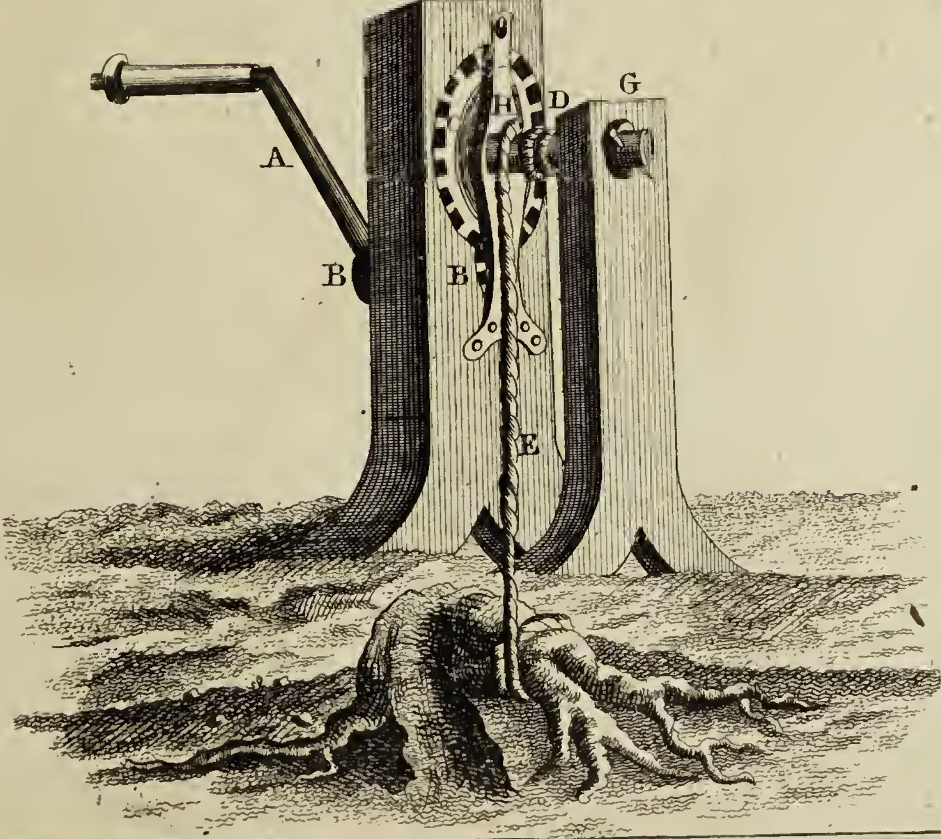
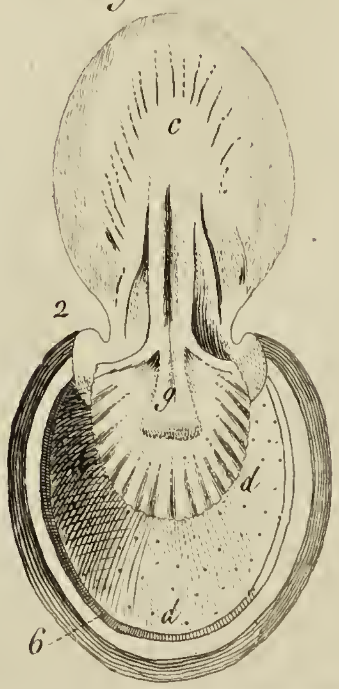


Fig. 3.



teen inches, and the whole cylinder made of the heart of oak: and when the irons were burnt in, and the man ſeated on the box deſigned for that purpoſe, the weight of the whole was about a ton. But you will think it ſtrange, that the blunt end of the irons were oppoſed to the clods, and run more taper, till they came to the ſurface of the cylinder, into which the irons were burnt, and inſerted about three inches: which was their length above the ſurface of the roller, and which, I always found, very ſufficient to cruſh the hardeſt clod that ever came in their way. Had I, indeed, attempted to go on the ground, when the ſoil was not perfectly dry, this poſition of the irons would have carried the clods round with the roller: for it is not its province to ſqueeze but cruſh. Nor indeed can a man do more harm to his ground, than going upon it, when it is not quite dry, with a roller, conſtructed according to the clay farmer's form and ſize of the irons; or by that which I have recommended. I am ſenſible, thoſe, who conſtruct the roller, according to the clay farmer's directions, imagine, that by inverting the ſhape, there is leſs danger of carrying the moiſt clods round with the roller: but, I muſt ſay again, there is no occaſion for this precaution: for, if the other form be at all neceſſary, it muſt be in the moiſt ſtate of the ground: which is the only reaſon, we ſhould keep the roller off the ſoil. I had the irons fixed in four inches aſunder, in the firſt row, from end to end. The ſecond row began juſt between the firſt and ſecond irons of the firſt row. The third row was like the firſt; and the fourth like the ſecond. Then alternately for the whole ſurface of the cylinder, as near as could be, the irons were four inches aſunder in each individual row, and four inches from row to row, as nearly as the ſuperficies of the cylinder would permit. I do not know how to convey a juſter idea to your readers of the ſhape of the irons, than to call them ox-harrow-teeth. For when I ſent for the workman, I deſired him to make ſo many of this denomination, ſix inches in length; and burn the ſmall end three inches into the wood: he went from me, as perfectly underſtanding what I meant; brought his number of irons; and inſerted them a proper depth into the cylinder. If ſome of your ſouth-country readers ſhould be at a loſs to know what is meant by ox-harrow-teeth, they will be pleaſed to remember, that they are irons faſtened into two harrows, which are drawn by either four oxen and two horſes, or ſix oxen alone, in very ſtiff ſoils. Now, it will appear to you, that the roller itſelf, and one harrow, will require at leaſt four able horſes, according to the clay farmer's ſtating the caſe: but my roller, without harrows, always ſtood in need of three ſtout horſes, which the man, from his box, always drove a-breaſt, for the greater convenience of turning on the land's ends. But were I to have two ox-harrows, (which would only extend the length of the roller) following the roller, for the purpoſe of tearing up clods, in order to be cruſhed, on going a ſecond time over the ſame, ſeven feet in length, I ſhould be obliged to have a much ſtronger team than four ſtout horſes; and, therefore, I muſt beg leave to obſerve, for this, an unanſwerable reaſon, that harrows are better omitted; as they always were, by my people, who ſet in with their ploughs, and turned up the ſoil from all requiſite depths, in order to have it cruſhed by the roller going twice in a place.

" If the clay farmer will not take it amiſs, I would tell him, that wheels to the roller only create expence and trouble. For I do not remember we ever had any diſadvantage from the weight of them in my four rollers, made for near a thouſand acres of land, of all denominations of ſoils, ſtiff and light: for, when the fellows had occaſion to convey the roller from one incloſure to another, and ſometimes over the hard high road, I never heard, or obſerved, there was the leaſt difficulty of doing it: as the irons were ſo ſtout, as not to receive any injury in the paſſage, otherwiſe than by friction; by which they would be indeed in time ſomewhat impaired. As to the width of the gates, I think there was never any ſtoppage; ſince the men, when they found the paſſage rather too ſtrait, could, by turning the horſes heads, eaſily inline the roller on one ſide, and by that means wriggle it in, where it was too long for entrance. Let who will be the father, or grandfather of this valuable inſtrument of huſbandry, I had reaſon to be extremely well pleaſed with my lucky hit, in conſtructing it from Mr. Ellis's barely mentioning a ſpiky roller: though, from his uſual giddineſs, he gave his readers no more than the name. As it is of conſequence to the world, to keep the expence of this inſtrument as low as poſſible, I ſhall be very ſorry to hear any more of wheels; for it may deter farmers from uſing it; and without their hearty concurrence, all will be only playing at farming. Gentlemen may pleaſe themſelves in every variation of the implements, and modes of culture: but without the aſſiſtance of thoſe, who bleſs the nation with their endleſs toil, a thouſand years hence will be as to-morrow.

" Beſides the purpoſes already mentioned, this roller muſt undoubtedly be of uſe in laying, originally, down lawns, or large pieces of graſs required to be level. Mr. Randal only mentions the reſtoring ſuch when depraved: but certainly this inſtrument muſt be extremely effectual in the caſe of all ſtiff lands, for the producing a good face in the firſt forming of fine pieces of graſs. The manner of doing this, in ſuch caſes, is too obvious to perſons qualified for executing ſuch work, to require any explanation: as the inſtrument may be uſed concurrently with any of the common methods of manuring and ſowing graſs ſeeds, as well as with Mr. Randal's compoſt, &c. they being no ways particularly neceſſary to the effects of the roller, though it may greatly aid them.

" This roller may likewiſe be very uſeful in preparing clay for the making canals or pieces of water. For where, as ſometimes happens, the clay grows dry, and will not admit of being duly tampered for uſe without great pains in breaking it, a very large quantity may very ſoon be reduced to the requiſite fineneſs, by ſpreading it on hard ground in a due thickneſs, and paſſing this roller a few times over it. In very great works, much trouble and labour may be ſometimes ſaved, by this means, where ſuch a roller is at hand; and the clay prepared in a manner that will anſwer the purpoſe much more effectually.

" It is certainly an inſtrument, which no farm, where the land is ſtiff, or in the leaſt liable to clot, ſhould want. For beſides the conſtant advantage of ſaving labour, and bringing land to a better condition for any kind of ſowing than the plough and harrow with any aſſiſtance of the work of hands can make it, in unfavourable ſeaſons and under ſuch circumſtances as Mr. Randal has mentioned in the above quotation, the loſs of the whole crop by an otherwiſe unavoidable delay beyond the ſeed time, may be with certainty prevented."

We ſhall conclude this article with the following ingenious account of the uſes of this inſtrument, which we have been favoured with from Mr. John Berington, of Winſley, near Hereford.

" As I live, ſays he, in a clay country, and had been often put to a great deal of difficulty in a dry unkind ſeaſon, in reducing the land to a proper tilth, I reſolved to make trial of Mr. Randal's ſpiky roller; but apprehending great ſtreſs muſt lie upon the horſe and frame, in turning ſuch, as well as tearing up the ground, it occurred to me, that I had ſeen recommended a double roller, that is, one divided in two parts. It is very probable that you have it already in deſign, if not, the following directions I imagine may ſuffice.

" Let the ends of each part be bound with narrow but ſtrong bands of iron, and let the ſpikes at the ends be placed cloſe to them; let each part have a ſeparate frame, but let the cheeks in which the inward gudgeons turn, be made of iron plates, about two inches wide above, and four where the gudgeons enter; the thickneſs, a common flat bar of iron; and theſe fixed, in any firm manner, to two cheeks of wood reaching down juſt to the bands, and of ſuch a thickneſs at bottom as not to interrupt the ſpikes. Let the inward gudgeons be made with quite flat heads, to prevent their ſlipping out in working; and this brings the two ends of the roller near together, which is of ſome little conſequence, as the fewer clots will be miſſed in working.

" Let the frames be joined together by four eyes, like thoſe of a ſmall gate, two at one end about five or ſix inches apart; the two at the end of the other, to take place juſt within them; an iron pin through all four, and keyed. Let the trills be placed juſt on the middle of each frame, and a bar of wood juſt behind the horſe to ſtrengthen them; the bar ſawed through in the middle, and joined by a ſtrong flat hinge; one ſide made to haſp upon a ſtaple, kept down with a wooden clet. This gives the whole proper play in working; and I may venture to affirm, it will be found, next to the plough, the moſt uſeful inſtrument in tillage, not only in reducing a ſtiff ſoil, but with a buſh at its tail, as Mr. Randal expreſſes it, will cover the ſeed when ſown much more effectually, and in a better manner, than a harrow, as it turns up the earth light and fine behind it; and though ſeemingly unweildy, will turn with eaſe, and may be worked with one, two, or three horſes at moſt, upon any land that is of a proper dryneſs to work upon, of which I cannot well forbear giving you an inſtance: the carter that was to drive it exclaimed, when he firſt ſaw it, that it would kill all his horſes: ſome time after, as he was uſing it upon a piece of fallow, a fellow-ſervant wanted a horſe for ſome uſe, and was going to catch one; the carter called to him, and told him, he might take one of his, having three, as he could do very well with two. Now I believe you will allow, that if it could ſo eaſily overcome the obſtinacy of a clown, there are very few clods that will be too hard for it.

"The ſpikes are about four inches without, and three within the wood; the thickneſs of the roller, and number of ſpikes, I think, may be determined, in ſome meaſure, by the nature of the ſoil it is to work upon."

SPINAGE, a well-known plant, cultivated in kitchen gardens.

It requires a rich, light, and well looſened ſoil. It is propagated by its ſeeds only, of which there are two ſorts, namely, the rough and prickly, which produces the prickly ſpinage with arrow-pointed leaves, and the ſmooth, from which ſprings the ſpinage with oblong oval leaves.

The ſeeds of the firſt of theſe kinds, which is by much the hardieſt, and therefore fitteſt to be cultivated for winter uſe, ſhould be ſown upon an open ſpot of ground, in Auguſt, juſt before a ſhower of rain, if it can luckily be ſo timed: for if the ſeaſon ſhould prove dry for a long while after the ſowing, many of them will not ſprout at all, and the plants of thoſe that do grow will come up ſo irregularly, that half the crop will frequently be loſt. It therefore is highly adviſable to water theſe ſeeds within two or three days after their being ſown, if rain does not fall in the mean time.

When the plants begin to be ſtrong, the ground on which they grow ſhould be well hoed, to deſtroy the weeds, and to thin the plants to the diſtance of three or four inches aſunder. This, like all other hoeings, ſhould always be performed in dry weather, the more effectually to kill the weeds: or, if it be rainy, they ſhould be carried off the ground as ſoon as they are cut up, to prevent their taking freſh root: for if many of them ſpring up, and the ſeaſon prove wet, they will ſtifle the plants of ſpinage, and make them rot. A ſecond careful hoeing is therefore neceſſary in about a month or five weeks after the firſt; and with the help of this the ſpinage will begin to be fit for uſe by the end of October. The beſt way of gathering it is, to crop off only the largeſt outer leaves, and to leave the middle ones to grow bigger: for by this means a regular ſupply may be had during the whole winter, and even till the ſubſequent ſpring ſowing ſhall have produced plants large enough for uſe, which generally is in April. The winter ſpinage will alſo then be ready to run up, and ſhould therefore be entirely cleared off, unleſs a parcel be left for ſeed, if wanted. But if early cabbages, which will want earthing up, have been planted among this ſpinage, as is the uſual practice of the gardeners about London, a ſeparate ſmall ſpot of ground ſhould be allotted purpoſely for ſowing ſome of this ſpinage for ſeed, without any other plants among it, and to cut up all the remains of the other winter crop, as ſoon as the ſpring ſpinage is fit for uſe.

The oblong oval leaved ſpinage, commonly called plantain ſpinage, which has thicker leaves and more ſucculent ſtalks than the former ſort, is ſown in the ſpring, likewiſe upon an open ſpot of fine rich earth. The London gardeners, who always endeavour to have as many crops in a ſeaſon as they poſſibly can, generally mix radiſh ſeeds with thoſe of the ſpinage which they ſow at this ſeaſon: but the beſt way for thoſe who have ground enough, is to ſow their ſpinage ſeeds alone. This crop muſt be hoed, cleared from weeds, and thinned, in the manner before directed for the winter ſpinage; and when the plants, which were at firſt left three or four inches aſunder, have grown ſo as to meet, it will be right to cut them out here and there for uſe, and to thin them in this manner, as they are wanted for the table, till thoſe that are left, ſtand eight or ten inches aſunder. The thinnings in the mean time will give the remaining plants room to ſpread; and if, after this laſt, the ground between them is well ſtirred to a good depth, and kept perfectly clear from weeds, this ſort of ſpinage will frequently produce leaves as large as thoſe of the broad leved dock, and extremely fine.

A ſucceſſion of ſpinage may be had throughout the whole ſeaſon, by ſowing it every three weeks, from about the middle of January to near the end of May; only obſerving, that the earlieſt ſowings muſt be upon the naturally drieſt ſoils, and that the lateſt ſhould be thinned moſt at their firſt hoeing, becauſe the remains of the former crops will furniſh a ſupply till theſe are full grown, and the plants will not be ſo apt to run up to ſeed when they ſtand at a diſtance from each other, as when they are cloſe together.

In order to have good ſeeds of ſpinage, each particular ſort ſhould be ſown by itſelf, in an open ſpot of rich and well dug ground. This ſowing ſhould be in February, as ſoon as the danger of froſt is over; and when the plants are come up, they ſhould be thinned with a hoe till they are ſix or eight inches aſunder every way. All weeds ſhould at the ſame time be carefully cut up and carried off: and in about three weeks or a month after this, the plants ſhould be hoed and thinned a ſecond time. Their diſtance from each other ſhould then be enlarged to at leaſt twelve or fourteen inches: for they will cover the ground very ſufficiently after they have ſhot out their ſide branches. Particular care is requiſite at this time to keep them very clear from weeds; becauſe theſe would make the plants of ſpinage run up weak, and thereby greatly injure them.

Mr. Miller is here extremely judicious in his directions for the farther management of ſpinage intended for ſeed. "When the plants, ſays he, have run up to flower, you will eaſily perceive two ſorts among them, viz. male and female. The male will produce ſpikes of ſtamineous flowers, which contain the farina, and are abſolutely neceſſary to impregnate the embryos of the female plants, in order to render the ſeeds prolific. Theſe male plants are, by the gardeners, commonly called ſhe ſpinage, and are often, by the ignorant, pulled up as ſoon as they can be diſtinguiſhed from the female, in order, as they pretend, to give room for the ſeed bearing to ſpread: but, from ſeveral experiments which I have made on theſe plants, I find that, where-ever the male plants are entirely removed before the farina is ſhed over the female plants, the ſeed which they produce will not grow, ſo that it is abſolutely neceſſary to leave a few of them in every part of the ſpot, though a great many may be drawn out where they are too thick; for a ſmall quantity of male plants (if rightly ſituated) will be ſufficient to impregnate a great number of female, becauſe they greatly abound with the farina, which, when ripe, will ſpread to a conſiderable diſtance, when the plants are ſhaken by the wind."

When the ſeeds begin to ripen, they muſt be guarded from birds; and when they are thoroughly ripe, which is known by their changing their colour, and beginning to ſhed, the plants ſhould be drawn up, and ſpread upon cloths, for a few days, to be completely dried by the heat of the ſun. That they may be perfectly ſo, they ſhould be turned every other day; and when they are quite dry, they ſhould be threſhed out, well cleaned, and laid up in a dry place, where mice, which are exceſſive fond of this food, cannot come at them.

SPINDLING, running to ſeed.

SPILTER, an inſtrument uſed by gardeners in digging the ground; a ſpade.

SPLENT, a hard excreſſence growing on the ſhank bone of a horſe.

Some horſes are more ſubject to ſplents than others; but young horſes are moſt liable to theſe infirmities, which often wear off, and diſappear of themſelves. Few horſes put out ſplents after they are ſeven or eight years old, unleſs they meet with blows or accidents.

A ſplent that ariſes in the middle of the ſhank bone is no ways dangerous; but thoſe that ariſe on the back part of this bone, when they grow large and preſs againſt the back ſinew, always cauſe lameneſs or ſtiffneſs, by rubbing againſt it; the others, except they are ſituated near the joints, ſeldom occaſion lameneſs.

As to the cure of ſplents, the beſt way is not to meddle with them, unleſs they are ſo large as to disfigure a horſe, or are ſo ſituated as to endanger his going lame.

Splents in their infancy, and on their firſt appearance, ſhould be well bathed with vinegar, or old verjuice; which, by ſtrengthening the fibres, often put a ſtop to their growth; for the membrane covering the bone, and not the bone itſelf, is here thickened; and in ſome conſtitutions purging, and afterwards diuretic drinks, will be a great means to remove the humidity and moiſture about the limbs, which is, what often gives riſe to ſuch excreſſences.

Various are the remedies preſcribed for this diſorder; the uſual way is to rub the ſplent with a round ſtick, or the handle of a hammer, till it is almoſt raw, and then touch it with oil of origanum. Others lay on a pitch plaiſter, with a little ſublimate, or arſenic, to deſtroy the ſubſtance: ſome uſe oil of vitriol; ſome tincture of cantharides; all which methods have at times ſucceeded; only they are apt to leave a ſcar with the loſs of hair. Thoſe applications that are of a more cauſtic nature often do more hurt than good, eſpecially when the ſplent is grown very hard, as they produce a rottenneſs, which keeps running ſeveral months before the ulcer can be healed, and then leaves an ugly ſcar.

Mild bliſters often repeated, as recommended in the article ſpavin, ſhould firſt be tried as the moſt eligible method, and will generally ſucceed, even beyond expectation: but if they fail, and the ſplent be near the knee or joints, you muſt fire and bliſter in the ſame manner as for the bone-ſpavin.

Splents on the back part of the ſhank-bone, are difficult to cure, by reaſon of the back ſinews covering them; the beſt way is to bore the ſplent in ſeveral places with an iron not very hot; and then to fire in the common way, not making the lines too deep, but very cloſe together.

To SPRAIN SEEDS, ſignifies, to throw them with a ſingle motion of the hand at a certain diſtance from one another.

SPRIG, a ſmall branch, a ſpray.

SPRING, the ſeaſon in which plants vegitate.

Spring alſo ſignifies a fountain, or iſſue of water from the earth. *See the articles* DRAINING, *and* WATER.

SPRING-WHEAT, a ſpecies of wheat ſown in the ſpring. *See the article* WHEAT.

The following experiment and obſervations on the comparative ripening of ſpring and common wheat made by the ingenious Mr. John Wynne, baker, and reported by that gentleman to the Dublin Society, muſt not be omitted here.

" Some little time after receiving the inſtructions I was honoured with from the ſociety, I was deſired by the committee, then ſitting to ſettle the premiums for the ſucceeding year, to make a comparative experiment between ſpring and common wheat.

" The purpoſe of this experiment was to diſcover, whether common wheat would not ripen when ſown late in the ſpring, as well as ſpring wheat.

" Accordingly, on the twenty-eighth day of March, I ſowed two perches of each ſort of wheat in my garden, in drills three feet aſunder, at the rate of five ſtone to an acre. I had but two pounds of ſpring wheat, otherwiſe I ſhould have extended the experiment.

" The common wheat came up well, but the ſpring wheat came up very thin in the drills, which, for ſome time, I apprehended was owing to ſome fault in the ſeed; but the caſe was otherwiſe, as appeared afterwards from a ſecond ſowing in another place: add to this, that in a few days I diſcovered mice had eaten great part of the ſeed; however, ſome little of it eſcaped, and planted greatly, as did the common wheat.

" As a ſubſtitute for the horſe-hoe, which could not be introduced in theſe ſmall experiments, I uſed the ſpade; and the plants grew to admiration.

" The fatality, which attends all ſmall experiments in the corn tribe, followed theſe: for I was obliged to cut the ſpring wheat before it was ripe, the birds, in defiance of all protection, having devoured moſt of it; however, it would have ripened completely, and, as a proof of this aſſertion, I have a few ears, which I ſelected from the reſt, which are very fine.

" It may be proper to obſerve, that the ſpring wheat was more expoſed to the ravages of birds than the other, as the common wheat I ſowed was bearded, which is always a great, though not a perfect, protection to it from birds.

" The common wheat met with a diſtemper which was quite as fatal to it, as the mice and birds were to the other: this was the ruſt, or mildew. Before this diſeaſe came upon it, it was as fine corn as ever I ſaw, but it never ripened; although in appearance the ears were very fine.

" This diſeaſe attacking this corn and ſparing the other, I am inclined to attribute to this circumſtance, viz. that this was very thick and ſtrong; whereas the other was very thin, from the accident before-mentioned: perhaps, had it been as thick, it might have ſhared the ſame fate. So that I think theſe experiments are not by any means concluſive, as to the ripening of either of theſe ſpecies of wheat, when ſown late in the ſpring.

" I ſowed another plot of ground, as was before-mentioned, on the fourth of May with ſpring wheat, which came up well, grew very ſtrong, and formed very fine ears in appearance, but never ripened.

" On the twenty-ninth of April, I ſowed an acre of very good ground with common wheat, which I ſteeped before-hand in putrid water; it came up in eight days, but made no figure till June; it formed ſmall ears, but produced no grain at all.

" So far we have two concluſive experiments that ſpring wheat will not ripen when ſown in the beginning of May; and that common wheat will not ripen when ſown the latter end of April.

" Notwithſtanding that our queſtion is not anſwered by the two firſt experiments; yet the diſeaſe attending the common wheat has furniſhed ſome obſervations with reſpect to the mildew, or ruſt, upon corn and other plants, which tend principally to confirm thoſe made by the ingenious Mr. Tillet, director of the mint at Troys, and ſeem to contradict moſt of our Engliſh writers on this diſeaſe; many of whom ſeem to have implicitly followed others, who, I am afraid, have undertaken to account for, and furniſh remedies againſt, a diſeaſe, which perhaps they had never ſeen.

" Various are the opinions, and many of them contradictory in themſelves: but, upon the whole, candour obliges me to own myſelf as much at a loſs to determine with certainty the cauſe of this diſeaſe, as, I find, the many writers are, who have thought themſelves perfect maſters of it. Even by reading ſix pompous pages, which I have gone over many times, I ſhould ſcarcely know the diſeaſe, ſo faint is the deſcription; but it will ever be known by the greateſt ſtrangers to country affairs under the French name, which indeed is as truly deſcriptive as it is laconic, by them it is called *rouille*, or ruſt. By the Romans it ſeems to have been called *rubigo*.

" I ſhall omit to give my obſervations upon this diſeaſe at preſent, as it would oblige me to quote many tedious paſſages from the books; and where there is a contrariety of opinions, although without evidence: yet, a little man, with a few facts only to ſupport a new theory, would ſtand a chance of making but a poor figure.

" At preſent I join in opinion with Mr. Tillet, and Mr. Reneaume; who ſeem to think that the extravaſated juices of the plants, operated upon, and condenſed, by the acrimony of the air, I ſhould rather ſay incruſted, are the occaſion of it. To this I ſhall only add, that I am at preſent of opinion, that the lacerated parts of the plants giving paſſage to, or rather changing the courſe of, the juices before-mentioned (which are the nutriment and life of the plants) to the diminution, and loſs, of the vegetable food to the nobler parts, is the true cauſe of the plants failing in their produce: but, I repeat it, I attempt not here to account how, and from what cauſe, thoſe lacerations, which I believe to be the baſis of the diſeaſe, happen.

" The comparative experiment between ſpring and common wheat, I think, ſhould be repeated, as the diſcovery thereby ſought for tends to a public benefit: but it ſhould be in a larger way, and in an open expoſure.

" A circumſtance has recurred to my memory, which had eſcaped my attention from the time it happened, till ſince I entered upon this ſubject.

" Laſt ſpring a poor neighbour of mine told me he had loſt the ſeaſon for ſowing his wheat, for want of money to buy ſeed, but that, if he could get a barrel of Poland wheat, (as he called it) which was the white cone, he would then ſow his ground: accordingly he obtained the ſeed, and did ſow it; but I underſtand, upon enquiry, that it produced not a good crop. He ſowed it ſome time about the beginning of February.

" And yet I am informed there is a gentleman in Scotland, who makes it his conſtant practice to ſow his wheat in the ſpring by choice: and that he intends to publiſh a recommendation of that practice.

" The lateſt I ever ſowed any with ſucceſs was the 30th of December; but that was only a ſmall experiment."

SPROUT-HILL. *See the article* ANT-HILL.

SPRIT, a ſhoot or ſprout.

SPUR, a diſtemper which frequently attacks rye, and ſometimes does damage likewiſe to wheat. The following remarks will give an idea of it.

" 1. The grains which have the ſpur are thicker and longer than the ſound ones, and generally project beyond their huſks, appearing ſometimes ſtrait and ſometimes more or leſs crooked.

" 2. Their outſides are brown or black; their ſurface is rough; and one may frequently perceive in them three furrows, which run from end to end. Their outward end is always thicker than that which ſticks to the chaff, and that moſt ſwollen end is ſometimes ſplit into two or three parts. It is not unuſual to find on their ſurface cavities which ſeem to have been made by inſects.

" 3. When a ſpurred grain is broken, one perceives in the middle or centre of it a pretty white flour, covered with another flour which is rediſh or brown. Though this vitiated flour has ſome conſiſtency, it may nevertheleſs be crumbled between one's fingers. M. Aimen has indeed ſometimes found this powder almoſt as black as that of ſmutty wheat.

" 4. Theſe grains, when put into water, ſwim at firſt, and afterwards ſink to the bottom. If chewed, they leave a bitter reliſh on the tongue.

" 5. The chaff appears ſound, though what is outmoſt is ſomewhat browner than when the ears are ſound.

" 6. All the grains of the ſame ear are not ever attacked with the ſpur.

" 7. The grains which have this diſtemper ſtick leſs to the ſtalks than ſound grains do.

" 8. M. Aimen imputes this diſtemper to the grains not being impregnated; and aſſures us that he has not ever found a germe in grains which had the ſpur. The ſame obſerver has collected, in a memoir which he has ſent me, ſeveral reflections and microſcopical obſervations; but I paſs over in ſilence ſuch reſearches as are more curious than uſeful.

" 9. I ſhall not ſtop to refute the opinion of thoſe who have pretended that fogs, dews, rain, the moiſture of the earth, may give this diſtemper to rye. But I cannot help ſaying that M. Tillet thinks, as does alſo M. Aimen, that other plants, beſides rye, are ſubject to the ſpur. M. Tillet has ſeen, and M. Delu has ſhewn me, grains of wheat which had the ſpur. The ſpur ought therefore not to be confounded with the uſtilago or burnt grain: they are two different diſtempers: and what ſeems ſtill more to eſtabliſh this difference, is, that M. Tillet's experiments prove that the powder of the ſpurred grains is not contagious like that of the carious or burnt.

" M. Tillet is ſtrongly inclined to think that the ſpur is occaſioned by the ſting or bite of an inſect, which turns the rye into a kind of gall; and he ſuſpects a ſmall caterpillar of being the cauſe of this miſchief. But neither he nor I dare to ſpeak affirmatively on this point.

" Dodard, Longius, Fagon, Delahire, Noel, and, lately, M. Salerne, give particular accounts of the diſeaſes with which numbers of people have been ſeized in ſome years, owing to their having lived upon bread in which there was much rye affected with this diſtemper.

" As moſt of the diſtempered grains are much bigger than the ſound ones, it is eaſy to ſeparate the greateſt part of them by ſifting. It is what the peaſants of Sologne do, when corn is not dear; but in times of great ſcarcity or dearth, they are loth to loſe ſo much grain: and then it is that they are attacked with a dry gangrene, which mortifies the extreme parts of the body, ſo that they fall off, almoſt without cauſing any pain, and without any hemorrhagy. The Hotel-Dieu at Orleans had had many of theſe miſerable objects, who had not any thing more remaining than the bare trunk of the body, and yet lived in that condition ſeveral days.

" As it is not in every year that the ſpur in rye produces theſe dreadful accidents, Langius is of opinion that there may be two kinds of this diſtemper; one which is not hurtful, and the other which occaſions the gangrene we have been ſpeaking of. It is however probable that there is but one kind of ſpur, and that it does not hurt, firſt, when ſufficient care is taken in ſifting the grain; and, ſecondly, when only a ſmall part of the corn is diſtempered. It is alſo ſaid, that the ſpur loſes its bad quality after the grain has been kept a certain time: in which caſe, the reaſon why ſome peaſants are attacked with the gangrene in years of dearth may be, that they conſume their crop as ſoon as the harveſt is over." *Duhamel's Culture de Tenes.*

SPURRE-WAY, a horſe-way through incloſed lands, and free to any one to ride in by right of cuſtom.

SPURREY, the name of a weed common in many parts of England. It ſeldom riſes above ſix inches in height, flowers in the beginning of July, ripens its ſeeds in Auguſt, and is an annual plant.

The beſt method of exterminating this weed is by ſummer fallows, and cutting it down before it can ſcatter its ſeeds, which are very ſmall.

They cultivate two ſpecies of this plant in Holland and Flanders for the winter food of cattle, when there is a ſcarcity of graſs. It is ſaid to enrich the milk of cows ſo as to make it afford excellent butter; and the mutton fed on it is preferable to that fed on turneps. Hens alſo eat this plant greedily, and it is commonly thought to make them lay an extraordinary number of eggs.

Though this plant cannot, from the lowneſs of its growth, afford a very great quantity of fodder, yet as it will grow on the pooreſt ſand, where no other graſs will thrive ſo well, it may be cultivated to conſiderable advantage in many places; and by feeding it off the ground, the dung of the cattle will improve the land.

The farmers in the low-countries commonly ſow it twice a year; the firſt time in April or May, to be in flower in June or July; and the ſecond time after their rye-harveſt, to ſerve their cattle in November and December. The uſual allowance with them is about twelve pounds of ſeed to an acre.

STABBING *of Cattle.* *See the article* HOVEN.

STABLE, a place or houſe for horſes, &c. furniſhed with ſtalls and proper apartments to contain their food, &c.

Nothing conduces more to the health of a horſe than the having a good and wholeſome ſtable. The ſituation of a ſtable ſhould always be in a good air, and on a firm, dry, and hard ground, that in winter the horſe may go out and come in clean. It ſhould always be built ſomewhat on an aſcent, that the urine and other foulneſſes may be eaſily conveyed away by means of trenches or ſinks for that purpoſe. As there is no animal that delights more in cleanlineſs than the horſe, or that more abominates bad ſmells, care ſhould be taken that there be no hen-rooſt, hog-ſtie, or neceſſary-houſe, near the place where the ſtable is to be built; for the ſwallowing of feathers, which is very apt to happen, when hen rooſts are near, often proves mortal to horſes; and the ſteams of a bog-houſe, or hog's-dung, will breed many diſtempers. The walls of a ſtable, which ought to be of brick rather than ſtone, ſhould be made of a moderate thickneſs, two bricks, or a brick and a half at leaſt, for the ſake of warmth in the winter, and to keep out the heat in the ſummer. The windows ſhould be made on the eaſt and north ſide of the building, that the north wind may be let in to cool the ſtables in the ſummer, and the riſing ſun all the year round, eſpecially in winter. The windows ſhould either be ſaſhed, or have large caſements, for the ſake of letting in air enough; and there ſhould always be cloſe wooden ſhutters, that the light may be ſhut out at pleaſure, by which means the horſe may be made to ſleep in the day as well as in the night, when it is judged proper he ſhould do ſo. Many pave the whole ſtable with ſtone, but that part which the horſe is to lie on ſhould be boarded with oak planks, which ſhould be laid as even as poſſible, and croſs-wiſe rather than length-wiſe; and there ſhould be ſeveral holes bored through them to receive the urine, and carry it off underneath the floor into one common receptacle; the ground behind ſhould be raiſed to a level with the planks, and it ſhould be paved with ſmall pebbles. There are two rings to be placed on each ſide of the ſtall, for the horſe's halter to run through, and a logger is to be fixed to the end of this ſufficient to poiſe it perpendicularly, but not ſo heavy as to tire the horſe, or to hinder him from eating; the beſt place for him to eat his corn in is a drawer or locker, made in the wainſcot partition, which need not be large, ſo that it may be taken out at pleaſure to clean it, by which means the common dirtineſs of a fixed manger may be avoided. Many people are againſt having a rack in their ſtables; they give the horſe his hay ſprinkled upon his litter, and if they think he treads it too much, they only nail up three or four boards, by way of a trough, to give it to him in: the reaſon of this is, that the continual lifting up of the head to feed out of the rack, is an unnatural poſture for a horſe, who was intended to take his food up from the ground, and makes him, as they expreſs it, withy-cragged. When there is ſtable-room enough, partitions are to be made for ſeveral horſes to ſtand in: theſe ſhould always allow room ſufficient for the horſe to turn about and lie down conveniently, and they ſhould be boarded up ſo high towards the head, that the horſes placed in ſeparate ſtalls may not be able to ſmell at one another, nor moleſt each other any way. One of theſe ſtalls ought to be covered in, and made convenient for the groom to lie in, in caſe of a match, or the ſickneſs of a horſe. Behind the horſes there ſhould be a row of pegs, to hang up ſaddles, briddles, and other utenſils; and ſome ſhelves for the bruſhes, pots of ointment, &c. The other requiſites for a ſtable are a dung-yard, a pump, and a conduit.

STACK, a large quantity of corn, hay, ſtraw, &c. regularly piled up, and generally thatched to defend the contents from the weather.

It is very common, in order to preſerve corn in the ſtraw, to make it up into ſtacks, by which means they often meet with very great loſſes by the dampneſs of the ground, which commonly rots and ſpoils it, ſometimes near a yard thick; and by rats and mice, and other vermin that breed in the ſtack, which eat and devour a great part thereof. To prevent both theſe inconveniencies, where timber is plentiful, they ſet four, or ſix, or more poſts into the ground, according to the bigneſs that they deſign the ſtack, granary, or barn that the corn is to be laid in: on theſe poſts they lay what is the ground-plats of other building, upon which they make a floor, or lay pieces croſs to ſupport the ſtack: and if they make a barn or granary of it, they erect ſides and a roof upon it; but if only a ſtack, they cover it with thatch, and the poſts that ſupport it, is by ſome perſons, covered round with tin near the top, for about a foot or ſo in breadth, in order to prevent the mice and rats getting up. But as tin is apt to ruſt, and ſo to looſe its ſmoothneſs, it will not anſwer the deſign long; therefore the better to prevent their getting up, is to cover them with Dutch tile, which will always keep ſmooth. But in Hampſhire and other countries where they have plenty of ſtone, they make their ſupporters of two ſtones, which is the beſt way.

The lower ſtone is about three feet high, two feet wide at the bottom, and one at the top; over this they lay another ſtone, of about a yard ſquare: ſome make it of a round form, which is the beſt. This prevents not only the mice and rats from climbing up, but alſo the dampneſs of the ground: and this way you may keep corn as long as you will, without much inconvenience or loſs, except what it loſeth in the firſt year's ſhrinking, and loſs of weight, which is very inconſiderable. Only you muſt obſerve, that what corn you ſtack muſt be bound up in ſheaves, that ſo the ears of the corn may be turned inward, and the ſtraw-ends out, which will ſave the corn from pigeons, crows, and other fowls, and likewiſe from the rain that beats on the ſides. If your ſtack be of wheat, you may lay oats or other coarſe grain on the top of it, under the thatch, the greateſt danger of wet being from the top, if any of the thatch ſhould blow off. And if you ſuſpect any rats or mice have got into the ſtack, greaſe a ſtick and thruſt it into it; and if there be any, they will gnaw the ſtick. The chief inconvenience that attends this way of keeping of corn, is its bulkineſs, and the farmer's wanting of his ſtraw to make dung with, and the chaff to give his cattle, &c. *Mortimer's Huſbandry, vol.* II. *pag.* 141.

STACK *of Wood*, a pile of wood three feet long, as many broad, and twelve feet high.

STADLE, the bottom of a corn mow, or hay-ſtack. It alſo ſignifies a tree ſuffered to grow for coarſe and common uſes, as poſts or rails.

STAG-EVIL. *See the article* STAGGERS.

STAGGERS, a diſeaſe incident to horſes: a kind of apoplexy.

Farriers generally include all diſtempers of the head, under two general denominations, viz. ſtaggers, and convulſions, wherein they always ſuppoſe the head primarily affected. But in treating theſe diſorders, we ſhall diſtinguiſh between thoſe that are peculiar to the head, as having their ſource originally thence, and thoſe that are only concomitants of ſome other diſeaſe, where the head is affected ſecondarily by conſent of nerves, the ſource of this diſorder being in the ſtomach, bowels, &c. By this method we ſhall avoid many blunders, which would otherwiſe ariſe in practice, for want of knowing the true ſeat of the diſorder.

In an apoplexy a horſe drops down ſuddenly, without other ſenſe or motion than a working at his flanks.

The previous ſymptoms are drowſineſs, watry eyes, ſomewhat full and inflamed; a diſpoſition to reel, feebleneſs, a bad appetite; the head almoſt conſtantly hanging, or reſting on the manger; ſometimes with little or no fever, and ſcarce any alteration in the dung or urine: the horſe is ſometimes diſpoſed to rear up, and apt to fall back when handled about the head, which is often the caſe with young horſes, to which it does not prove ſuddenly mortal, but with proper help they may ſometimes recover. If the apoplexy proceeds from wounds, or blows on the head, or matter on the brain, beſides the above ſymptoms, the horſe will be frantick by fits, eſpecially after his feeds, ſo as to ſtart and fly at every thing. Theſe caſes ſeldom admit of a perfect recovery; and when horſes fall down ſuddenly, and work violently at their flanks, without any ability to riſe after a plentiful bleeding, they ſeldom recover.

All that can be done is to empty the veſſels as ſpeedily as poſſible, by ſtriking the veins in ſeveral parts at once, bleeding to four or five quarts, and to raiſe up the horſe's head and ſhoulders, ſupporting them with plenty of ſtraw. If he ſurvives the fit, cut ſeveral rowels; give him night and morning, glyſters prepared with a ſtrong decoction of ſenna and ſalt, or the purging glyſter; blow once a day up his noſtrils a dram of powder of aſarabacca, which will promote a great diſcharge, afterwards two or three aloetic purges ſhould be given; and to ſecure him from a relapſe, by attenuating and thinning his blood, give him an ounce of equal parts of antimony and crocus metallorum for a month; or which is preferable, the ſame quantity of cinnabar of antimony and gum guaiacum.

If the fit proceeds only from fullneſs of blood, high feeding, and want of ſufficient exerciſe, or a ſizy blood (which is often the caſe with young horſes, who though they reel, ſtagger, and ſometimes ſuddenly fall down, yet are eaſily cured by the above method) an opening diet with ſcalded bran and barley will be neceſſary for ſome time; and the bleeding may be repeated in ſmall quantities.

help thinking that the quantity of water which falls in rain, would not be more than is requiſite to moiſten the mixture, and bring on that putrid fermentation which is neceſſary for the due incorporating and perfecting of the compoſt. It will, however, be right to have a ſhade to put over it occaſionally, in caſe the ſeaſon ſhould prove extremely wet.—Columella informs us, that the Romans covered their ſtercoraries with hurdles; but does not ſpeak of covering them with mould, as here directed.

The pit being thus prepared, the farmer's next ſtudy ſhould be to fill it with a compoſt ſuited to the nature of his land. Thus, if his ſoil is a ſtrong clay, a layer of dung ſhould be covered with a layer of ſand, rubbiſh of old houſes, or other ſubſtances already mentioned for the improvement of clay. Litter of all kinds becomes a good addition, becauſe it is ſlow in decaying, and if mixed with the clay, keeps its parts aſunder. The compoſt for meliorating clay may be carried out, and mixed with the earth, freſher than for any other ſoil; becauſe, in this ſtate, it will more effectually keep the particles of the clay ſeparated; and if ſome degree of its putrefaction is carried on in the ſoil, it will much more powerfully open it.—If, on the contrary, the ſoil is ſand, the dung ſhould be mixed with clay, ſcouring of ponds, or other fat ſlimy ſubſtances, which may give conſiſtence to the ſand. And if the farmer is happy in a ſoil in which neither of the extremes prevail, he may then mix his manure with the richeſt mould he can find, and incorporate them well together, by frequent turning, before the compoſt is carried to the field.—Columella thinks they are ſlothful huſbandmen, who, in thirty days, have not a load of dung, of twenty buſhels, from each of the leſſer cattle, and ten loads from each of the larger ſort, by means of judicious mixtures with their dung. He thinks this mixture, or compoſt, moſt beneficial to corn, after it is a year old; becauſe it ſtill retains all its ſtrength, and does not then breed weeds.

“ Many good effects, ſays Dr. Home, particularly that of hindering the oils from being volatilized, and of fixing them, will ariſe from a mixture of lime with theſe compoſts, after they are thoroughly rotted. But as many experiments have proved that quick-lime powerfully reſiſts putrefaction, it does not ſeem judicious to mix it with dung-hills which are not ſufficiently putrefied, as it muſt ſtop that proceſs.”

“ There is a very great attraction betwixt quick-lime and all oily bodies. It unites intimately with expreſſed oils. With this intention it is uſed in the manufacture of ſoap, to help the junction of the alkaline ſalts and oils. It muſt, therefore, attract the oils powerfully from the air and earth, diſſolve them, and render them miſcible with water: it muſt, from this reaſon, ſoon exhauſt the ſoil of all its oleaginous particles, if the farmer does not take care to ſupply them by dung or animal ſubſtances. Farmers have, by experience, diſcovered it to be gare at impoveriſher of lands; but they did not know how it acted. Its operation is, to exhauſt the earth of its oils. The proper cure for this is, to mix dung with the lime, ſo that it may have ſomething to act on.”

“ Lime is a great diſſolver of all bodies, both vegetable and animal; but particularly the latter. We know how ſoon it reduces hair and woollen rags into a pulpy ſubſtance. This effect is ſo ſtrong, that, in the common method of ſpeaking, it is ſaid to burn them. In this way it certainly operates in the earth, by diſſolving all animal and dry vegetable ſubſtances, and converting them to the nouriſhment of vegetables, at leaſt ſooner than otherwiſe they would be. Like other calcarious bodies, it is not diſſolvable but by acids. With theſe, a great effervеſcence happens, a ſolution of the calcarious body is made, and a neutral ſalt is formed from that conjunction. This neutral ſalt is always ſoluble in water, unleſs where the acid of vitriol is uſed.” *Home's Principles of Vegetation, page* 69, 70.

The Society of Improvers in the Knowledge of Agriculture in Scotland, have paid great attention to the ſubject of compoſts, and are very particular in their inſtructions on this head, to ſeveral of their correſpondents. I gladly take this opportunity of paying the tribute of praiſe juſtly due to their public ſpirit, and congratulate them on the great ſucceſs which has attended their labours in many parts of their country. At the ſame time I cannot help regretting, that, though all our neighbours have ſet us ſo many examples of periodical inſtruction in this moſt uſeful art, there is not yet any inſtitution of that kind in England. It is to be hoped, that the Society for the Encouragement of Arts, Manufactures and Commerce, will ſoon take off this reproach, and not ſuffer it to be longer ſaid that agriculture lies neglected in this kingdom, where the people enjoy every advantage requiſite to promote it, in a far higher degree than the inhabitants of any other country in the world. The wealth of our farmers is incomparably greater; their property, and the tenure of their land, are infinitely better ſecured; and the happieſt of ſoils and climates combine to reward their labour.

The Society in Scotland give to a gentleman who had written to them, and who had clay and lime at command, the following judicious directions for collecting a compoſt, or making a ſtercorary, for the improvement of a ſandy ſoil. “ Take, ſay they, in the field intended to be manured, a head-ridge, the moſt conveniently ſituated for a ſtercorary. Plow it two or three times, as deep as can be, in the cleaving way, if the ridge be high gathered, and harrow it well: then lay thereon your ſlimy clay, about a foot thick, leaving a part of the ground un-covered: next lay a thin layer of dung, another of clay, and after that a layer of un-ſlaked lime, at leaſt a foot thick: then throw up the earth left uncovered on each ſide. After this, repeat another layer of clay, and lime-ſtone, as before, and finiſh it with a layer of clay and ſea-wreck, covered with earth. The more of the ſlimy clay the better: for though it may be cold, yet it will not be the worſe for a ſandy hot ground. If you examine the clay, we doubt not but you will find it a very fat ſubſtance; being, as we conjecture, moſtly muſcle and other ſhells mixed with earth, brought by the tide and river Southeſque. On the coaſt of Lothian, we found that ſlimy ſubſtance to be nothing elſe; and if it be ſo with you, it is certainly one of the beſt manures.”

“ After this ſtercorary has ſtood ſix weeks or two months, incorporating and fermenting, turn and mix it; and that this work may be performed to the better purpoſe, and with as ſmall an expence as poſſible, yoke your plow, enter upon your ſtercorary with a cleaving furrow, and continue repeating the plowings the ſame way, until the very bottom of the ſtercorary be ripped up; then harrow it: it is impoſſible to over-do it. If it be very cloddy, it ſhould be harrowed between the plowings. Begin then in the middle, and plow again and again in the gathering way, until it be brought into as narrow bounds, and be raiſed as high as poſſible. Let all that the plow has left be gathered up, and thrown with ſhovels on the top. Every ſuch turning and heaping occaſions a new ferment, and improves the manure. If the ſeeds of barley, or of any other quick-growing vegetable, were ſprinkled thin on the ſtercorary, and the plants buried in it, when fulleſt of ſap, before they come to ſeed, by turning or more heaping, the manure would be improved.” This might be repeated ſeveral times in the courſe of the ſeaſon; for the practice has been found ſucceſsful. *Maxwell's Collection, page* 26.

In another place, they obſerve that ſuch a ſtercorary may be turned in the ſame manner as ground is trenched. The higher it is raiſed, the better. Each turning will make it heat like a garden hot-bed, and this fermentation will reduce it to a fine fat mould. If the firſt heat ſhould go off (which may eaſily be known by thruſting a pole into it) before it has produced this effect, it may be turned over again, and will take a new heat, which is of great advantage to it, beſides the better mixing of the ſeveral manures. About fifty or ſixty cart-loads of this compoſt are uſed upon an acre of ground. I have been the more particular in extracting this account, becauſe any farmer, by attending to the rules here given, may ſuit his compoſt to the nature of his ſoil. Where the ſoil varies, he will do well to have another ſtercorary, properly compoſed, in a convenient part of the field he intends to manure.

The ſame ſociety, in their directions for the management of ſheeps dung, where the ſheep are houſed, or fed under cover during the inclemency of the winter, adviſe laying under them ſubſtances ſuited to the nature of the ſoil intended to be improved. A layer of ſand, for inſtance, for ſtiff land, will be greatly benefited by being covered with a couch of litter in the ſheep-houſe. When their dung becomes troubleſome or offenſive to them, or begins to make them dirty, the whole ſhould be removed to the ſtercorary. But if the dung of the ſheep is to be laid on a ſandy ſoil, clay, or any ſuch ſubſtance, though covered with litter it would ſoon become wet, and too cold for the ſheep to lie on. It would therefore be better, in this caſe, to ſpread a thick couch of litter under the ſheep, and mix this in the ſtercorary with the lime, &c. by which means the ſame advantage may be obtained, without injury to the cattle. If loam, or a rich mould, be laid under ſheep, the judicious farmer will be careful to collect a ſufficient quantity of it, when it may be got dry, in the ſummer. Whatever is uſed for this purpoſe, ſhould be renewed as often as it is ſufficiently impregnated by the urine and dung of the ſheep.

The well preparing of mixed dung, is, as Mr. Worlidge rightly inſiſts, a piece of huſbandry by no means to be neglected; for the more and better the dung is, the greater will be the crop; and an increaſe of the crop will augment the quantity of dung. On the contrary, a decay in the dung makes a decay in the crop, &c. The riſe, or fall, of the value of many farms in this kingdom muſt therefore neceſſarily depend upon the good or bad management of this eſſential part of huſbandry. *See the article* DUNG-HILL.

STERILE, barren, unfruitful.

STEW, a ſmall kind of fiſh-pond, the peculiar intention of which is to maintain fiſh, and keep them for the daily uſes of a family.

STOCK, the trunk or body of a fruit-tree, into which the graft, or bud is inſerted.

All ſtocks for fruit-trees ſhould be raiſed from the kernels or ſtones of the fruit; for ſuckers (though ſome people uſe them), beſides being hardly ever well rooted, are very apt to produce quantities of other ſuckers, which weaken the trees exceedingly, and become very troubleſome in the borders and walks of a garden. The beſt way therefore is to ſow a few ſtones and kernels annually, or at leaſt every other year, for a conſtant ſupply. Both theſe ſorts of ſeeds are beſt when their fruit has been ſuffered to hang upon the tree till it drops through ripeneſs, and is afterwards permitted to begin to rot: but they muſt be carefully taken out before that rottenneſs can affect them. They ſhould then be well cleared from the pulp, and the largeſt, plumpeſt, and heavieſt ſhould be ſelected, and carefully laid up in dry ſand, in a place where neither vermin nor moiſture can come to them; for the latter would ſpoil their growth by rendering them mouldy, and the former, particularly rats and mice, are ſo very fond of the kernels of apples and pears, that they will even ſcratch them up after they are ſown, and then devour them. Traps ſhould therefore be ſet in the ſeminary, to catch thoſe miſchievous animals.

Layers, ſlips, and cuttings, when they have taken good root, make far better ſtocks for grafting on, than any ſuckers; but ſtill they are much inferior to thoſe which are raiſed from ſeeds.

The beſt ſtocks for each ſort of fruit are the following.

For apples, which muſt always be grafted upon a free ſtock, that is to ſay, upon a ſtock of their own kind, for they will not take upon that of any other fruit, the ſorts moſt generally uſed are, 1. The crab ſtock, as it is commonly termed; 2. The Dutch creeper; 3. The Paradiſe ſtock; and, 4. The codlin ſtock.

The firſt of theſe, called likewiſe free ſtocks, are uſually raiſed from the kernels of all ſorts of apples taken indiſcriminately from the cyder-preſs; and as all the trees of this ſpecies are, without diſtinction, termed crabs before they are grafted, theſe are called by the general name of crab ſtocks: but the beſt, particularly for ſuch apple trees as are intended for ſtandards, are raiſed from the kernels of real wildings, or crabs, which have been preſſed for verjuice; for theſe are always cleaner, freer from canker, more durable, and leſs luxuriant in their growth, than any that are raiſed from the kernels of finer and ſweeter apples. They alſo produce the firmeſt, moſt juicy, and beſt taſted fruit, as well as the fitteſt for keeping, and will preſerve the ſorts grafted upon them in their true ſize, colour and flavour, far better than any of the other ſorts of free ſtocks. Theſe laſt will, indeed, produce larger fruit; but it will not be ſo well taſted, or keep near ſo long. For winter apples in particular, the true crab ſtock is incomparably the beſt. In ſhort, it is remarkably with this, as it is with all other fruits, that, the ſourer the ſtock is, the better its produce will be.

The ſecond ſort of ſtocks for apples, called the Dutch paradiſe apple, Dutch ſtock, or Dutch creeper, is generally preferred for eſpaliers, or dwarfs, becauſe it is eaſily kept within the compaſs uſually allotted to thoſe trees, without ſtinting the graft too much; nor does it decay, or canker, near ſo ſoon as the third ſort, commonly called the dwarf paradiſe apple, which is now raiſed only for very ſmall gardens, or for the curioſity of ſetting an apple-tree upon the table with its fruit upon it, which never is at all numerous.

Codlin ſtocks are uſed by ſome, in order to ſtint the growth of their grafts: but as they never produce firm or laſting fruit, they ſhould be abſolutely rejected, at leaſt for all winter apples, and eſpecially if they have been propagated by ſuckers, as is the common way. Even the codlin tree itſelf is ſo much improved by being grafted upon a crab ſtock, that it becomes much more durable than it would otherwiſe be, ceaſes to put out ſuckers, and produces firmer and tarter flavoured fruit, which is alſo much fitter to keep.

November and December are proper times for ſowing the kernals of apples in dry ground; but where the ſoil is wet, it is beſt to wait till February. The moſt regular and moſt convenient way of ſowing them, in order to facilitate the taking up of the plants, is to drop them, but not too cloſe together, in little channels opened acroſs the bed, (which, it is taken for granted, has been well dug, raked, and properly prepared as before directed), and then to cover them with about half an inch deep of the ſame mould. The plants will come up in the ſpring, when they muſt be carefully weeded; and if the ſeaſon ſhould prove dry, it will be right to water them twice or thrice a week. The weeding of them muſt be continued during the whole ſummer, leſt they ſhould be choaked, or ſtinted in their growth; and if they thrive well, they will be fit to tranſplant into the nurſery the next October; at which time the ground that is to receive them ſhould be dug again thoroughly, and carefully cleared from all weeds.

The beſt ſtocks for all ſorts of firm winter pears are raiſed from the kernels of the fruit of which perry has been made, or from the ſeeds of ſome of the ſtrongeſt and quickeſt growing ſummer pears, ſuch as the lady's thigh, and the Windſor. Theſe kernels, if ſaved as before directed for apples, and afterwards ſown, in the ſame manner, early in the ſpring, will come up in about ſix weeks; and if the plants thus produced are kept clear from weeds, they will be ſtrong enough to remove from the ſeed bed into the nurſery in the enſuing month of October. But for all ſorts of ſoft melting pears, which are in general the ſummer and autumn fruits, quince ſtocks are preferred, eſpecially for a ſtrong ſoil, or for ſuch trees as are deſigned for dwarfs or walls; becauſe the luxuriancy of their growth is checked by theſe ſtocks, and their ſhoots are more eaſily kept within due compaſs, than they can be when grafted upon free ſtocks. They muſt not, however, be uſed indifferently for all ſorts of pears; firſt, becauſe there are ſome which will not thrive upon them, but will decay in two or three years, or at moſt but juſt keep alive; and ſecondly, moſt of the ſorts of hard, or winter pears, are rendered ſtony by being grafted on a quince ſtock: beſides which it is to be obſerved, that no ſort of pear will do upon quince ſtocks in very dry and gravelly ground. Theſe ſtocks are often propagated from ſuckers, which may be obtained in great quantities, by cutting down an old quince tree; but, for the reaſons before aſſigned, they are not near ſo good as thoſe which are raiſed from well rooted layers or cuttings.

The white thorn was formerly uſed as a ſtock to graft pears on; but it is now almoſt totally laid aſide for that purpoſe, becauſe it never keeps pace in its growth with the fruit grafted or budded upon it; and alſo becauſe the fruit which it produces is generally dryer, and more apt to be ſtony, than that which grows upon pear ſtocks.

Cherries do beſt when grafted upon ſtocks raiſed from the ſtones of the common black, or wild red cherry, both of which are ſtrong growers, produce clean ſtocks, and are more laſting than any of the garden kinds. Theſe ſtones, collected from the ripeſt and almoſt rotten fruit, may be ſown in the autumn in a bed of light earth; or they may be kept in ſand till the ſpring, and be ſown then. The plants produced by them muſt be kept carefully clear from weeds, and watered from time to time in dry weather, as before directed. They ſhould remain in the ſeed bed till the ſecond autumn after ſowing, and will then be fit to tranſplant into the nurſery, in October. Stocks of the Corniſh, and of the Morello cherry, likewiſe raiſed from the ſtones, have alſo been uſed with ſucceſs, to render the trees more fruitful and leſs luxuriant in their growth; for in theſe laſt reſpects they have nearly the ſame effect upon cherries, as the paradiſe ſtock has upon apples.

Plums will not do upon any but plum ſtocks, the beſt of which are raiſed from ſtones of the freeſt growing ſorts, ſuch as the muſcle, the white pear-plum, &c. Theſe ſtones ſhould be ſet in autumn, about three inches deep and four inches aſunder, in a bed of light dry earth, which it will be right to cover in the winter with a little dry ſtraw, or haulm, to protect them from the froſt; for that would deſtroy them, if it were to penetrate deep into the ground. Their plants will come up the next ſpring, when the covering of litter ſhould be carefully removed; and if they are watered ſparingly now and then in the ſpring and ſummer, and kept conſtantly clear from weeds, they will be fit to remove from the ſeminary into the nurſery in the then enſuing ſpring, or, which is more eligible, in the following autumn.

All the late, or autumn peaches, which are the hard ſorts, and all nectarines and apricots, ſucceed beſt upon ſtocks of the muſcle, or of the white pear-plum, raiſed from the ſtone; though any of the large growing plums, whether white or red, will afford very good ſtocks for theſe fruits. Some recommend almond and apricot ſtocks for the early, or ſummer peaches (commonly diſtinguiſhed by the appellation of melting peaches), which will not grow upon plum ſtocks: but the almond ſtocks are ſo tender in their roots, ſo apt to ſhoot too early in the ſpring, and of ſo ſhort duration, that the preference is deſervedly given, for theſe kinds, to the apricot ſtock, upon which they will take perfectly well, without being near ſo ſubject to blight, as upon the almond. Theſe ſtocks are raiſed, and managed, in the ſame manner as thoſe of the plum. They are particularly proper for all ſorts of peaches which are planted in a dry ſoil; becauſe the peach ſeldom does well in ſuch ground, if it be grafted on any other ſtock; but the apricot will thrive there exceedingly. For this reaſon, the common practice of the nurſery gardeners is, to bud the plum ſtocks either with apricots, or ſome free growing peach, and after theſe have grown a year, they bud the tender ſorts of peaches upon their ſhoots; by which means many ſorts ſucceed well, which would ſcarcely keep alive in the common way. The gardeners term theſe double worked peaches.

The ſtones of peaches are not worth ſetting for ſtocks to inoculate, unleſs it ſhould be for almonds; becauſe the plants which they produce are of a ſpungy nature, and will neither laſt, nor bear tranſplanting. They may indeed, produce ſome new ſorts of peaches, if they are neither budded nor grafted (for all the varieties of fruits have been originally obtained from their ſeeds); and theſe may be better ſuited to our climate, than ſuch as are brought from warmer countries: but ſo few fruits raiſed in this manner prove better than thoſe from which the ſeeds were taken, that they ſeldom make amends for the trouble of rearing them.

STONE-BREAK, or Engliſh ſaxifrage, a perennial plant common in paſture grounds. The root has a ſharpiſh and aromatic taſte. The ſtalks are round, ſtreaked, and reddiſh towards the bottom. The leaves are ſmooth, of a dark green, and divided twice into long, narrow, ſharp ſegments. The foot-ſtalks are membranaceous at the baſe. The flowers grow in looſe umbels; and of a pale yellow colour. The ſeeds are oval, ſtreaked, and red at the top.

" Every farmer, ſays a correſpondent of the editors of the Muſeum Ruſticum, knows which ſort of graſs he would wiſh to have predominant in his meadows: it would ſurely be very eaſy for him to ſave ſome of the ſeeds of ſuch graſs, and propagate it a-part till he had ſaved ſufficient to ſow, ſuppoſe an acre of land with it, pure and unmixed: when arrived at this point, he might propagate it as extenſively as he thinks proper.

" I muſt not however forget the chief intended ſubject of my letter, which is, to recommend to your readers the ſaxifrage as a plant proper to be intermixed with the graſs of their meadows.

" I have now in my holding above thirty acres of meadow land, which fortunately for me bear a graſs that needs no improvement; though this I in part attribute to my having drained my land properly ſome years ago, ſince which the bite is much improved.

" Amongſt this graſs in my meadows there grows a conſiderable quantity of ſaxifrage; which, in the opinion of all the dairy-men in my neighbourhood, is the reaſon my cheeſe is ſo particularly good.

" Now I ſhould imagine that when a farmer has plowed up a foul meadow, and intends ſowing it with good graſs ſeed, it would be no difficult matter to procure a ſprinkling of ſaxifrage-ſeed to mix with it: this would certainly be of ſervice; and we ſhould not deſpiſe this excellent plant becauſe it is common, and not far-fetched: there is great plenty of it in the Netherlands, in their fineſt cow-paſtures; and that I have often heard aſſigned as a reaſon for their having ſuch quantities of cheeſe of a ſuperior quality; though I muſt at the ſame time own, I have in London taſted ſome Dutch cheeſe, ſtuffed full of cloves, which was not the beſt in the world; but this might have been an accident, for they ſay their cheeſe is in general excellent.

" But, to return to my immediate ſubject, I would by all means recommend the propagation of the ſaxifrage plant in meadows, not only on account of its great uſe in improving the quality of cheeſe, and butter alſo, which it does, but becauſe it is a native of our iſland, and there is no danger of its ſucceeding to the farmer's wiſh; which cannot be ſaid of every plant recommended for cultivation.

" But it muſt be remembered, that I do not recommend it to be cultivated alone; I never tried it in that manner: that it will thrive very well when mixed with good meadow graſs, daily experience convinces me; and this method it is I urge." *Muſeum Ruſticum, vol.* I. *pag.* 472.

The burnet, cultivated to ſo much advantage by Mr. Roque and others is a ſpecies of the ſaxifrage. *See the article* BURNET.

STONE, a hard ſolid body, neither molliable, fuſible by fire, nor ſoluble in water; formed by ſucceſſion of time in the bowels of the earth.

M. Tournefort ſuppoſes that ſtones vegetate; but M. Geoffray accounts for the origin and formation of ſtones in a different manner. He lays it down as a principle that all ſtones, without exception, have been fluid; or, at leaſt, a ſoft paſte, now dried and hardened: and on this principle he examines the formation of the different kinds of ſtones, and ſhews that the earth alone is ſufficient for the ſame, independant of all ſalts, ſulphurs, &c.

It has been argued, and is not yet determined, whether ſtones are hurtful, or beneficial, to arable lands. Examples are not wanting on both ſides of the queſtion; though, in general, it ſeems rather to be carried for them. However, nothing can excuſe leaving a ſtone in any ground ſo large as to interrupt the plough. If they are very large, they ſhould be blown to pieces with gun-powder, and then be carried off. Some ſpots, very fertile in ſeveral kinds of grain, ſeem to conſiſt of nothing but ſtones; and inſtances are given of fields being rendered barren by taking away the ſtones which covered them. Theophraſtus accounts for this in a hot country, where it happened to the Corinthians, by ſaying, that the ſtones ſhelter the earth from the ſcorching heat of the ſun, and thereby preſerve its moiſture. The ſame holds true even in our colder latitude, where the heat of the ſun is leſs apt to hurt us; and Mr. Evelyn is clearly of opinion that huſbandmen rather impoveriſh, than improve, thoſe grounds which are almoſt covered with ſtones, eſpecially where corn is ſown, if they pick them off too minutely; becauſe they thereby expoſe the land too much to the effects of heat and cold. Certain it is, that a moderate mixture of ſmall gravel preſerves the earth both warm and looſe, and prevents too ſudden exhalations. But it ſeems highly probable that there muſt be ſome farther reaſon, beyond what has yet been aſſigned, for the benefit ariſing from ſtones. The example already given of the ſtone uſed in Oxfordſhire; and a remakable incident which happened to M. Du Hamel, give great room to think that the ſtones which are thus beneficial, are of the lime-ſtone or calcarious kind.

"The ſtone which is uſed for building at Denainvilliers, ſays M. Du Hamel, is very hard. It bears poliſhing like marble; and is here and there intermixed with ſhells, ſome of which are filled with a kind of oaker, and others contain a cryſtaline ſubſtance. This ſtone is very fit to make lime of. Some workmen, who were building about our houſe, cut pieces of this ſtone upon a graſs-plat. When they had done their work, the rubbiſh was cleared away, and nothing was left upon the graſs but the duſt and very ſmall fragments, which had fallen from the ſtones in cutting them. The next year, the graſs grew ſurpriſingly thick in all the places where theſe ſtones had been cut, was much taller and greener than any where elſe, and preſerved its vigour for ſeveral years. One would ſcarcely have thought that ſo hard a ſtone, reduced to powder would have produced an effect like that of marle. The goodneſs of lime, as a manure, is, perhaps, chiefly owing to the fineneſs of the powder, to which the lime-ſtones are reduced by calcination.

"This fact may help to clear up another, which cannot have eſcaped the notice of thoſe who attend to the differences of ſoils. They muſt have obſerved ſome grounds ſo thickly covered with ſtones, that ſcarce any thing elſe is ſeen after a heavy ſhower of rain. Yet ſome of theſe lands are very fertile, and produce fine wheat. I know not whether I am miſtaken; but I think I have obſerved that this fertility is found only in fields where thoſe ſtones are calcarious. It is very probable that the duſt which is formed by the mutual rubbing of theſe ſtones contributes to that fertility." *Culture des Terres, tom.* V. *pag.* 220.

The farmer may eaſily inform himſelf whether this be the caſe; and if it is, he has a certain rule to go by in the management of ſtones; viz. by trying with aqua fortis, or ſpirit of ſea-ſalt, as mentioned before, whether they are calcarious or not: for every ſtone on which the ſpirit does not effervеſce, is of no uſe, and therefore ſhould be removed, as an impediment to the neceſſary labour. However, the prudent huſbandman will make the experiment of clearing his land, firſt on a ſmall ſpot; that he may be ſure of the ſucceſs, before he embarks in a greater expence. *See the article* LIME.

STONE, alſo denotes a certain quantity or weight of ſome commodities.

A ſtone of beef at London is the quantity of eight pounds; in Herefordſhire, twelve pounds; in the north ſixteen pounds.

A ſtone of wool, according to a ſtatute made in the eleventh year of the reign of Henry VII. is to weigh fourteen pounds, but in ſome places it is more, in others leſs; as in Glouceſterſhire fifteen pounds, in Herefordſhire twelve pounds.

A ſtone, among horſemen, is the weight of fourteen pounds.

STONY-LANDS, ſuch as are full of flints, pebbles, or ſmall fragments of free ſtone.

Theſe lands, in many places, yield good crops, and the general rule is, that in ſtiff and cold lands the ſtones ſhould be as carefully picked out as poſſible, but in light and dry grounds they ſhould be left. In Oxfordſhire they have great quantities of a lean earth, and a ſmall rubble ſtone, or a four ſort of land mixed with it; this is ſometimes very full of weeds, and ſometimes very clear of them. If they are weedy they fallow them late; but if they are ſcary, as they call it, that is, if they have a ſward upon them, they either fold them in winter, and add ſome hay-ſeed to the ſheep's dung, to bring up the graſs; or elſe they lay old thatch or ſtraw, and dung upon it: for they reckon that if thoſe lands have no ſward upon them before they are fallowed, they will by no means be brought to bear a good crop, but a great deal of May-weed, and other uſeleſs weeds. In September, November, and December, they fallow as the ſward directs them: if this be done in either of the two laſt months, they call it a winter fallowing; and never ſtir it again, till they plow it, and ſow it with barley; and thoſe lands are reckoned to do better than if finely tilled. They will bear wheat and meſlin in a kindly year, and large crops of barley, if they are well managed, and kept in good heart.

They always fallow theſe lands every other year, unleſs they ſow peas upon them; ſometimes they ſow them with lentils; and, when they are quite worn out, they lay them down for clover or rey-graſs.

STOOKING, SHOCKING, *or* STACKING, the ſetting the ſheaves into ſhocks, the better to guard it from the rain.

A correſpondent of the authors of the Muſcum Ruſticum, has given us the following method of ſtacking, or ſtooking corn to preſerve it from the wet, and in which ſituation it may remain in the field ſix weeks or two months, without any danger from the inclemency of the weather.

"They ſet one ſheaf upright with the ears uppermoſt; and round that they place a circle of many other ſheaves, with their ears uppermoſt, inclining on the firſt ſheaf; and when ſo placed they look like the figure of an extinguiſher.

"Then they lay an horizontal circle of ſheaves, with all the ears in the center, and cover thoſe ears with a looſe ſheaf or two.

"Thus placed they are protected from all wet, and may remain in the field ſix weeks, or two months, as ſafe as in a barn; and this method of ſtacking has been adopted in Suſſex, Surry, Kent, and many other ſouthern counties, to the great benefit of the farmers and the public." *Muſeum Ruſticum, vol.* II. *page* 35.

In a ſubſequent number of the ſame work, the rev. Mr. Comber, of Eaſt-Newton, in Yorkſhire, has made ſome remarks upon the above method of ſtooking, and alſo deſcribed the method followed in Yorkſhire.

"It is to be wiſhed, ſays he, that this gentleman had been more particular in his account. He does not tell us whether this ſtack, as he calls it, is made immediately after the wheat is gathered, or after it has had field-room in ſome other manner, though this circumſtance is very material towards a right judgment of its uſefulneſs, and even of the expedition. He does not tell us, whether by a circle of many other ſheaves he means a circle of one row of ſheaves, or of more, though this circumſtance too is very material.

"I will now give a ſhort, but, I hope, ſufficient deſcription of the method of ſtooking uſed in Yorkſhire, &c.

"Ten ſheaves are diſpoſed in two rows, each row leaning againſt the other: then two ſheaves are laid on the top, ſo as to meet at the centre with their tails, and to ſlope downwards.

Now to compare the methods, I muſt obſerve, firſt, that in your correſpondent's the ſheaves appear to be ſet ſo cloſe as to exclude a free courſe of air, moſt eſſential to give, preſerve, or reſtore, dryneſs to corn; whereas in ours, the air has a free courſe, whether it bear againſt one or other end of the ſtook, or even againſt either ſide of it.

"Secondly, in your correſpondent's method, only ſome looſe ears are laid as a cover to the whole ſtook; and thoſe cannot reaſonably be ſuppoſed long to reſiſt the beating of the rain, but to tranſmit it to all, or many of the ears below them, which they are ſuppoſed to cover: and if we conſider what violent winds often viſit us in, and ſoon after, the harveſt, we ſhall readily allow, that theſe looſe ears may reaſonably be expected to be blown off, and become no cover; nay, to be blown about and away, and often totally loſt; whereas, in our method, the cloſeneſs and weight of two of the beſt ſheaves in the twelve may reaſonably be ſuppoſed to be a good cover, and to continue ſo, and hardly to be blown off by any wind, if carefully laid on; at leaſt, not to be blown away, but ſo as ſoon to be replaced.

"Thirdly, the flat poſition of your correſpondent's cover, muſt make it liable extremely to receive all the rain that deſcends, and tranſmit it to what lies beneath; whereas the ſloping poſition of our cap ſheaves, neither expoſes them to receive directly, nor to retain, nor tranſmit the rain to the corn below, but to throw it off, eſpecially as the tails of the ſheaves, in which the ſtraw is thickeſt and ſtrongeſt, receive the moſt of the rain, which can do them little or no harm, and eſpecially if the tails of theſe ſheaves be thruſt cloſely together. In ſhort, gentlemen, your correſponpent's method ſeems to threaten that dreadful malady, mow-burn, whilſt ours gives the corn all poſſible guard againſt it, viz. acceſs of ſun and wind.

" It is of great conſequence to the public, as well as individuals, to guard againſt every ſpecies of deſtruction to ſo valuable a crop as wheat is, in every ſtage, but more eſpecially in its laſt, in which almoſt all the expence is over: therefore, the above gentleman's aſſertion, that his method of ſtacking is adopted in Suſſex, Surry, Kent, and many other ſouthern counties, made me more ſolicitous to examine it; and ſince, on a fair compariſon with our Yorkſhire method, it appears to have every diſadvantage, I perſuade myſelf I am doing my duty to my country by ſhewing to many counties a much better method than that which they have adopted. *Muſeum Ruſticum, vol.* II. *page* 250.

STOOMING *of wine*, is the putting bags of herbs, or other ingredients into it. *See the article* WINE.

STOOP, a poſt fixed in the earth.

STOT, a young bullock; a ſteer.

STOVES, in gardening, are buildings erected for the preſervation of tender exotic plants, which will not live in theſe northern countries, without artificial warmth in winter. Theſe are built in different methods, according to the ingenuity of the artiſt, or the different purpoſes for which they are intended; but in England they are at preſent reducible to two.

The firſt is called a dry ſtove, being ſo contrived, that the flues through which the ſmoke paſſes are either carried under the pavement of the floor, or elſe are erected in the back-part of the houſe, over each other, and are returned ſix or eight times the whole length of the ſtove. In theſe ſtoves the plants are placed on ſhelves of boards laid on a ſcaffold above each other, for the greater advantage of their ſtanding in ſight, and enjoying an equal ſhare of light and air. In theſe ſtoves are commonly placed the tender ſorts of aloes, cereus's, euphorbiums, tithymals, and other ſucculent plants, which are impatient of moiſture in winter; and therefore require, for the moſt part, to be kept in a ſeparate ſtove, and not placed among trees, or herbaceous plants, which preſpire freely, and thereby often cauſe a damp air in the houſe, which is imbibed by the ſucculent plants, to their no ſmall prejudice.

Theſe ſtoves may be regulated by a thermometer, ſo as not to over-heat them, nor to let the plants, ſuffer by cold; in order to which all ſuch plants, as require nearly the ſame degree of heat, ſhould be placed by themſelves in a ſeparate houſe; for, if in the ſame ſtove there are plants placed of many different countries, which require as many different heats, by making the houſe warm enough for ſome plants; others, by having too much heat, are drawn and ſpoiled.

The other ſorts of ſtoves are commonly called bark ſtoves, to diſtinguiſh them from the dry ſtoves already mentioned. Theſe have a large pit, nearly the length of the houſe, three feet deep, and ſix or ſeven feet wide, according to the breadth of the houſe; which pit is filled with freſh tanners bark, to make an hot-bed; and in this bed the pots of the moſt tender exotic trees, and herbaceous plants, are plunged: the heat of this bed being moderate, the roots of the plants are always kept in action; and the moiſture, detained by the bark, keeps the fibres of their roots in a ductile ſtate, which, in the dry ſtove, where they are placed on ſhelves, are ſubject to dry too faſt, to the great injury of the plants. In theſe ſtoves, if they are rightly contrived, may be preſerved the moſt tender exotic trees and plants, which, before the uſe of the bark was introduced, were thought impoſſible to be kept in England; but, as there is ſome ſkill required in the ſtructure of both theſe ſtoves, we ſhall deſcribe them as intelligibly as poſſible, particularly the bark ſtove; by which it is hoped every curious perſon will be capable of directing his workmen in their ſtructure.

The dimenſion of this ſtove ſhould be proportioned to the number of plants intended to be preſerved, or the particular fancy of the owner; but their length ſhould not exceed forty feet, unleſs there are two fire-places; and, in that caſe, it will be proper to make a partition of glaſs in the middle, and to have two tan-pits, that there may be two different heats for plants from different countries, for the reaſons before given in the account of dry ſtoves; and were I to erect a range of ſtoves, they ſhould be all built in one, and only divided with glaſs partitions, at leaſt the half way towards the front; which will be of great advantage to the plants, becauſe they may have the air in each diviſion ſhifted by ſliding the glaſſes of the partitions, or by opening the glaſs-door, which ſhould be made between each diviſion, for the more eaſy paſſage from one to the other.

This ſtove ſhould be raiſed above the level of the ground, in proportion to the dryneſs of the place; for, if it be built on a moiſt ſituation, the whole ſhould be placed upon the top of the ground; ſo that the brick-work in the front muſt be raiſed three feet above the ſurface, which is the depth of the bark-bed, whereby none of the bark will be in danger of lying in water; but, if the ſoil be dry, the brick-work in front need not be more than one foot above-ground, and the pit may be ſunk two feet below the ſurface. Upon the top of this brick work, in front, muſt be laid the plate of timber, into which the wood-work of the frame is to be mortiſed; and the upper timber in front muſt be placed four feet aſunder, or ſomewhat more, which is the proportion of the width of the glaſs-doors or ſaſhes: theſe ſhould be about ſix feet and an half, or ſeven feet long, and placed upright; but from the top of theſe ſhould be ſloping glaſſes, which ſhould reach within three feet of the back of the ſtove, where there ſhould be a ſtrong crown-piece of timber placed, in which there ſhould be a groove made for the glaſſes to ſlide into. The wall in the back-part of the ſtove ſhould be at leaſt thirteen inches thick; but eighteen inches is ſtill better; becauſe, the thicker the out-ſide wall is built, the more the heat of the flues will be kept in the houſe; and carried up, about nine feet above the ſurface of the bark-bed; and, from the top of this wall, there ſhould be a ſloping roof to the crown-piece where the glaſſes ſlide in. This crown-piece ſhould be about ſixteen feet high from the ſurface of the bark-bed or floor, which will give a ſufficient declivity to the ſloping glaſſes to carry off the wet, and be of a reaſonable height for containing many tall plants. The back-roof may be ſlated, covered with lead, or tiled, according to the fancy of the owner: for the manner of this outſide building is often very various, and differently built.

In the front of the houſe there ſhould be a walk, about eighteen or twenty inches wide, for the conveniency of walking; next to which the bark pit muſt be placed, which ſhould be in width proportionable to the breadth of the houſe: if the houſe is twelve feet wide, which is a due proportion, the pit may be ſeven feet wide; and behind the pit ſhould be a walk eighteen inches wide, to paſs in order to water the plants, &c. then there will be twenty-two inches left next the back-wall, to erect the flues, which muſt be all raiſed above the top of the bark-bed; theſe flues ought to be one foot wide in the clear, that they may not be too ſoon ſtopped with the ſoot; and the lower flue, into which the ſmoke firſt enters from the fire, ſhould be two feet deep in the clear; and this may be covered either with caſt iron plates, or broad tiles; over this the ſecond flue muſt be returned back again, which may be eighteen inches deep, and covered on the top as before; and ſo, in like manner, the flues may be returned over each other three or four times, that the heat may be ſpent before the ſmoke paſſes off. The thickneſs of the wall in front of theſe flues need not be more than four inches; but it muſt be well jointed with mortar, and plaiſtered withinſide to prevent the ſmoke from getting into the houſe; and the out-ſide ſhould be faced with mortar, and covered with a coarſe cloth, to keep the mortar from cracking, as is practiſed in ſetting up coppers. If this be carefully done, there will be no danger of the ſmoke entering the houſe, which cannot be too carefully avoided; for there is nothing more injurious to plants than ſmoke, which will cauſe them to drop their leaves; and, if it continue long in the houſe, will entirely deſtroy them.

The fire-place may be made either at one end, or in the middle, according as there is moſt conveniency; for, wherever it is placed, it ſhould have a ſhed over it, and not be expoſed to the open air; for it will be impoſſible to make the fire burn equally, where the wind has full ingreſs to it ; and it will be troubleſome to attend the fire in wet weather, where it is expoſed to the rain.

The contrivance of the furnace muſt be according to the fuel which is deſigned to burn ; but, as turf is the beſt firing for ſtoves, where it can be had, becauſe it burns more moderately, and laſts longer, than any other ſort of fuel, and ſo requires leſs attendance, I ſhall deſcribe a proper ſort of furnace for that purpoſe.

The whole of this furnace ſhould be erected within the houſe, which will be a great addition to the heat ; and the front wall on the outſide of the fire place, next the ſhed, ſhould be three bricks thick, the better to prevent the heat from coming out that way. The door of the furnace, at which the fuel is put in, muſt be as ſmall as conveniently may be to admit of the fuel ; and this door ſhould be placed near the upper part of the furnace, and made to ſhut as cloſe as poſſible; ſo that there may but little of the heat paſs off through it. This furnace ſhould be about twenty inches deep, and ſixteen inches ſquare at bottom ; but may be ſloped off on every ſide, ſo as to be two feet ſquare at the top; and under this furnace ſhould be a place for the aſhes to fall into, which ſhould be about a foot deep, and as wide as the bottom of the furnace : this ſhould alſo have an iron door to ſhut as cloſe as poſſible ; but juſt over the aſh-hole, above the bars which ſupport the fuel, ſhould be a ſquare hole about four inches wide, to let in air to make the fire burn : this muſt alſo have an iron frame, and a door to ſhut cloſe when the fire is perfectly lighted, which will make the fuel laſt the longer, and the heat will be more moderate.

The top of this furnace ſhould be nearly equal to the top of the bark-bed, that the loweſt flue may be above the fire ; ſo that there may be a greater draught for the ſmoke ; and the furnace ſhould be covered with a large iron plate, cloſely cemented to the brick-work, to prevent the ſmoke from getting out; or it may be arched over with bricks; but you ſhould be very careful, wherever the fire is placed, that it be not too near the bark-bed ; for the heat of the fire will, by its long continuance, dry the bark, ſo that it will loſe its virtue, and be in danger of taking fire; to prevent which, it will be the beſt method to continue an hollow between the brick-work of the fire and that of the pit, about eight inches wide; which will effectually prevent any damage ariſing from the heat of the fire; and there ſhould be no wood-work placed any where near the flues, or the fire-place, becauſe the continual heat of the ſtove may in time dry it ſo much, as to cauſe it to take fire; which ought to be very carefully guarded againſt.

The entrance into this ſtove ſhould be either from a green-houſe, the dry ſtove, or elſe through the ſhed where the fire is made, becauſe, in cold weather, the front-glaſſes muſt not be opened.

The other ſort of ſtove, which is commonly called the dry ſtove, as was before ſaid, may be either built with upright and ſloping glaſſes at the top, in the ſame manner, and after the ſame model of the bark-ſtove; or elſe the front glaſſes, which ſhould run from the floor to the cieling, may be laid ſloping, to an angle of forty-five degrees, the better to admit the rays of the ſun in ſpring and autumn : the latter method has been chiefly followed by moſt perſons who have built this ſort of ſtoves : but, were I to have the contrivance of a ſtove of this kind, I would have it built after the model of the bark-ſtove, with upright glaſſes in front, and ſloping glaſſes over them, becauſe this will more eaſily admit the ſun at all the different ſeaſons ; for, in ſummer, when the ſun is high, the top glaſſes will admit the rays to ſhine almoſt all over the houſe ; and, in winter, when the ſun is low, the front glaſſes will admit its rays ; whereas, when the glaſſes are laid to any declivity in one direction, the rays of the ſun will not fall directly thereon above a fortnight in autumn, and about the ſame time in ſpring ; and, during the other parts of the year, they will fall obliquely thereon ; and, in ſummer, when the ſun is high, the rays will not reach above five or ſix feet from the glaſſes.

Beſides, the plants placed towards the back-part of the houſe will not thrive in the ſummer-ſeaſon for want of air ; whereas, when there are ſloping glaſſes at the top, which run within four feet of the back of the houſe ; theſe, by being drawn down in hot weather, will let in perpendicular air to all the plants ; and, of how much ſervice this is to all ſort of plants, every one who has had opportunity of obſerving the growth of plants in a ſtove, will eaſily judge : for, when plants are placed under cover of a cieling, they always turn themſelves towards the air and light, and thereby grow crooked ; and if, in order to preſerve them ſtraight, they are turned every week, they will nevertheleſs grow weak, and look pale and ſickly, like a perſon ſhut up in a dungeon ; for which reaſons, I am ſure, whoever has made trial of both ſorts of ſtoves, will readily join with me to recommend the model of the bark-ſtove for every purpoſe. *Miller's Gard. Dict.*

STOVER, fodder for cattle.

STOUND, a wooden veſſel to put ſmall beer in.

STOWK, the handle of a pail ; alſo a ſhock of twelve ſheaves.

STOWRE, a round of a ladder ; a hedge-ſtake ; alſo the ſtaves in the ſides of a waggon, in which the eve-rings are faſtened.

STRAIN, or SPRAIN, a violent extenſion of the ſinews or tendons of ſome muſcle, where by the tendinous fibres are overſtretched, and ſometimes ruptured, or broken.

To form therefore a true idea of theſe diſorders, let us firſt conſider every muſcle, and tendon, as compoſed of ſpringy elaſtic fibres, which have a proper power of their own, to contract and extend themſelves : or, to make their action more familiar, let us compare them to a piece of catgut, that we may the better judge with what propriety oily medicines are directed for their cure. Thus then, if by a violent extenſion of this catgut, you had ſo overſtretched it, as to deſtroy its ſpringineſs or elaſticity, and was inclined to recover its loſt tone ; would you for that purpoſe think of ſoaking it in oil ? And is not the method of treating ſtrains, or overſtretched muſcles and tendons, full as prepoſterous, when you bathe or ſoak them in oily medicines, at a time that they want reſtringents to brace them up ? Yet cuſtom has ſo eſtabliſhed this practice, and fallacious experience ſeemingly ſo confirmed it, that it would be a difficult taſk to convince the illiterate, and prejudiced, of the abſurdity ; who, by attributing effects to wrong cauſes, are led into this error, and the oils uſurp the reputation that is due only to reſt and quiet : they ſeem however to be aware of the ill conſequences, by their adding the hot oils, as ſpike, turpentine, and origanum ; which, though they in ſome meaſure guard againſt the too ſuppleing quality of the other oils ; yet the treatment is ſtill too relaxing to be of real ſervice.

And indeed in all violent ſtrains of either tendon or muſcles, whatever opinion we may entertain of bathing and anointing with favourite noſtrums, which often ſucceed in ſlight caſes, where perhaps bandage alone would have done ; yet it is the latter, with proper reſting the relaxed fibres, till they have thoroughly recovered their tone, that are the chief things to be depended on ; and frequently ſome months are neceſſary for effecting the cure.

All violent ſtrains of the ligaments, which connect the bones together, eſpecially thoſe of the thigh, require time, and turning out to graſs, to perfect a recovery. External applications can avail but little here, the parts affected laying too deep, and ſo ſurrounded with muſcles, that medicine cannot penetrate to them. The ſooner in theſe caſes, a horſe is turned out to graſs, the better, as the gentle motion in the field will prevent the ligaments and joint oil, from thickening, and of courſe the joint itſelf from growing ſtiff ; nor do I believe that firing, ſo commonly practiſed in this caſe, is of half the conſequence as reſt, and turning out for a conſiderable time ; which by the bye, is always adviſed at the ſame time the horſe is fired. I could not avoid ſaying thus much, in order to ſhew the great advantages of reſt in all ſtrains, and that no horſe ſhould be worked till he is thoroughly recovered.

When a horſe's ſhoulder is overſtrained, he does not put out that leg as the other, but to prevent pain, ſets the ſound foot hardly on the ground, to ſave the other ; even though he be turned ſhort on the lame ſide, which motion tries him the moſt of any. When trotted in hand, inſtead of putting his leg forward in a right line, he forms a circle with the lame leg ; and when he ſtands in the ſtable, that leg is advanced before the other.

In order to cure this lameneſs, firſt bleed him, and let the whole ſhoulder be well bathed three times a day with hot verjuice or vinegar, in which may be diſſolved a piece of ſoap; but if the lameneſs continues without ſwelling, or inflammation, after reſting two or three days, let the muſcles be well rubbed for a conſiderable time, to make them penetrate, with good opodeldoch, or either of the following mixtures:

> Take camphorated ſpirits of wine two ounces; oil of turpentine one ounce; this proportion will prevent the hair coming off.
>
> Or,
>
> Take the beſt vinegar half a pint; ſpirit of vitriol, and camphorated ſpirit of wine, of each two ounces.

When the ſhoulder is very much ſwelled, it ſhould be fomented with woollen cloths (large enough to cover the whole) wrung out of hot verjuice and ſpirit of wine; or a fomentation prepared with a ſtrong decoction of wormwood, bay-leaves, and roſemary, to a quart of which may be added half a pint of ſpirit of wine.

A rowel in the point of the ſhoulder in this caſe often does great ſervice; eſpecialty if the ſtrain has been very violent, and the ſwelling very large; but as to boring up the ſhoulder with a hot iron, and afterwards inflating it, is both a cruel and abſurd treatment; and the pegging up the ſound foot, or ſetting on a patten ſhoe, to bring the lame ſhoulder on a ſtretch, is a moſt prepoſterous practice, and directly calculated to render a horse incurably lame; for it can only be neceſſary in caſes the very oppoſite to this, where the muſcles have been long contracted, and we want to ſtretch them out.

Where poultices can be applied they are at firſt undoubtedly very effectual, after bathing with hot vinegar or verjuice, and are to be preferred greatly to cold charges, which by drying ſo ſoon on the part, keep it ſtiff and uneaſy; let them be prepared with oatmeal, rye-flower, or bran boiled up in vinegar, ſtrong beer, or red wine lees, with lard enough to prevent their growing ſtiff; and when by theſe means the inflammation and ſwelling is brought down, bathe the part twice a day with either of the above mixtures, opodeldoch, or camphorated ſpirits of wine; and rowl the part three or four inches, both above and below, with a ſtrong linnen rowler, of about two fingers width; which will contribute not a little to the recovery, by bracing up the relaxed tendon; and perhaps is more to be depended on than the applications themſelves.

As opodeldoch is variouſly made, and thoſe uſually ſold in the ſhops, do not ſeem ſo well calculated for horſes, we ſhall inſert the following, as better adapted to this purpoſe, and recommend it to be kept ready prepared for the uſe of the ſtable; it being not only very proper for the above uſe, but for bruiſes, cold ſwellings, benumbed parts, and for diſperſing many other ſuch ſort of tumors: it may occaſionally alſo be given internally for the gripes from wind, or taking cold; for the ſtrangury alſo, and as a cordial; one ounce, or more, may be taken for a doſe, in a pint of ale.

> Take Jamaica pepper four ounces, winters bark, carraway ſeeds, laurel, and juniper berries bruiſed, of each two ounces; roſemary, marjoram, and lavender flowers, of each one ounce; rectified ſpirit of wine, three pints; let them digeſt in a warm place ten days, then ſtrain off the tincture, and diſſolve in it Venice ſoap a pound and a half; camphor three ounces; Barbadoes tar four ounces; oil of turpentine ſix ounces; oil of amber two ounces; mix and make a liniment.

In Strains of the coffin joint that have not been diſcovered in time, there will grow ſuch a ſtiffneſs in the joint, that the horſe will only touch the ground with his toe; and the joint cannot be played with the hand; the only method here is repeated bliſtering, and then firing ſuperficially.

Strains of the back ſinews are very common, and are eaſily diſcovered by the ſwelling, which extends ſometimes from the back ſide of the knee down to the heel, but for the moſt part the horſe ſets that leg before the other. The tendon ſhould be well bathed three or four times a day with hot vinegar; and if much ſwelled, apply the poultices above recommended; and when the ſwelling is down, bathe with the mixtures above, or with camphorated ſpirit of wine and oil of amber, in which is diſſolved as much camphor as the ſpirits will take up, and rowl up the tendon with a proper bandage, or laced ſtocking; which laſt properly fitted to the limb, might be wore to great advantage; not only in theſe ſort of injuries, but in moſt others, where there is a diſpoſition to the greaſe, or other ſwellings of the limbs, from weak and relaxed fibres. Curriers ſhavings wetted with vinegar have been found uſeful for this purpoſe; as has alſo tar and ſpirit of wine: but where the tendon has ſuffered by repeated injuries of this kind, the caſe will demand bliſtering, firing, and proper reſt.

Strains of the knees and paſterns ariſe frequently from kicks, or blows; if they are much ſwelled, apply firſt the poultices; and when the ſwelling is abated, bathe with the above, or the following.

> Take vinegar one point; camphorated ſpirits of wine, four ounces; white vitriol, diſſolved in a little water two drams.
>
> Or,
>
> Take the whites of three or four eggs, beat them into a froth with a ſpoon; to which add an ounce of roach allum finely powdered; ſpirit of turpentine, and wine, of each half an ounce; mix them well together.

The following is alſo much recommended by the French writers, and has been found very ſucceſsful in ſome old ſtrains, when other remedies have failed.

> Take one pound of tar, and two of rectified ſpirit of wine, ſtir them together over a fire till they incorporate (but take care the flame does not catch the ſpirits) then add two ounces of bole finely powdered; and a ſufficient quantity of oatmeal to bring it to the conſiſtence of a poultice; to which add lard enough to prevent its growing dry; apply it ſpred on cloth twice a day.

As great weakneſs remains in the paſterns after violent ſtrains, the beſt method is to turn the horſe out to graſs till he is perfectly recovered; when this cannot be complied with, the general way is to bliſter and fire.

When a horſe is lame in the ſtifle, he generally treads on his toe, and cannot ſet the heel to the ground. Treat him at firſt with the vinegar and cooling reſtringents; but if a large ſwelling with puffyneſs enſues, foment it well with the diſcutient fomentation till it diſperſes; and then bathe the part with any of the above medicines.

A lameneſs in the whirle bone and hip, is diſcovered by the horſe's dragging his leg after him, and dropping backward on his heel when he trots. If the muſcles of the hip are only injured, this kind of lameneſs is cured eaſily; but when the ligaments of the joint are affected, the cure if often very difficult, tedious, and uncertain. In either caſe, at firſt bathe the parts well with the cooling medicines, four or five times a day; in the muſcular ſtrain, this method alone may ſucceed, but in the ligamentous, it is reſt and time only can reſtore the injured parts to their proper tone.

Strains in the hock are to be treated by ſoaking the parts with coolers and repellers; but when the ligaments are hurt, and they are attended with great weakneſs and pain, uſe the fomentation. If a hardneſs ſhould remain on the outſide, it may be removed by repeated bliſtering; if within, it may be out of the power of any external applications to remove; however the joint ſhould be fired gently with ſmall razes or lines pretty cloſe together, and then covered with a mercurial plaiſter. To the diſcutient fomentation above mentioned may be added crude ſal armoniac, with a handful of wood-aſhes boiled in it.

The bliſtering ointment for the above purpoſes may be found under the article SPAVIN; but the ſublimate ſhould be omitted.

The firing uſed for the ſtrengthening relaxed ſinews or tendons, ſhould act only on the ſkin, which by contracting and hardening it all round the ſinews, compreſſes them more firmly like a bandage. *See the article* FIRING. *Bartlet's Farriery, pag.* 224.

STRANGLES, a diſtemper to which colts and young horſes are very ſubject; and begins with a ſwelling between the jaw-bones, which ſometimes extends to the muſcles of the tongue; and is attended with ſo great heat, pain, and inflammation, that ſometimes till matter is formed, the horſe ſwallows with the utmoſt difficulty.

The ſymptoms are extraordinary heat and feveriſhneſs, with a painful cough, and a great inclination to drink without being able; ſome horſes loſing their appetite intirely, others eating but little, by reaſon of the pain which chewing and ſwallowing occaſions: when the ſwelling begins on the inſide of the jaw-bones, it is much longer in coming to matter than when more to the middle; when it ariſes among the glands, and divides into ſeveral tumours, the cure is generally tedious, as it breaks in different places; and when it forms upwards on the wind-pipe and gullet, there is ſometimes danger of ſuffocation, unleſs the ſwelling ſoon breaks. But the moſt dangerous kind is, when, beſides the above ſymptoms, the horſe runs at the noſe; this by ſome is called the baſtard ſtrangles.

As this diſorder ſeems to be critical, the moſt approved method is to aſſiſt nature in bringing the ſwellings to maturity, by keeping them conſtantly moiſt with ointment of marſhmallows, and covering the head and neck with a warm hood. But as all ſwellings in glandular parts ſuppurate ſlowly, the following poultice may be applied hot twice a day: it is alſo a very proper one to ripen, or bring any other ſwelling to matter.

> Take leaves of marſhmallows ten handfuls; white lilly-root half a pound; linſeed and fenugreek ſeed bruiſed, of each four ounces: boil them in two quarts of water till the whole is pulpy, and add four ounces of ointment of marſhmallows, and a ſufficient quantity of hogs-lard, to prevent its growing ſtiff and dry.

In five or ſix days, by theſe means, the matter is generally formed, and makes its way through the ſkin; and if the diſcharge is made freely and with eaſe, the opening need not be inlarged; but ſhould be dreſſed with the following ointment ſpread on tow, ſtill continuing the poultice over it to promote the digeſtion, and prevent any remaining hardneſs.

> Take roſin and Burgundy pitch, of each a pound and a half; honey and common turpentine, each eight ounces; yellow wax four ounces: hogs-lard one pound; verdigreaſe finely powdered one ounce: melt the ingredients together, but do not put in the verdigreaſe, till removed from the fire; and it ſhould be ſtirred in by degrees, till the whole is grown ſtiff and cool.

If the fever and inflammation run high, and the ſwelling be ſo ſituated as to endanger ſuffocation, a moderate quantity of blood muſt be taken away, and the remainder diluted with plenty of water gruel, or warm water, maſhes, &c.

The running at the noſe, which often attends the ſtrangles, is dangerous; eſpecially if it continues after they have ripened and broke, as the horſe will be greatly weakened thereby. To prevent this waſte and decay, give him every day for ſome time an ounce of Jeſuits bark; or a ſtrong decoction of guaiacum ſhavings, which hath been found extreamly beneficial in reſtraining theſe glandular diſcharges when too liberal, and in drying up ulcers of all kinds in horſes. *See the article* GLANDERS.

If a hardneſs remains after the ſores are healed up, they may be anointed with the mercurial ointment; and when the horſe has recovered his ſtrength, purging will be neceſſary.

STRANGURY, a diſeaſe incident to cattle, conſiſting in a difficulty of making urine, attended with great pain. *See the article* KIDNEY.

STRAW, the ſtalk on which corn grows, and from which it is thraſhed. *See the articles* DUNG *and* RICK.

STRAWBERRY, the name of a well-known plant, cultivated in gardens for its fruit.

Strawberries may be raiſed from ſeeds; for by that means it is that we have obtained the ſcarlet ſtrawberry, which is a native of Virginia; the hautboy, originally an American plant; and the Chili ſtrawberry, which was firſt brought into Europe by M. Frezier, a French engineer: but the common, and moſt expeditious way of propagating them is from their runners, which eaſily take root at their joints, and there form plants, which, in two or three months, are fit to be cut off and tranſplanted. Thoſe which root earlieſt in the ſpring, and neareſt to the mother plant, are the fitteſt for this purpoſe: and the beſt time for removing them is in October, that they may get new roots before the hard froſt ſets in. They ſhould never be taken from old neglected beds, where the plants have been ſuffered to run into a multitude of ſuckers, nor from any but the moſt fruitful plants.

The ground in which they are planted muſt be well dug, and very carefully cleared of weeds; and when it is levelled, it ſhould be marked out into beds three feet and an half, or at moſt four feet wide, leaving a path way of two feet, or two feet and an half broad between them. Theſe paths are neceſſary for the convenience of gathering the fruit, for weeding and dreſſing of the beds, and, which is of eſſential conſequence to plants that remain ſo long in the ground as theſe do, to be frequently dug up, in order to lay fine freſh earth to the roots of the plants. Of the wood ſtrawberry, which is a native of this iſland, but of the ſmalleſt growth of any, though greatly improved, both as to ſize and flavour, by culture in the garden, four rows may be planted, in a quincunx order, at about eight inches from each other in the rows, and a foot diſtance from row to row, in the beds that are four feet wide: but three rows in a bed three feet wide will do much better, becauſe theſe will be more benefited by the digging of the alleys. The ſcarlet ſtrawberry muſt be planted at a foot diſtance every way, and the hautboy at ſixteen inches. The Chili ſtrawberry, which is the largeſt of all, muſt be ſet at about two feet diſtant from plant to plant. This laſt is found to ſucceed beſt under the ſhade of trees, in a very ſtrong brick earth, approaching nearly to clay: but it ſeldom perfects its fruit here, ſo as to anſwer the trouble of cultivation. In Chili, where it grows wild, the fruit of the larger ſort (for there are two kinds, but neither of them fit for the open air in this country) is as big as a wall-nut, but not ſo well taſted as our own ſtrawberries.

If the winter prove ſevere, ſome old tanner's bark, or if that cannot be eaſily procured, ſaw-duſt, ſea-coal aſhes, or decayed leaves of trees, ſhould be ſpread over the ſurface of the bed, between the plants, to keep out the froſt. This care is abſolutely neceſſary to the Chili ſtrawberry, which is frequently killed in hard winters.

In the ſpring, after the danger of hard froſt is over, the ground between the plants in the beds ſhould be forked with a narrow three pronged fork, to looſen it and break the clods: and if the tan, or other covering, which was laid on in the autumn, is then mixed with and buried in the earth, it will be of ſervice to the plants, eſpecially in ſtrong land. A covering of moſs ſpread over the beds about the latter end of March, or the beginning of April, will not only keep the ground moiſt, by preventing the drying winds of the ſpring from penetrating it, and thereby contribute greatly to ſecure a good crop of fruit; but it will alſo preſerve the fruit clean from that grit which is often thrown up by heavy rains after it is full grown, to the great detriment of its flavour, becauſe it muſt then be waſhed before it can be eaten. When the plants begin to flower, they muſt be watered very plentifully if the ſeaſon is dry, and great care muſt be taken to keep them clear from weeds. At Michaelmas, the beds ſhould be forked again, the weeding ſhould be repeated carefully, the alleys ſhould be dug, and the weeds buried in them, all the ſtrings or runners muſt be taken from the roots, and the plants ſhould be thinned, by pulling up the weakeſt, wherever they ſtand too cloſe together. The throwing of a little fine earth over them, at that time, will alſo greatly ſtrengthen their roots.

As theſe beds ſeldom continue good above three years, in the common way of managing them (though Mr. Miller, with greater care and judgment than is uſually exerted, has made them remain in perfection four or five years), and as they yield but little fruit the firſt year; it is neceſſary to new plant ſome freſh ground every third year. When this is done, the old beds may be deſtroyed, and the ground converted to ſome other uſe, after the new ones have had one year's growth. But that ſtrawberry beds may be made to yield good crops even for ſome years longer than the abovementioned uſual term of their duration, is perhaps more than probable, if they are cultivated according to the principles of what is called the new huſbandry.

The indefatigable M. de Chateauvieux, among his numerous and judicious trials of that huſbandry, upon different plants, applied it to ſtrawberries, of which he planted ſeveral beds of well and deeply looſened earth, ſix feet wide, with ſingle rows. The vigour of the plants, the largeneſs of their leaves, and the very great number of their roots, though cultivated only by ſtirring of the ground with the horſe-hoe, without the leaſt help of dung, manure of any kind, or watering even in the drieſt weather, gave him room to expect, before the firſt ſummer was over, that their fruit would be very large and plentiful the next year: nor was he diſappointed; for in 1754, which was their ſecond year, his ſtrawberries were admirable, extremely large, finely ſcented, and of a very high flavour. He continued the ſame method in 1755 and 1756, and with the ſame ſucceſs as before. In ſhort, though the year 1755 was ſo extremely hot and dry, that no watering could well ſuffice to keep alive the plants that were managed in the common way; theſe remained conſtantly green, and in great vigour, and their fruit was, in every reſpect, finer than that on which the utmoſt care was beſtowed in his kitchen garden.

An ingenious writer in the Muſeum Ruſticum has obliged the world with the following method of cultivating ſtrawberries.

" I have them, ſays he, of ſeveral kinds; and the fruit, in the ſeaſon, is in great perfection, being large, and poſſeſſing a fine flavour. Theſe I procure with no great trouble or difficulty in the cultivation.

" I plant them in regular rows on beds three feet wide. The ſoil I chuſe for them is a good, natural, freſh, rich loam: the leſs it requires of manure the better, the fruit being the ſweeter and finer.

" On each of theſe beds above mentioned, I plant three rows of plants, in quincunx order, at fifteen inches diſtance every way; and I rather chuſe to plant them each on a little hillock, as it were, ſomething in imitation of hops.

" Between the beds are intervals of the ſame width.

" My next care is, by frequent hoeing, to keep my plants as clear from weeds as poſſible, by which they are ſure to be ſupplied with plenty of nouriſhment; a matter of great conſequence, particularly when the fruit is ſet, as then they require moſt, and the weeds are alſo at that ſeaſon moſt luxuriant: I therefore then ſtir the earth with the hoe often, which anſwers, as I ſaid before, a double purpoſe.

" I obſerve to keep my plants as clear as poſſible from runners; by which means my fruit is larger, and ſooner ripe, than it would otherwiſe be.

" When my ſtrawberry plants have borne fruit two ſucceſſive years on the beds, I get the alleys, or intervals, dug up and prepared, into which I tranſplant them in the ſame manner they were planted in the firſt-mentioned beds, which then become in their turn the intervals.

" Here they remain two years more, when I again remove them into freſh land prepared for the purpoſe, in this manner never letting them bear fruit more than two years in one ſpot.

" I cannot eaſily deſcribe to you the great benefit this method of management is of to the plants, which are thereby greatly invigorated, and the fruit prodigiouſly improved, both in point of ſize and flavour, inſomuch that they appear to be quite of a different nature from thoſe of my neighbours, who firſt furniſhed me with the plants."

STRAWBERRY-TREFOIL. *See the article* TREFOIL.

STRICKLE, the whet-ſtone placed upon the extremity of the ſhaft of a ſcythe.

STRIKE, a buſhel, or four pecks of corn.

STRINGHALT, a diſeaſe in horſes, conſiſting in a twitching and ſnatching up of the hinder leg much higher than the other.

STUBBLE, the ſtalks of corn left in the field by the reaper.

It has been a diſpute among farmers, whether wheat-ſtubble ſhould or ſhould not be ploughed in. We ſhall therefore give the following remarks of a ſenſible vale-farmer on this ſubject.

" We are far from being advocates, ſays he, for plowing in ſtubble; yet our land is not light, but the contrary, and bears as good crops of wheat as any in the kingdom.

" As our ſoil is not light, it agrees very well with horſe-beans, which we frequently ſow after wheat; but if ever we let the ſtubble remain uncut till bean ſeaſon, and plow it in, the conſequences are ſurely fatal; it cauſes the earth to lie hollow; the bean plants to fall down; the ſun and air get at the roots, and prevent the plant thriving; and the crop is always very greatly leſſened: beſides, the ſtubble, which with us is very ſtrong, clogs the plowſhare, and gathers up in clods, which are a ſure and a fatal ſhelter for many noxious inſects.

" Theſe facts, which every vale-farmer is well acquainted with, induce us always to mow our ſtubbles, which we apply to many and various uſes: if it is long, it ſerves very well for thatching: we litter our yards, ſtables, and cowhouſes with it for making dung; we uſe it for drying malt; and a great deal is burnt by the poor cottagers, for warming themſelves in winter, dreſſing their victuals, baking, brewing, *&c.*" *Muſeum Ruſticum, vol.* III. *p.* 275.

STUM, the unfermented juice of the grape, after it has been ſeveral times racked off, and ſeparated from its ſediment.

STUMP, the part of any ſolid body, particularly of trees, &c. remaining after the reſt are taken away.

A bare view of Fig. 6. Plate XXIV. is ſufficient to explain a very ſimple engine which Mr. Evelyn gives, for pulling up large roots.

The handle *A* turns the ſpindle of the pinion *B*, which has four or five teeth. Theſe teeth turn the larger wheel *C*, which moves the cylinder D, on which the rope *E* is rolled as the root is drawn up; one end of the rope being previouſly faſtened to the cylinder. The whole frame is let into a block of wood *F*, about four feet high and one in breadth; and the other end of the roller or cylinder is ſuſtained by a leſſer block of wood *G*. *H* is an iron plate which holds the wheel and pinion in the larger block. The cylinder, wheel, pinion, and handle of this machine ſhould be made of good tough iron. The cylinder may be about four inches in diameter, and fourteen or ſixteen inches in length. The reſt is obvious: though I apprehend an improvement might be made, by adding a catch, to ſecure either the handle or the cylinder, while the labourer (for one man will eaſily manage this engine) may be obliged to ſuſpend his work, in order to clear away any obſtacle that may have occurred. It would likewiſe certainty be right to place the wheels, and conſequently the handle, ſomewhat higher than is here directed, to ſave the very great fatigue of ſtooping down continually while this laſt is turned.

Where the roots are very large, and obſtinately tenacious, M. de Turbilly's advice, to blow them up with gunpowder, will be found very beneficial; eſpecially if neither of the abovementioned inſtruments can be had.

Where a place has been over-grown with wood, the earth is ſo thoroughly ſtirred by digging and pulling up the ſtumps and roots of the trees, that one plowing in autumn is generally ſufficient. The froſts in winter kill the weeds and break the clods; and after a ſecond plowing, in the ſpring, theſe lands may be ſown with expectation of an abundant crop: for the trees not having exhauſted the earth towards the ſurface, but having on the contrary manured it with their leaves, a conſiderable produce may be expected for many years.

M. Du Hamel mentions a ſmall field, which had formerly been underwood, and being converted into arable ground, produced plentiful crops of wheat and oats for upwards of twenty years running, without being reſted. It is true the ſoil was peculiarly proper for wheat, and would have been exhauſted much ſooner if it had been a poorer earth.

STUMPY, full of ſtumps; hard, ſtiff.

STURK, a young bullock; a heifer.

STY, a cabbin, or ſmall building to keep hogs in.

SUCCORY. *See the article* ENDIVE.

SUCCULENT, juicy, moiſt.

SUCKER, a young twig, or ſhoot from the root.

SUFFOLK-GRASS, the ſame with meadow-graſs, or poa. *See* Poa.

SUILLAGE, a drain of filth.

SULL, a plough. *See the article* Plough.

SULL-PADDLE, a plough paddle.

SUMMER, the ſeaſon in which the ſun arrives at the northern ſolſtice, and the days are at the greateſt length.

Summer, alſo implies the large piece of timber, or principal beam of a floor.

To SUMMER-LAND, or *To* Summer-Stir, to fallow land in the ſummer.

SUN-FLOWER, the name of a well-known flower, much cultivated in large gardens.

The ſun-flower is an annual plant, and the ſeeds ſhould be ſown every ſpring in a bed of good light earth. When the ſhoots are about three inches high they ſhould be tranſplanted into nurſery beds, and ſet at eight inches diſtance every way; they ſhould remain there till they are a foot high, and then be carefully taken up with a ball of earth at their roots, and planted in large borders, or intermixed with flowering ſhrubs, and other large plants; they muſt be frequently watered till they have taken root, after which they require no other care. The flowers appear in July, and ſtand a conſiderable time: the largeſt of them ſhould be preſerved for ſeed. The birds are very fond of the ſeed of the ſun-flower, and muſt therefore be carefully guarded from them, and the head left on the plant till October, at which time it ſhould be cut off, and hung up to dry in an airy place, and in a month more the ſeeds will be perfectly hardened. *Miller's Gard. Dict.*

SUN-SCORCHED, a term uſed in ſome parts of England to expreſs a diſtemperature of fruit-trees, owing to the ſun's affecting them too forcibly on a ſudden; the conſequence of which is the loſs and withering of the fruit. Such trees only are ſubject to this, as are planted in places ſheltered from the ſpring ſun, and open to that of the ſummer; and may be always cured by proper waterings.

SURBATING, a term uſed by farriers to ſignify the ſole of a horſe's foot being worn, bruiſed, or ſpoiled by beating the hoof againſt the ground in travelling without ſhoes, or going in hot ſandy lands, or with a ſhoe that hurts the ſole, or the like. It alſo ſometimes happens by over-riding a horſe while young, before his feet are ſufficiently hardened, or even by the hardneſs of the ground, and high lifting of his feet. The ſigns of this defect are his halting on both fore-legs, going ſtiffly, and creeping as if foundered.

There is nothing better for ſurbated feet than tar melted into the foot, or vinegar boiled with ſoot to a proper conſiſtence and poured into the foot boiling hot, with hurds over it, and ſplints to keep it in.

SURFEIT, a diſeaſe incident to horſes and other cattle.

Surfeits ariſe from various cauſes; but are commonly the effects of ſome diſeaſes not attended to, or that have been ill cured.

A horſe is ſaid to be ſurfeited, when his coat ſtares, and looks ruſty and dirty, though proper means has not been wanting to keep him clean. The ſkin is full of ſcales and dander, that lays thick and mealy among the hair, and is conſtantly ſupplied with a freſh ſucceſſion of the ſame, for want of due tranſpiration. Some horſes have hurdles of various ſizes like peas or tares: ſome have dry fixed ſcabs all over their limbs and bodies; others a moiſture attended with heat and inflammation; the humours being ſo ſharp, and violently itching, that the horſes rub ſo inceſſantly, as to make themſelves raw. Some have no eruptions at all, but an unwholeſome look, and are dull, ſluggiſh, and lazy: ſome appear only lean and hide-bound: others have flying pains and lameneſs, reſembling a rheumatiſm: ſo that in the ſurfeits of horſes, we have almoſt all the different ſpecies of the ſcurvy, and other chronical diſtempers.

The following method is uſually attended with ſucceſs in the dry ſpecies. Firſt take away about three or four pounds of blood; and then give the following mild purge, which will work as an alterative, and ſhould be repeated once a week, or ten days for ſome time.

> Take Succotrine aloes ſix drams, or one ounce; gum guaiacum half an ounce; diaphoretic antimony, and powder of myrrh, of each two drams: make into a ball with ſyrup of buckthorn.

In the intermediate days, an ounce of the following powder, ſhould be given morning and evening in his feeds.

> Take native cinnabar, or cinnabar of antimony, finely powdered, half a pound; crude antimony, in fine powder, four ounces; gum guaiacum, alſo in powder, four ounces: make into ſixteen doſes for eight days.

This medicine muſt be repeated till the horſe coats well, and all the ſymptoms of ſurfeit diſappear. If the horſe is of ſmall value, two or three common purges ſhould be given, and half an ounce of antimony, with the ſame quantity of ſulphur, twice a day, or the alterative balls with camphor and nitre, as directed in the preceding chapter.

If the little ſcabs on the ſkin do not peel off, anoint them with the mercurial ointment; during the time of uſing which, it will be proper to keep the horſe dry, and to give him warm water. This ointment properly rubbed into the blood, with the aſſiſtance of purging phyſick, has frequently cured theſe kind of ſurfeits, without any other aſſiſtance.

The wet ſurfeit, which is no more than a moiſt running ſcurvy, appears on different parts of the body of a horſe, attended ſometimes with great heat and inflammation; the neck oftentimes ſwells ſo in one night's time, that great quantities of a hot briny humour iſſues forth, which, if not allayed, will be apt to collect on the poll or withers, and produce the poll-evil or fiſtula. This diſeaſe alſo frequently attacks the limbs, where it proves obſtinate, and hard to cure: and in ſome horſes ſhews itſelf ſpring and fall.

In this caſe bleed plentifully, avoid externally all repellers, and give cooling phyſic twice a week; as, four ounces of lenitive electuary, with the ſame quantity of cream of tartar; or the latter, with four ounces of Glauber ſalts, quickened, if thought proper, with two or three drams of powder of jallap, diſſolved in water-gruel, and given in a morning faſting.

After three or four of theſe purges, two ounces of nitre made into a ball with honey, may be given every morning for a fortnight; and, if attended with ſucceſs, repeated for a fortnight longer.

The powders above-mentioned may alſo be given with the horſe's corn; or a ſtrong decoction of guaiacum ſhavings, or logwood may be given alone to the quantity of two quarts a day. Theſe, and indeed all alterative medicines, muſt be continued for a long time, where the diſorder proves obſtinate.

The diet ſhould be cool and opening, as ſcalded bran or barley; and if the horſe is hide-bound, an ounce of fenugreek ſeeds ſhould be given in his feeds for a month or longer; and, as this diſorder often proceeds from worms, give the mercurial phyſic too, and afterwards the cinnabar powders, as above directed; but as in general it is not an original diſeaſe, but a ſymptom only of many, in the cure, regard muſt be had to the firſt cauſe: thus as it is an attendant on ſurfeits, fevers, worms, &c. the removal of this complaint muſt be variouſly effected.

In a mangy horſe the ſkin is generally tawny, thick, and full of wrinkles, eſpecially about the mane; the loins and tail, and the little hair that remains in thoſe parts ſtands almoſt always ſtrait out or briſtly: the ears are commonly naked and without hair, the eye and eye-brows the ſame; and when it affects the lymbs, it gives them the ſame aſpect; yet the ſkin is not raw, nor peels off, as in the hot inflamed ſurfeit.

Where this diſtemper is caught by infection, if taken in time it is very eaſily cured: and I would recommend a ſulphur ointment as moſt effectual for that purpoſe, rubbed in every day. To purify and cleanſe the blood, give antimony and ſulphur for ſome weeks after. There are a great variety of external remedies for this purpoſe, ſuch as train oil and gun-powder, tobacco ſteeped in chamber-lye, &c. Solleyſell recommends the following.

Take burnt alom and borax in fine powder, of each two ounces; white vitriol and verdigreaſe powdered, of each four ounces; put them into a clean pot, with two pounds of honey, ſtirring till they are incorporated; when cold, add two ounces of ſtrong aqua fortis.

But when this diſorder is contracted by low feeding, and poverty of blood, the diet muſt be mended, and the horſe properly indulged with hay and corn. The following ointments are effectually uſed for this diſorder, rubbed into the parts affected every day.

Take powdered brimſtone, train oil, and tar, of each equal quantities; to which may be added ginger, or white hellebore.

Or,

Take ſulphur vivum, half a pound, crude ſal armoniac one ounce, hogs lard, or oil, a ſufficient quantity to form into an ointment.

Or,

Take quickſilver, and oil of vitriol, of each one ounce; hogs lard, one pound, ſulphur vivum four ounces, oil of turpentine one ounce and half.

Theſe are both very powerful remedies for this diſorder, and can ſcarce fail of ſucceſs.

To the two firſt, occaſionally, may be added a third part of mercurial ointment; but as ſulphur is in general allowed, to be the ſpecific in the itch; and being found both more ſafe, and efficacious than mercury; ſo we apprehend it will ſufficiently anſwer the purpoſe here; for as this diſorder ſeems beſt accounted for by Leuwenhoek, from certain ſmall inſects he diſcovered in the puſtules, by the microſcope; ſo it ſeems as if they were deſtroyed, by the ſteams of brimſtone, though only raiſed by the heat of the body; for in the human body, the itch may be cured by partial ſulphurous unctions, on the legs only; but where the mange proves obſtinate in horſes, let the parts be waſhed with ſublimate water before the application of the ointment, and ſubjoin the internal uſe of ſulphur, in order to diffuſe the ſteams more certainly through the ſkin; there being reaſon to believe, as in the itch, that the animalcula may ſometimes lie too deep, to be thoroughly deſtroyed by external applications only.

SURVEYING, the art or act of meaſuring lands; that is, of taking the dimenſions of any field, parcel, or tract of land, laying down the ſame in a map or draught, and finding the content or area thereof.

As this art is of the utmoſt importance to all owners and occupiers of land, we ſhall endeavour to explain it in the eaſieſt and moſt intelligent manner. And in order to this we ſhall begin with the principles of the art, and proceed gradually to ſhew how all the ordinary figures may be meaſured, protracted, and caſt up, with no other inſtruments than chains, compaſſes and ſcales. We ſhall afterwards endeavour to explain, in a very eaſy and conciſe manner, the uſe of the plain table, and other inſtruments uſed in ſurveying; ſo that any perſon, of a common capacity, and that underſtands the four firſt rules of arithmetic, may be able to ſurvey and parcel out land, plat it, and give up its content with eaſe and expedition.

Of geometrical definitions, diviſions, and remarks.

I. A point is that which hath no parts, either of longitude or latitude, but is indiviſible, ordinarily expreſſed with a ſmall prick, like a period at the end of a ſentence.

II. A line hath length, but no breadth nor depth, whoſe limits or extremities are points. This is either right or crooked.

III. A right line lies ſtreight, and equal between its extream points, being the ſhorteſt extenſion between them; the crooked or circular not ſo.

IV. A ſuperficies hath length and breadth, but no depth; of this, lines are the limits.

V. A plain ſuperficies in that which lieth equally (or evenly) between its lines.

VI. An angle is the meeting of two lines in one point, ſo as not to make one ſtreight line; and if drawn beyond that point, they will interſect or croſs one another. This in vulgar Engliſh may be called a corner; of which there be two ſorts, one right, the other oblique.

VII. A right angle is that which is made by two right lines, croſſing or touching one another perpendicularly, (or ſquarely) like an ordinary croſs, or carpenter's ſquare.

VIII. An oblique angle is that which is either greater or leſs than a right angle; and this is of two ſorts, obtuſe and acute.

IX. An obtuſe angle is greater than a right angle, like the left and right corners of a Roman X.

X. An acute angle is leſs than a right angle, like the higheſt and loweſt corners of the ſame letter.

XI. A figure is that which is comprehended under one line or many; of this there are two kinds, a circle, and a right-lined figure.

XII. A circle is a perfect round figure, ſuch as is drawn with a pair of compaſſes, the one foot being turned round in a point, and the other wheeled about it. The point in the preciſe middle is called the center; the round line, the circumference or periphert; a line going thro' the center, and divides the circle into two equal parts, is called the diameter; half of that line is a ſemi-diameter, or radius; half the circle is ſtiled a ſemi-circle; the quarter, a quadrant; any portion of it, cut off by a right line not touching the center, is called a ſegment.

XIII. Right-lined figures are ſuch as are limited by three right lines, or more, and are either triangles or triangulate, that is, ſuch as are compounded of, and reſolvable into triangles.

XIV. Triangles are figures comprehended under three right lines, and (as Ramus thinks that for a reaſon he gives, lib. 6. pr. 6.) might be better called trilaterals; but the name triangle from the number of the angles hath obtained.

Alſo from the nature and quantity of their angles, theſe triangles are diſtinguiſhed into three ſorts, 1. Rect-angled, having one right angle. 2. Obtuſe-angled, having one obtuſe angle. And 3. Acute-angled, having all acute angles; for no triangle can have more right or obtuſe angles than one, becauſe by a well known old rule, no triangle upon a plain ſuperficies can conſiſt of three greater angles than ſuch, as being jointly taken are equal to two right.

Theſe three ſorts of triangles may, according to the length and proportion of their ſides, be ſub-diſtinguiſhed into ſeven; for each of them may have either two equal ſides or none; and the acute-angled may have all three ſides or lines equal: but be triangles of what name or kind ſoever, they are all capable of being exactly meaſured by one plain rule, as hereafter ſhall fully appear.

XV. Triangulate figures are ſuch as have more angles, and conſequently more ſides or lines, than three; and theſe are either quadrangular or multangular.

XVI. Quadrangular figures are ſuch as have four angles, and as many ſides, and theſe are either parallellograms or trapeſias.

XVII. Parallellograms are figures that are bounded with parallel lines, that is, ſuch lines as are every where of the ſame diſtance one from another, ſo as if they were infinitely extended, they would never meet, like the upright lines of the Roman H. Theſe parallellograms are either rectangular or obliquangular.

XVIII. Rect-angular parallellograms are ſuch as have four right angles, viz. the ſquare or quadrat, and the long ſquare, otherwiſe called the oblong.

XIX. The ſquare is that figure that hath four right angles, and four equal ſides, like any of the ſix faces of a die.

XX. The long ſquare hath alſo four right angles, and the oppoſite ſides are equal, but the adjoining ſides meeting at each angle, differ in length. Of this figure is a well printed page in a book, and the ſuperficies of a well cut ſheet of paper, or an ordinary pane of glaſs.

XXI. Obliquangled parallellograms are ſuch as have oblique angles, viz. two acute, and two obtuſe. Of theſe there are two kinds, the rhombus, and the rhomboides.

XXII. The rhombus is a figure that hath equal ſides, but no right angles, like the form of a diamond on the cards, or the moſt ordinary cut of glaſs in windows, whoſe oppoſite angles are equal.

XXIII. The rhomboides is a defective rhombus; for if from any ſide of a rhombus we cut off a part with a parallel line,

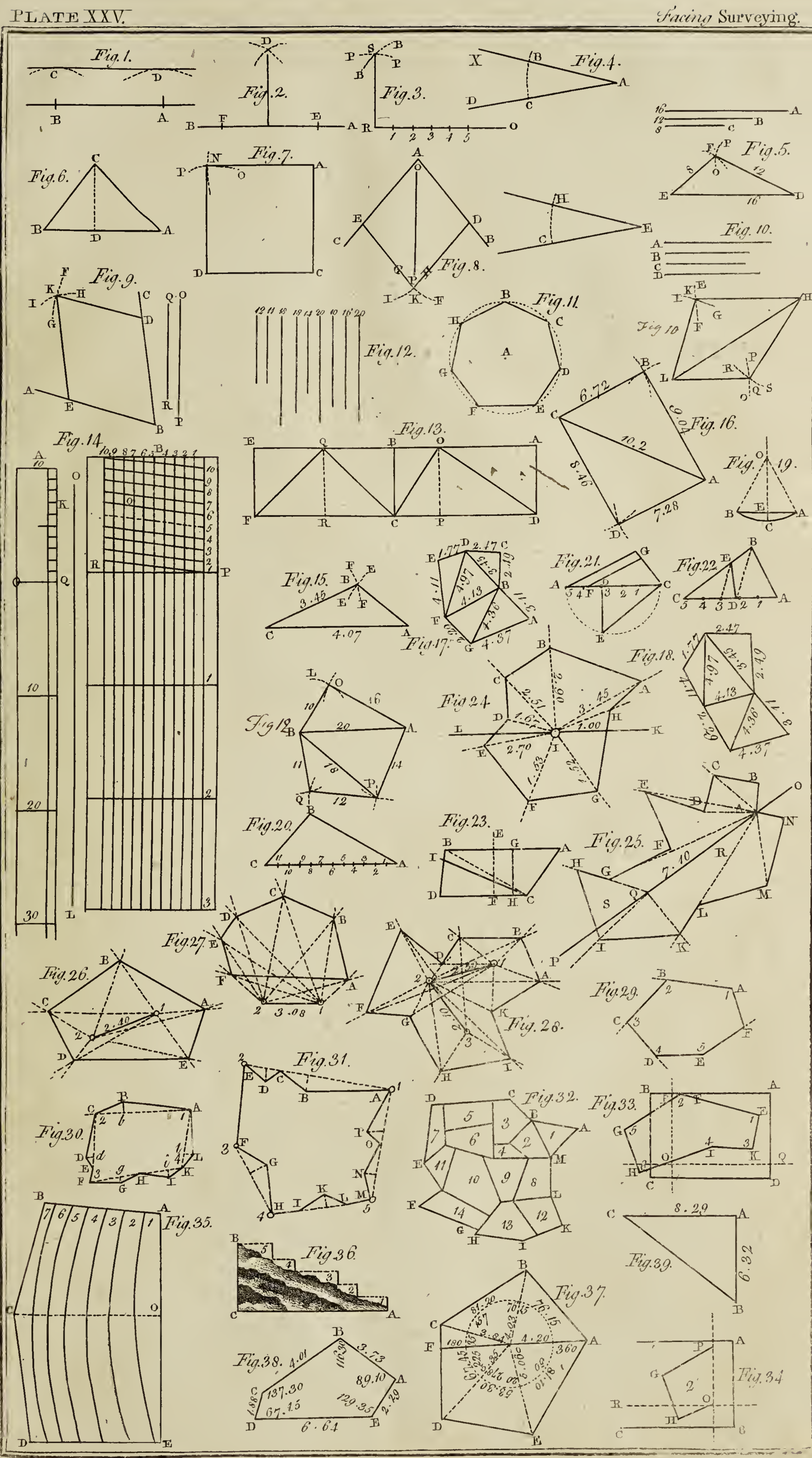


Fig. 1.
Fig. 2.
Fig. 3.
1 2 3 4 5
Fig. 4.
16
12
8
Fig. 5.
Fig. 6.
Fig. 7.
Fig. 8.
Fig. 9.
Fig. 10.
Fig. 11.
Fig. 12.
12 11 18 19 14 20 10 16 20
Fig. 13.
Fig. 14.
10 9 8 7 6 5 4 3 2 1
10
20
30
Fig. 15.
3.45
4.07
Fig. 16.
6.72
9.04
10.2
8.46
7.28
Fig. 17.
1.77
2.17
2.49
4.97
4.13
4.11
4.36
4.37
Fig. 18.
2.47
Fig. 19.
Fig. 20.
11 9 7 5 3 1
10 8 6 4 2
Fig. 21.
Fig. 22.
Fig. 23.
Fig. 24.
2.90
2.51
3.45
1.67
1.00
2.70
1.53
1.52
Fig. 25.
7.10
Fig. 26.
2.40
Fig. 27.
3.08
Fig. 28.
Fig. 29.
Fig. 30.
Fig. 31.
Fig. 32.
Fig. 33.
Fig. 34.
Fig. 35.
7 6 5 4 3 2 1
Fig. 36.
Fig. 37.
76.15
4.20
360
180
Fig. 38.
4.01
3.73
137.30
89.10
67.15
129.35
1.88
2.29
6.64
Fig. 39.
8.29
6.32

line, the remainder will be a rhomboides, which hath neither equal ſides nor angles, but yet the oppoſite ſides and angles are equal.

XXIV. The trapezium is a figure that is neither parallellogram, nor, conſequently, hath equal ſides or angles, but is irregularly quadrangular, as if drawn at adventure. Of this ſhape moſt fields prove, that ſeem to the eye to be ſquares or oblongs.

XXV. Multangular figures are ſuch as contain more ſides and angles than four, and they are either regular or irregular.

XXVI. Regular multangulars take their names from their number of angles, ſo a pentagon, hexagon, heptagon, octagon, eucagon, decagon, ſignify multangular figures of five, ſix, ſeven, eight, nine, ten angles, and conſequently ſides.

XXVII. An irregular polygon, or multangular figure, is that which hath more angles, and ſides than four, the ſides, and angles, being unequal to one another.

Of geometrical problems.

I. *To draw a line parallel to another, at any diſtance aſſigned.*

Plate XXV. Fig. 1. Open your compaſſes to the diſtance given, and chuſing two points conveniently diſtant in the line given, as here at A and B, deſcribe the arches C and D, to whoſe convexity, if you apply a rule, the parallel line is eaſily drawn.

II. *To raiſe a perpendicular upon a line given, or to croſs that line at right angles in a point aſſigned.*

Fig. 2. Suppoſe the point C in the line A B were aſſigned for the perpendicular, open the compaſſes to a convenient diſtance, and mark out the two points E and F in the line A B, then opening them ſomewhat wider, you may, by ſetting one foot in E and F ſeverally, deſcribe the two arches cutting one another at the point D, from which, if you draw a line to the point C, the work is done for the raiſing of a perpendicular; but if you be to croſs the lines at right angles, you may continue the line from D thro' C at pleaſure.

But if the ſaid line A B had been given to be divided in the preciſe middle, by another line croſſing it at right angles, the way is to ſet one point of the compaſſes in A and B ſeverally, and having deſcribed two arches above the line, interſecting one another as at D, do the like below the line A B from the ſame points, and with the ſame extent of your compaſſes, then through the ſeveral interſections, a rule being laid upon them, a line may be drawn, cutting the given line exactly in the middle at right angles.

Note, That when one point of your compaſſes ſtand in A, you may make both the arches belonging to that center above and below the line; and then removing the compaſſes to B, you may croſs them both.

III. *To raiſe a perpendicular at the end of a line.*

Fig. 3. Let O R be the line given, then to raiſe a perpendicular at R, make five little equal diviſions, and taking four of them with your compaſſes, ſet one foot of your compaſſes in R, and with the other deſcribe the arch P P; then take the diſtance from R to 5, and placing one foot in 3, with the other deſcribe the arch B B, interſecting the former in the point S; then ſhall the line S R (being drawn by a ſtrait rule) be a perpendicular to the line O R.

IV. *To let fall a perpendicular upon a given line from any point aſſigned.*

Open your compaſſes ſo as one foot being ſet in the aſſigned point, the other may go clear over the line given, and thereby deſcribe an arch cutting the line at two points; then ſhall the half diſtance between thoſe two points be the point to which the perpendicular may be drawn from the point aſſigned. But if you think it too much pains to find the point of half diſtance by trial, you may help yourſelf by the ſecond problem: for if you deſcribe two arches interſecting one another on the farther ſide of the line from the aſſigned point, placing (to that purpoſe) the foot of your compaſſes firſt in one of the interſections of the given line, and then in the other; you may by laying a rule upon the aſſigned point, and the interſection of the two arches, draw a perpendicular from the ſaid aſſigned point, cutting the given line at right angles.

N. B. All theſe problems with regard to perpendiculars, aim at no greater matter, than what may be performed in a mechanical way with exactneſs enough by the help of a ſmall ſquare exactly made, for if you apply one leg of ſuch a ſquare to any line, ſo as the angle of the ſquare may touch the end of the ſaid line, or any other point where the perpendicular is to be raiſed, you may by the other leg draw the perpendicular. In the like manner to let fall a perpendicular from a point aſſigned, you need only to apply one leg of the ſquare to the line, ſo as the other may touch, at the ſame time, the aſſigned point, whence you may draw the perpendicular by that leg that toucheth the point.

If the angle of your ſquare be a little blunt, either thro' ill making or long uſing, you muſt allow for it when you apply it to the point in a line. And when you are drawing a perpendicular, you muſt ſtop before you reach the given line, and then by applying the leg of your ſquare to that part of the perpendicular already drawn, ſo as part of that leg may paſs clearly over the given line, you may draw the reſt of your perpendicular as exactly as if the angle had been true. The ſame method is to be taken when a line is to be croſſed by another drawn quite through it at right angles.

V. *An angle being given, to make another equal to it.*

Fig. 4. The angle X A D being given, and a line drawn at pleaſure, as is the loweſt from the point E, open your compaſſes to any convenient diſtance, and ſetting one foot in A, deſcribe the arch B C. Then with the ſame extent ſetting one foot in E, with the other deſcribe the arch C H, long enough to equal or exceed the other. Then taking the diſtance B C between the points of your compaſſes, ſet one in C, and with the other mark the point H in the arch C H, through which point H a line being drawn from the point E, will make an angle with the line E C, equal to the angle given.

Note, When we ſpeak of the quantity of angles, their equality or unequality, we never regard the length of the lines; for if you extend or contract them at pleaſure, the angle is ſtill the ſame. But that is the greateſt angle whoſe lines are fartheſt diſtant from one another at the ſame diſtance from the angular point, or the place where its lines meet.

VI. *Any three lines being given, (equal or unequal) ſo as no one of them be longer than the other two joined together, to make a triangle of them.*

Fig. 5. The lines A B C being given, ſet the line A from D to E; then with your compaſſes take the length of the line B, and ſetting one foot in D, deſcribe the arch P O. This being done, take with your compaſſes the length of the line C, and ſetting one foot in E, with the other croſs the former arch at F, from which interſection drawing lines by a rule to D and E, the triangle is finiſhed.

Note, That if all the ſides, or two of them, be equal, the method is the ſame; but the labour leſs, becauſe we need not to take the ſame length twice over with the compaſſes.

VII. *To find the perpendicular of the triangle, in order to the meaſuring of it.*

Fig. 6. Let the line A B be accounted the baſe, and from the angle C, let fall a perpendicular as was taught Probl. 4. upon that line at D, which is ready for taking off with compaſſes, and meaſuring on a ſcale, of which hereafter in meaſuring the content of figures.

But if we have no occaſion to draw the perpendicular, but only to know the length of it, (as it moſt frequently falls out in meaſuring) no more is needful, but to ſet one foot of the compaſſes in the angular point C, and extend the other to the baſe A B, ſo as it may touch it, but not go beyond it; then have we the perpendicular between the points of the compaſſes.

VIII. *One ſide being given, to make a ſquare.*

Fig. 7. The line C D being given, raiſe a perpendicular at C of the length, at the leaſt, of the given line; then taking the line C D between the feet of your compaſſes, ſet it upon the perpendicular from the angular point C to A: with the ſame diſtance ſetting one foot in D, deſcribe the arch O P. Laſtly, with the ſame diſtance, or extent, ſet one foot in A, and with the other deſcribe the arch,

croſſing the arch O P in N, from which interſection a line drawn by a rule to A, and another to D, finiſh the geometrical ſquare or quadrant A C D N.

IX. *To make a long ſquare, the length and breadth being given.*

This is ſo nearly like the former, that a particular figure is not neceſſary to explain it. Suppoſe each ſide of the ſquare in the laſt problem to conſiſt of 8 ſmall equal parts, and you were to make a long ſquare, whoſe length muſt be equal to a ſide thereof, viz. 8, and the breadth half ſo much: when you had drawn the line C D, for the length, and raiſed the perpendicular at C, you muſt take the ſhorter line given for the breadth, and ſet upon the perpendicular from C, upwards to a point, which for diſtinction we ſhall call the point E, imagining it ſo marked: with the ſame extent of the compaſſes deſcribe the arch, placing one foot in D. Laſtly, extending your compaſſes to the length of the line C D, ſet one foot in E, and with the other croſs the arch aforeſaid. Then a right line drawn from that interſection to E, and another from the ſame to D, compleat the long ſquare.

X. *To make a rhombus, the ſides being given.*

Fig. 8. If the angles be not limited, draw any oblique angle at pleaſure, either acute or obtuſe, as here the angle B A C, which is acute. Then let the line O P be the length of a ſide, which being taken with your compaſſes, ſet it from the angular point A, in both lines to D and E, in which two points, place a foot of your compaſſes ſucceſſively without altering them, viz. in D, to deſcribe the arch F G, and in E to deſcribe the arch H I, croſſing one another in the point K, from which, right lines drawn to D and E, finiſh the rhombus D A E K.

Note, If any angle be given together with the ſide, to limit the ſhape and content, begin with that, and proceed as before; for you muſt know, that to make a rhombus (or rhomboides) like to another for figure, or equal to it in content, it is not ſufficient to have the ſame ſides; for the more oblique the angles are, the farther will the rhombus differ from a ſquare, and the leſs will be the content. But you muſt have an angle given, or elſe a diagonal line, which is a right line paſſing through the rhombus from one oppoſite angle to another, and dividing the figure into two equal triangles. If the former, viz. an angle, be given, we have ſhewed what uſe is to be made of it. If the latter, *i. e.* a diagonal, together with the length of the ſides, you may, by taking the length of the ſides with your compaſſes, and ſetting a foot in the ends of the diagonal line, make a triangle on the one ſide of the diagonal, by Probl. 6. and then another on the other ſide by the ſame problem, the diagonal being a common baſe to them both; and this will give the figure exactly.

XI. *To make a rhomboides, the ſides being given.*

Fig. 9. If neither angle nor diagonal be given, make any angle at adventure, as here A B C. Then ſuppoſing the lines given to be O P and Q R, ſet the length of the longer upon the line B C, from B to D, and the ſhorter on the line B A to E. Then with the compaſſes extended from B to E, ſet one foot in D, and deſcribe the arch F G. Likewiſe, with the compaſſes extended to the length of the line O P, ſetting one foot in E, with the other deſcribe the arch H I, interſecting the former arch at K; from which interſection lines drawn to D and E, finiſh the rhomboides.

XII. *To make a trapezium, the diagonal and lines in order being given.*

Fig. 10. Let the line HL be the diagonal of a trapezium, whoſe ſides are the lines A B C D; the ſide A being counted the firſt, as that which takes it, being from the point H, and the reſt in the order as they are marked alphabetically.

Then with your compaſſes ſet to the length of the line A, place one foot in H, and with the other deſcribe the arch E F. Next taking the length of the line B, with the one foot of your compaſſes placed in L, with the other make the arch G I, interſecting the former at K; from which point of interſection, lines drawn to H and L, make the triangle H K L.

Then with the extent of the line C, ſet one of the feet of your compaſſes at L, and deſcribe the arch O P. Laſtly, ſetting them to the length of the line D, and placing one foot of your compaſſes in H, with the other make the arch S R, interſecting the former at Q; ſo ſhall lines drawn from Q, to L and H, make up the triangle L Q H, and finiſh the trapezium H K L Q.

I could have been much briefer in this problem, by referring to the 6th; but this being of very great and frequent uſe, I deſired to be very plain.

XIII. *To make a regular polygon, otherwiſe called a regular multangular, or multilateral figure, conſiſting of many equal ſides and angles, viz. above four apiece.*

Being ſatisfied what ſhall be the diſtance between the center and every angle, with that diſtance deſcribe a circle, which being equally divided into as many parts as the figure muſt have angles (or ſides, for they are equal in number) and lines drawn from the points of diviſion within the circle from point to point, (ordinarily called chords) the polygon is finiſhed, as in this diagram.

Fig. 11. Suppoſe an heptagon, or multangular figure of ſeven ſides, and as many angles, be to be deſcribed, every angle being deſigned to be diſtant from the center A, ſeven eighths, or three quarters and a half of an inch; with that diſtance deſcribe the circle B C D E F G H, which being divided into ſeven equal parts, and lines drawn from point to point, the heptagon B C D E F G H will be therein included.

We ſhall rather leave our reader to find out the points of diviſion by many trials, than to puzzle him with the geometrical way for finding out chords to that purpoſe.

XIV. *Having the ſides of the triangles whereof it conſiſteth, orderly given, to make an irregular multangular, or multilateral figure.*

This will be more fully handled hereafter, when I come to ſhew the method of drawing plats of ground. In the interim I will give you a ſpecimen of an irregular pentagon.

Fig. 12. Having the lines of three triangles given, lay down the greateſt of the firſt, viz. 20, from A to B for a baſe, and by Probl. 6, make a triangle of it, and the other lines 16 and 10, viz. the triangle A B O.

Secondly, You find by the number 20 over the firſt line of the ſecond triangle, that it is the common baſe to them both; and therefore, by the ſame Probl. 6, make the triangle A B P of the lines 20, 14, 18.

Laſtly, Finding the baſe of the third triangle to be the ſame with 18, one of the ſides of the ſecond make the triangle P B Q of the lines 18, 11, 12: ſo is the quinquangular figure finiſhed.

How every line is to be found in its due order in this, or any other ſort of multangular figures, ſo as to give a true and exact account, not only of the ſuperficial content, but alſo of the figure and ſituation, is to be taught hereafter in the doctrine and practice of Protraction.

How to find the ſuperficial content of any right-lined figure, the lines being given.

As a foundation to what we ſhall lay upon this ſubject, there are ſome few geometrical principles or theorems out of Euclid and Ramus, which I deſire may be remembered; and becauſe underſtanding is a great help to memory, we ſhall make uſe of a kind of ocular demonſtration; which, though not ſo ſtrict and artificial as that which is to be found in the commentators upon Euclid in the quoted places, will be more ſerviceable becauſe more eaſily underſtood.

Theor. 1. *Every parallellogram being of the ſame length with the baſe of a triangle, and of the ſame height with the perpendicular of that triangle, is double to it.* Euclid 41. 1.

Fig. 13. Here are two equal oblongs, or long ſquares, A B C D and B E F C, and within them two triangles inſcribed, whoſe baſes are of the ſame length, and their perpendiculars, O P and Q R, of the ſame height with the oblongs. Now each of theſe triangles being parted into two right-angled triangles by their perpendiculars, then it is plain to the eye, and from the nature of diagonals, which ever divide a parallellogram into equal parts, that the two

new triangles O P D and O P C, which make up the firſt of the given triangles, are equal to the triangles D A O and O B C, which make up the remainder of the parallellogram A B C D. Therefore that parallellogram is double to that triangle, which was to be demonſtrated.

In like manner it is evident, that the parallellogram B E F C is double to the triangle C O F, becauſe C R Q is equal to B Q C, and Q R F is equal to Q E F.

Theor. 2. *All triangles having the ſame baſe, and lying between the ſame parallels, are equal.* Euclid 37. 1.

So in our laſt diagram, the two given triangles having baſes of the ſame length, and lying between the ſame parallels, are evidently equal, becauſe they are demonſtrated to contain each of them the exact half of the parallellograms, wherein they are inſcribed; and the parallellograms being equal, their halves muſt be equal alſo.

Theor. 3. *The ſides of the triangulate (that is, one that hath four or more ſides) are ever two more than the triangles of which it is made.* Ram. lib. 10. prop. 2.

Fig. 10, 12. This is plain by inſpection, if you view again the figures of the trapezium and irregular pentagon, in the 12th and 14th problems.

Theſe theorems being allowed to be true the doctrine concerning the ſuperficial content of right-lined figures, might be reduced to a narrow compaſs; for he that knoweth how to huſband theſe three theorems, may eaſily take up theſe corollaries, *ordine inverſo.*

1. Any quadrangular figure, regular or irregular, may by a diagonal be parted into two triangles; any five-ſided figure by two diagonals into three triangles; and ſix-ſided figures into four by three diagonals, &c. by Theor. 3.

2. It is no matter of what ſhape the triangle is, as to the rule for meaſuring, for whether it be right-angled, acute-angled, or obtuſe-angled, and whether it have three, two, or no lines equal, it is only the length of the baſe, and height of the perpendicular, and is conſiderable by Theor. 2.

3. The true meaſure or content of any triangle, whether alone, or as part of any triangulate figure of 4, 5, 6, or more ſides, (and conſequently of the whole figure, by ſumming up the content of all the ſeveral triangles) is found by multiplying the whole baſe of the triangle by half the perpendicular, or the whole perpendicular by half the baſe; which being a rule of ſuch infinite uſe in ſurveying, we deſire it may be remembered; and that it may be underſtood, we ſhall give a plain example.

Fig. 6. Suppoſe A B the baſe of the triangle belonging to the 7th problem, to be 44, and the perpendicular C D to be 20: whether you multiply 44, the whole baſe by 10, the half of the perpendicular, or 20, the whole perpendicular by 22, the half baſe, the product gives the content 440, as is here apparent.

44	20
10	22
——	——
440	40
	40
	——
	440

Having thus given a general method how all right-lined figures may be reduced to triangles, and ſo their content found, we might paſs to the next head concerning inſtruments, and their uſe; but becauſe there are nearer ways in meaſuring particular kinds of triangulate figures proper to thoſe kinds, we ſhall briefly mention them.

I. *To find the contents of a ſquare, or long ſquare.*

Multiply the length by the breadth, the product gives the area or content.

Example of a ſquare.

17 inches length.
17 inches breadth.
——
119
17
——
289 ſquare inches.
——

Example of an oblong.

25 feet long.
13 feet broad.
——
75
25
——
325 ſquare feet.
——

II. *To find the area or content in meaſure of a rhombus.*

Let fall a perpendicular from one of the obtuſe angles upon the oppoſite ſide; that ſide multiplied by the perpendicular, gives the area.

20 yards the ſide.
14 yards the perpendicular.
——
80
20
——
280 ſquare yards.

III. *To find the area of a rhomboides.*

Divide it into two triangles by a diagonal drawn between either pair of the oppoſite angles, then from either of the other angles let fall a perpendicular upon that diagonal; then ſhall that diagonal, being multiplied by that perpendicular, give the area.

Example.

19 rods the diagonal.
5 rods the perpendicular.
——
95 ſquare rods the content.
——

IV. *To find the content of a trapezium.*

Fig. 10. Divide it by a diagonal into two parts from angle to angle, as the trapezium, probl. 12. is divided by the diagonal H L, then from the other two angles, which in that figure are marked with K and Q, let fall perpendiculars upon the diagonal, half the ſum of thoſe perpendiculars being multiplied by the diagonal, or common baſe, gives the ſuperficial content.

Example.

Suppoſe in the trapezium before mentioned the diagonal is 33, the perpendicular from K 13, and that from Q 15, the area or ſuperficial content is thus computed.

13 chains the firſt perpendicular.
15 the ſecond perpendicular.
——
28 the ſum of both perpendiculars.
——
14 their half ſum.
33 the diagonal.
——
42
42
——
462 ſquare chains the area.
——

V. *To find the content of a regular polygonial, or multangular figure, otherwiſe called multilateral.*

Draw a line from the center to the middle of any ſide; half of the perimeter, or of all the ſides, being multiplied by that line before-mentioned, gives the content.

VI. *To find the content of an irregular polygon, or many-ſided figure.*

Divide it into trapezias and triangles by diagonal, then find their content ſeverally, and ſum up all together.

Fig. 12. Suppoſe the polygon belonging to the laſt problem were given without the diagonals A B and B P; then by drawing thoſe diagonals, the figure is divided into three triangles, whereof two being upon the ſame baſe A B, make up a trapezium, whoſe content may be found juſt in the ſame manner as was taught even now in the fourth rule, having found the perpendiculars from O and P falling upon the line A B. Then there remains the triangle B Q P, whoſe content may be found by the general rule concerning triangles, having found the perpendicular falling from Q on the line B P; and then having added the content of that triangle to the content of trapezium, you have the area of the whole polygonial figure.

Concerning chains, compaſſes, and ſcales.

I. Amongſt the many ſorts of chains uſed for meaſuring land, three are moſt famous, bearing the names of their inventors, Mr. Rathborne, Mr. Gunter, and Mr. Wing, all of them ingeniouſly divided, and uſeful in their kind; but brevity will give us leave only to deſcribe one, and that ſhall be Mr. Gunter's, being moſt in uſe, and eaſy to be procured.

This chain contains in length, four ſtatute-poles or perches, each perch containing 16 feet and a half, or 5 yards and a half; ſo that the whole chain is 66 feet, or 22 yards long.

This whole chain is divided into 100 equal parts or links, whereof 25 are a juſt pole or perch; and for ready counting, there is uſually a remarkable diſtinction by ſome plate or large ring at the end of every 25 links, but eſpecially at the preciſe middle of the chain, which ſhould differ from the reſt in greatneſs and conſpicuouſneſs. Alſo at the end of every tenth link, it is uſual to hang a ſmall curtain-ring; and if there be at every five links end a piece of wire made like the bow of a link, with a little ſhank an inch or leſs long, or ſome ſuch diſtinction, it is ſtill better.

When you are to meaſure any line by this chain, you need to regard no other denomination but only chains and links, ſet down with a prick of your pen betwixt them. *e. g.* If you found the ſide of a cloſe to be 6 chains and 35 links long, it is thus to be put down, 6. 35.

But if the links be under 10, a cypher muſt be prefixed; ſo 7 chains 9 links muſt be thus ſet, 7.09.

In the uſing of this, or indeed of any, chain, care muſt be taken both to go ſtrait, and to keep a true account; for which purpoſe, it is good that he which goeth before, carry in his hand a bundle of rods, to ſtick down one at the end of the chain which leads, having firſt ſtretched it well, and that he which follows do not only gather up the rods to keep the account, but alſo at every remove, mark whether he ſee the leader directly between his eye and the angle, or other mark he aims to meaſure to; and if need be, call to the leader to move towards the right or left hand, till he ſee him in a direct line to it.

II. Compaſſes are ſo well known, that we need not deſcribe them; only they ſhould be of braſs, with ſteel points, ſmall and neatly wrought, nine or ten inches long from the joint to the points, turning ſo truly upon the rivet, that they may be eaſily opened, and yet ſtand ſo firmly, that an arch or circle may be, without their ſhrinking, deſcribed upon a large radius.

III. Scales are certain lines divided into equal parts, upon plates or broad rules of braſs or box, and they are of two ſorts, 1. Plain. 2. Diagonal.

1. Plain ſcales are made up of two ſmall lines parallel to one another at a little diſtance, and theſe are divided into great equal parts, which ſignify tens, and are noted 10, 20, 30, 40, 50, &c. according to the length of the lines. They may be of any convenient length, but theſe great diviſions are ſeldom more than inches, or leſs than third parts apiece.

Again, one of the great diviſions is ſub-divided into ten equal parts by ſhort lines, whereof that in the middle ſtanding for 5, is longer than the reſt.

Fig. 13. According to the numbers of theſe little parts contained in an inch, the ſcale is named, A ſcale of 10, 11, 12, 16, 20, 24, 30, &c. in an inch. That ſhort one which we give you the figure of A, is of 10 in an inch, ſo noted at the top, according as is uſual upon the rules, and indices of plain tables. The line marked O Q, ſeparates units and tens; units being taken upward from that line, and tens downward; mixt numbers both ways.

As for example.

7 is the extent of the compaſſes upon the ſcale A, from the line O Q to K; 30 is their extent from the line ſo marked to O Q; and 27 is their extent from the line 20, to the ſhort line K aforeſaid.

Here note, that you muſt not expect to find the letters O Q or K upon the ſcales which you buy, being only marks uſed at pleaſure, to make my meaning plain; and likewiſe that this ſcale of 10 in an inch, and others that are ſmaller are uſually made, for more convenient uſe, ſo long as to contain nine or ten of the great diviſions, ſignifying tens; though the figure at A being deſigned for no other uſe than to help our conceptions, extends but a little beyond 30, that length being ſufficient for my purpoſe in this place.

Fig. 14. Theſe plain ſcales, eſpecially the ſmaller ſorts of them, ſuch as 24 or 30 in an inch, are very proper for drawing figures upon paper, where the numbers repreſented by the lines are not above 100, for then every diviſion may be counted as it is upon the ſcale, or above upon a long ſcale.

Alſo in the ſurveying of foreſts, chaſes, and great commons, where the lines are vaſtly long, and the miſtake of a few lines is not conſiderable, they may be conveniently uſed, accounting the tens and units to ſignify ſo many whole chains, and ſo eſtimating the parts of a chain with the compaſſes upon the ſmall diviſions, which a ſagacious man may do very near upon one of the larger ſcales. But it would be much better for ordinary meaſuring, if the grand diviſions of the ſcale were two inches apiece, for then the ſmaller diviſions being of five in an inch, would be ſo large as to be ſub-divided into five apiece, which repreſents 20 links; and then the half one of thoſe ſmaller diviſions ſignifying 10 links, and the quarter 5, a very ordinary judgment may come very near to the truth by eſtimation.

2. But the diagonal ſcale is ſo well known to every mathematical-inſtrument-maker, ſo eaſy to be procured, and every way ſo fitted to Gunter's chain, that we cannot but highly commend it.

It is made, as appears by the figure B, upon eleven parallel lines equidiſtant, ſo as to include ten equal ſpaces, which are all cut at right angles by tranſverſe lines dividing them all into four equal parts.

One of theſe tranſverſe lines, *viz.* P R, where it toucheth the firſt and laſt lines, ſeparates between the hundreds, or whole chains, and the tens, repreſenting 10 links apiece, the chains being numbered downwards on the left hand from P only to 3, but on the inſtrument itſelf they may go on to 9 or 10, but the tens upward from P to 10.

From the points of diviſion into tens upon the firſt line, beginning at P, to the like points beginning at R in the laſt line are nine diagonal lines drawn, the firſt beginning at P, and ending at the firſt diviſion above R. The ſecond begining at the firſt diviſion above P, and ending at the ſecond above R. In a word, they are all drawn from one diviſion leſs from P, to one more from R; by which it comes to paſs that every diagonal, by that time it hath paſſed from the firſt line to the eleventh, is a whole tenth part of an inch, which anſwers to ten links of the chain, farther diſtant from the line P R than at the points upon the firſt line whence it was drawn.

Every one of thoſe diagonals is divided into ten equal parts by the long parallel lines running through the whole ſcale, and numbered on the top from 1 to 9. Whereby it is evident that the interſection of any of the nine parallel lines that are numbered at the head with any diagonal, muſt be farther diſtant from the line P R, than the interſection of the line next before it with the ſame diagonal by $\frac{1}{10}$ of $\frac{1}{10}$, that is, by $\frac{1}{100}$, which anſwereth to a ſingle link of your chain.

From what hath been ſaid, and inſpection of the figure B, theſe things plainly follow; which, as ſo many clear inſtances, will help you to underſtand it fully.

The diſtance from P R, to the ſecond diviſion below it, anſwereth to two chains.

The diſtance from P R to the eighth diviſion upward, being taken (with compaſſes) upon the firſt line of the eleven from P to 8, anſwereth to 80 links.

Conſequently the extent of the compaſſes from the ſecond grand diviſion below P, to the eighth of the leſs diviſions upward, is proportionable to 2 chains 80 links.

The diſtance from P R to the firſt diagonal being taken upon the parallel line, noted with 9 above, anſwereth to 9 links: where note, that the firſt diagonal is not that which is noted with 1, but that which is drawn from the point P.

The diſtance upon the ſame line from P R to the diagonal that is marked with 7, is anſwerable to 79 links.

The extent of the compaſſes from the bottom of the figure upon the ſame line to the ſame diagonal, anſwereth to 3 chains 79 links.

In ſhort whole chains may be meaſured upon any line from P R, to the grand diviſion noted with the given number, decads alone, or chains and decads upon the firſt line of the eleven where the diagonals begin. Links alone, decads with links, and chains and decads with links, always upon that line upon which the number of the odd links ſtands at the head of the ſcale.

N. B. Theſe directions will as well fit, if half an inch be only allowed for a chain, and conſequently all the diagonals, genals drawn within that extent, as it is uſual upon the other end of the ſame rule, the grand diviſion for chains going the contrary way, and noted with numeral figures in order. It is therefore proper when you furniſh yourſelf with ſcales, to have diagonal ſcales of both dimenſions on the fore-ſide of your rule, and upon the back-ſide many plain ſcales of equal parts, with a line of chords.

How to caſt up the content of a figure, the lines being given in chains and links.

Having deſcribed theſe plain inſtruments, and in ſome meaſure ſhewed the uſe of them in ſeverals, it were very proper in the next place to teach their joint uſe in meaſuring and protracting; but becauſe we would have our young ſurveyor, before we take him into the field, able to perform his whole work together, we intend to ſhew him, 1. How he ought to make his computations; 2. The grounds or principles that will juſtify him in ſo doing.

For the firſt, take theſe rules:

1. Put down your length and breadth of ſquares and oblongs, and your baſe and half perpendicular of triangles directly under one another, expreſſed by chains and links with a prick betwixt them, as was taught before, chap. 4.

2. If the odd links were under ten, put a cypher before the numeral figure expreſſing them, (as there alſo was ſhewed) and if there be no odd links, but all even chains, put two cyphers after the prick.

3. Multiply length by breadth, and baſe by the half perpendicular, according to the rules for finding the content of figures, chap. 3.

4. From their product cut off five figures, accounting cyphers alſo for ſuch, reckoned from the right hand backward, with a daſh of your pen, ſo ſhall thoſe to the left hand ſignify acres.

5. If thoſe five cut off were not all cyphers, multiply them by four, and cutting off five towards the right hand again, the reſt will be roods or quarters.

6. If amongſt theſe five figures towards the right hand that were cut off at the ſecond multiplication, there be any figures beſides cyphers, multiply all the five by forty, and cutting off five again by a daſh of your pen, thoſe on the left hand ſignify ſquare perches, poles, or roods.

A few examples will make all plain.

Queſt. 1. *What is the content of a ſquare, whoſe ſides are every one of them 7 chains, 25 links?*

Length 7. 25.
Breadth 7. 25.

3625
1450
5075

5|25625
4

1|02500
40

1|00000

Anſw. 5 acres, 1 rood, and 1 perch, as here appears.

Queſt. 2. *In a long ſquare whoſe length is* 14 *chains, and the breadth* 6 *chains* 5 *links, what is contained?*

Length 14.00
Breadth 6.05

7000
84000

8|47000
4

1|88000
40

35|20008

Anſw. 8 acres, 1 rood, and 35 perches, as the work makes it evident.

Queſt. 3. *In a triangle, whoſe baſe is* 3 *chains, and half the perpendicular* 98 *links, what is the content?*

The baſe 3.00
Half perpend. 0.98

2400
2700

|29400
4

1|17600
40

7|04000

Anſw. 0 acres, 1 rood, 7 perches.

There are other ways of computation by ſcales, tables, &c. But that this is demonſtrative, will appear by the following ſteps.

1. It is evident, that in this way of multiplication, the product is ſquare links; for every chain being 100 links, it is all one to multiply 7.25 by 7.25, or 725 by 725 without pricks; for the pricks ſignify ſomething as to conceptions, but nothing at all in operation. The product therefore of the firſt example was really 525625 links.

2. Every chain being 4 perches long, it follows, that 5 chains, or 20 perches, in length, and 2 chains, or 8 perches, in breadth, make an acre, or 160 ſquare perches; for 20 being multiplied by 8, gives 160.

3. From hence it plainly follows that there are exactly 100000 ſquare links in an acre; for 5 chains multiplied by 2, is the ſame with 500 links by 200, which makes 100000. And he does not deſerve the name of an arithmetician, that is ignorant of this old plain rule, when the diviſor conſiſts of 1 and cyphers, as 10, 100, 1000, 10000, 100000, &c. cut off from the right hand ſo many figures of the dividend as the diviſor hath cyphers, accounting them the remainder; ſo ſhall the reſt on the left ſide be the quotient. It is plain then that 525625 ſquare links, make 5 acres, and 25625 ſquare links over.

Thus we have made it clear to a very ordinary capacity, that as far as concern acres, the rules for computation are good. Now for roods and perches, though it might be ſufficient to mention that known rule in decimal arithmetick, multiplying decimal fractions by known parts, gives thoſe known parts in integers, due regard being had to the ſeparation, we ſhall proceed thus: if 25625 ſquare links, which remain above an acre, contain any quarter or quarters of an acre, then, if they be multiplied by 4, and divided by 100000, that is, five cut off from the product, they will contain ſo many acres as now they do quarters, or roods, for any number of quarters multiplied by 4, muſt needs produce the like number of unites or integers, and the diviſion only reduce them into the right denomination. Now, 25625 being multiplied by 4, and five figures being cut off from the product, the reſult is, 1|02500, that is, an acre and above; which ſhews it was above a quarter before it was multiplied by 4.

And to find how much, that is, how many ſquare perches are contained in this laſt remainder, you muſt conſider this 2500, not as ſquare links remaining above the rood or quarter, but as four parts or quarters of ſquare links, or, which is all one, as the true number of ſquare links multiplied by 4, and conſequently being multiplied by 40, the fourth part of ſquare perches in an acre, it muſt as often contain 100000 ſquare links, or an acre, as the quarter of this number 2500, viz. 625, ſignifying ſquare links, containing ſquare perches; and ſo, for 100000 divided by 160, the number of perches in an acre, gives 625, anſwering to one perch; and 2500 multiplied by 40, gives 100000, or one acre, the five cyphers being cut off.

2500 160 100 000625
40 960

1|00000 400
320

800
800

How to meaſure a cloſe, or parcel of land, and to protract it, and give up the content.

Hitherto we have been like children learning to ſpell, now let us ſet our ſyllables together: that is, let us make uſe of the inſtructions before given to meaſure a piece of land, to plot it, and to caſt up the content.

All cloſes, or parcels of land, are either ſuch as need not be plotted for finding their true meaſure, but the chain alone doth the work; or ſuch as cannot be conveniently meaſured without plotting or protraction.

Of the firſt ſort are the ſquare and long ſquare, known before-hand to be ſuch, or found ſo to be by ſuch inſtruments as are not yet deſcribed, or by meaſuring all the ſides and diagonals. Theſe ſquares and long ſquares, need no protracting; for you need only to multiply the chains and links of the length, by the chains and links of the breadth, and ſo proceed as in the firſt and ſecond examples: but all others, whether triangles or triangulate, are to be protracted. We ſhall give examples therefore in the three ſorts of figures, triangular, quadrangular, and multangular.

But before we proceed to particular inſtances, let the young practitioner remember,

1. To begin at ſome notable angle of the field where there is ſome houſe, gate, ſtile, well, or the like; or if there be none, then to dig up a clod, drive down a ſtake, or at leaſt, to obſerve what quarter of the heavens it pointeth towards, whether eaſt, weſt, north, or ſouth, and on your paper mark it with the letter A, or any other.

2. To go parallel to the ſide of the field, if pits, buſhes, or the like, hinder not, and if they do, to allow for it, accuſtoming yourſelf to go either with your left hand towards the hedges, walls, or pales; or with your right hand towards them; and when you go contrary to your uſual cuſtom, note it on your paper by ſome mark known to yourſelf.

3. To ſet down the chains and links of every ſide as you meaſure them, and not truſt your memory. A black lead pen will be very proper for this purpoſe.

4. To take care, if you have more ſcales than one upon your rule, leſt you confound yourſelf by taking lines off of ſeveral ſcales, or meaſuring perpendiculars upon wrong ones; for every line of the ſame figure muſt be made by the ſame ſcale, and the perpendiculars meaſured by it.

5. To make uſe of a ſcale of larger diviſions when you meaſure ſmall cloſes, and of ſmaller when you meaſure great ones.

6. To make your lines and points where angles meet, ſmall, pure, and neat.

7. To ſet on your chains and links at twice, when any line is too long for your ſcale.

Theſe things being premiſed, proceed thus:

I. Suppoſe a triangular field is to be meaſured with the chain, beginning at eaſtern angle A, Fig. 15. and find the ſides in their order and meaſure to be ſeverally thus; 2.29, 3.45, 4.07.

Making uſe of the leſs diagonal ſcale, becauſe the other would make the figure too large, otherwiſe it were more proper for ſo ſmall a cloſe, with your compaſſes take off the ſcale 4 chains and 7 links, and ſetting them from A to C, draw that line for the baſe, becauſe the longeſt of the three; then take 2 chains 29 links off the ſame ſcale, and ſet them in the eaſtern point A, and turning the looſe foot of the compaſſes above the line A C, deſcribe, at that diſtance 2.29, the arch E E.

Next taking with your compaſſes upon the ſame ſcale the extent of 3 chains 45 links, place one foot in the point C, and with the other make the arch F F, interſecting the former in the point B; and drawing the lines A B and B C, the triangle A B C is the plot of the triangular field meaſured.

But before you can give the content, you muſt find the length of the perpendicular, which is done by ſetting one foot of the compaſſes in B, and extending the other to the baſe A C, ſo as it touch it, and paſs not over it, for then the length of the perpendicular is between the points of the compaſſes, and being applied to the ſame ſcale by which the triangle A B C was made, it appears to be 1 chain 42 links. With the half whereof multiply 4.07, the length of the baſe, the content appears to be 0 acres, 1 rood, 6 perches.

The baſe 4.07
Half perpend. 0.71

407
2849

28897
4

1|15588
40

6|23520

II. Suppoſe you were to meaſure a quadrangular or four-cornered field, begin as before at ſome remarkable angle; and going round the cloſe, find the ſides to be 9.04, 6.72, 8.46, 7.28, and the diagonal from that remarkable angle to the oppoſite angle to be 10.02; we begin to protract it thus:

Fig. 16. Having by the help of your ſcale and compaſſes drawn the diagonal 10.02, from the remarkable angle A to C, the oppoſite angle, make a triangle of it, and the firſt and ſecond ſides 9.04 and 672, and another after the ſame method of that diagonal, and the third and fourth ſides 8.46 and 7.28, ſo you have the trapezium A B C D.

Then by the help of your ſcale and compaſſes, you find the perpendicular of the triangle A B C to be 6.02, and of the other, viz. C D A 6.01, which added, are 12.03, whereof the half ſum is 6.01; by which, multiplying the baſe 10.02, the content of the field will be 6 acres, 0 roods, 3 perches.

The baſe 10.02
Half perpend. 6.01

1002
60120

6|02202
4

|08808
40

3|52320

Before we paſs any farther, let it be remembered,

1. Any quadrangular cloſe, or parcel of ground whatſoever, having right lines, may be thus meaſured, protracted, and computed.

2. The odd meaſure above perches, is not valuable here, nor in the former computations, being always under a ſquare perch; but in multangulars, where there be many remainders, they muſt be ſummed up, and the perches contained in them added to the content before found.

3. This laſt, and the following figures, are made, that they might not be too large, by a ſcale of 400 in an inch, *i. e.* by the leſs diagonal ſcale, each chain and link being counted two.

III. Fig. 17. If this multangular figure be conceived to repreſent a cloſe of ſeven ſides, which is to be meaſured, begin at the remarkable angle A, and going round the cloſe, find the ſides will be 3.11, 2.49, 2.47, 1.77, 4.11, 2.29, 4.37.

Then meaſure the four diagonals, B D, D F, F B, and B G, in the order you will find them to be 3.45, 4.97, 4.13, and 4.36, which is as ſhort a way as can be taken, to prevent unneceſſary walks.

But when you come to protract by the help of your ſcale and compaſſes, firſt make the triangle B C D of the firſt diagonal, and the ſecond and third ſides. Then the triangle D E F upon the ſecond diagonal, and fourth and fifth ſides; and upon the ſame diagonal, as a common baſe, the triangle B D F of the firſt, ſecond, and third diagonals.

Next of the ſame third diagonal, together with the 4th and 6th ſides, make the triangle B F G, and upon the fourth diagonal, as upon a common baſe with the firſt and laſt ſides, the triangle A B G. So is the whole cloſe plotted.

And now it ſtands viſibly reduced into two trapezias A B F G and B D E F, together with the triangle B C D, which we ſhall not now caſt up, having ſo often ſhewn how ſuch work is to be done.

But it muſt be acknowledged that this method of plotting parcels of land that have many angles, requires not only more care and pains, but better ſkill and memory, than to draw diagonals upon paper, when the plot is already taken by the plain table, or other ſtanding inſtrument. We ſhall therefore, to help our young practitioner in this caſe, advertiſe him of two eaſy ways to help myſelf, ſo as to be out of danger of miſtakes.

One way is, to divide the multangular field into two or more parts, as the laſt might have been by the diagonal B F; then might each part have been meaſured ſeverally, as if they had been ſeparated by a pale, or were ſundry men's lands parted by a boundary.

Another way that much helps both the underſtanding and memory, is, to draw a rude draught of the figure of the land you intend to meaſure, not only as to the ſides, but alſo neceſſary diagonals. Then meaſuring the lines upon the ground correſpondent to thoſe on the paper, ſet the lines as you meaſure them upon the lines of the draught, as if it were the true ones, and when you have finiſhed your meaſuring, protract it truly. Such as you ſee here, but it is better larger, will do your buſineſs; for it is not a pin matter how rude or falſe the lines or angles be, reſemblance being all that is deſired.

Concerning the meaſuring of circles, and their parts.

We have hitherto purpoſely abſtained from meddling with the circle, and its parts, that we might lay thoſe things cloſe together without unneceſſary mixtures, that are of greateſt uſe.

It is very rare, if a land-meter ever have occaſion to meaſure any field or parcel of land, that will prove either circle, ſemi-circle, quadrant, or ſector. Sometimes indeed there will be a little crook in an old hedge bowing like an arch; but we have never ſeen any offer to meaſure it as a ſegment, but always take it as an angle or angles.

Yet becauſe it may be expected we ſhould ſay ſomewhat of thoſe things, we ſhall briefly do it.

I. To meaſure a circle in the more exact way, is, to ſquare the diameter, and to multiply that ſquare by 7854; ſo ſhall the content be in integers and decimals.

But the more uſual and quick way, (and near enough for any uſe we ſhall make of it) is, to multiply the half of the periphery or circumference by the ſemi-diameter.

In like manner to find the content of a ſemicircle, quadrant, or ſector, made up of ſemi-diameters, and arched lines, multiplying the half arch by the ſemi-diameter, gives the content.

Fig. 19. But that which falls out moſt frequently in menſuration, though ſeldom much regarded, except where a curious exactneſs is required, is that particular ſort of ſegment which we call a ſection, leſs than a ſemi-circle, ſuch as this figure A B C. And to find the content of it, the center of the circle, whereof this is a ſection, muſt be firſt found, as here at O, from which lines drawn to A and B, make up the ſector A O B C; which being meaſured according to the laſt rule, and from the content thereof, the content of the triangle A O B ſubſtracted, the difference or reſidue is the content of the ſection A B C.

But two queſtions may be here demanded:

1. How may the center be found? 2. How may ſuch a portion of land be truly protracted and computed?

To the firſt we anſwer, that the moſt exact and artificial way, is, by making a mark any where in the arch.

As for example.

At the point C, and then, by a problem known not only to every ſurveyor, but to ordinary carpenters and joiners, for finding the center of a circle, whoſe circumference will paſs through 3 given points that are not in a right line, as A C B, to find the center O. But if you know not how to do it ſo, croſs the line A B in the middle, as here it is done by the perpendicular O C; ſo you may by a few trials find both the due extent of your compaſſes, and the point in the perpendicular that will fit your purpoſe near enough; for if a little error be committed in making up the ſector, the moſt of it goes off again in the ſubſtraction of the triangle.

II. For the latter, you may take this ready courſe: meaſure the length of both your lines, the chord and the arch, and their diſtance at the middle of them both; then, when you come to protract, firſt take the length of your right line from the ſcale, and having laid it down, croſs it in the middle at right angles with a dry line, as in the laſt figure, ſo ſhall it interſect the line A B in the point E; then from the ſame ſcale take the meaſured diſtance between the two lines in the middle, and ſet it upon that dry line from the interſection at E, to the point C. Then, by trials, find a due place in the dry line O E C, and ſuch a diſtance with your compaſſes, that the one foot reſting in that line, the other may deſcribe the arch A C B, and the ſection is protracted.

Concerning cuſtomary-meaſure, and how it may be reduced to ſtatute-meaſure, & e contra, *either by the rule of three, or a more compendious way by multiplication only.*

Though the ſtatute-perch or pole is 16 feet and a half, and no more, yet there are poles of larger meaſure uſed in many places, as of 18, 20, 21, 24, and 28 feet, nay, in ſome 22 feet and a half. It were therefore very convenient that our young ſurveyor were furniſhed with a chain fitted to the cuſtomary meaſure of the country where he lives. But becauſe theſe are too large and cumberſome for ſmall cloſes, it is very convenient, inſtead of one chain of 100 links, to make two of 2 poles apiece, each pole divided into 25 links, as that of 100 is; which two half chains may, in meaſuring large fields, be tied together by the loops with pack-thread, or joined by a buttoning key-ring for more ſpeedy diſpatch; but in ſmaller we may uſe the half chain of 50 links, only taking care that we count not half chains for whole ones.

And in theſe caſes where the poles are large, and the cloſes ſmall, it were ſtill more convenient if you had a chain of 2 poles only, divided into 100 links. Only you muſt then take notice, that whereas working by whole chains and links, the firſt multiplication, after five cut off, gives the content in acres and parts. The like work by half chains and half links, will give the content in roods or quarters of acres, and parts of ſuch roods.

But though it is no hard matter, for one that can find out the length of a link by dividing the number of feet in a chain by 100, and provide himſelf of good iron-wire and curtain-rings to make it of, and a ſharp-edged file, and round-noſed plyers to make it with, to be furniſhed with ſuch a chain, yet becauſe every one cannot do this, we ſhall ſhew how you may eaſily, and yet very truly reduce ſtatute-meaſure into cuſtomary, that ſo the chain before deſcribed may do your buſineſs all England over.

Know therefore, for a ground to go upon, that acres bear proportion to one another as the ſquare of their poles; and therefore if you multiply 33, the number of half feet in the ſtatute-pole, by itſelf, which gives 1089, and alſo multiply the number of half feet contained in a pole of that meaſure you would reduce into; in the ſame manner you may, by the rule of three reverſe, obtain your deſire, making to that purpoſe 1089 the firſt number, the ſtatute-meaſure the ſecond, and the ſquared half feet of the pole given the third. As for example: ſuppoſe of a cloſe meaſured by the ſtatute-pole, the length and breadth, and their product be as here repreſented in the margin. And it is deſired that the content may be caſt up according to the large Cheſhire meaſure of eight yards, or 24 feet to the pole or rod. Then before you cut off any figures, conſider that in the ſtatute-pole are 33 half feet, and in the Cheſhire pole 48; multiply therefore 33 by 33, and 48 by 48, and you will have, 1089 and 2304, which, together with the ſaid product, may be thus placed: 1089, 672693 :: 2304, and ſo multiplying 672693 by 1089, and dividing their product, being 732562677, by 2304, the quotient is 317952; from which, if 5 figures towards the right hand be cut off, the content, by this cuſtomary-meaſure of 24 feet to the pole, will be 3 acres, 0 roods, 28 perches, as here appears:

```
  9.33 L.
  7.21 B.
 -------
   933
  1866
 6531
 -------
 672693 prod.
```

```
 3|17952
       4
 --------
  |71808
      40
 --------
28|72320
```

But if the lines on the land had been meaſured according to that cuſtom of 24 feet to the pole, and the content muſt have been found according to ſtatute-meaſure, then we muſt have multiplied the product by 2304, and have divided that latter product by 1089. And in the ſame method you may proceed in all or any of the reſt. But the truth is, that though this way be very exact, plain, and comprehenſive, ſuiting all the cuſtomary-meaſures before-mentioned without fractions, it is ſomething tedious, except the practitioner knows how to relieve himſelf by a large table of logarithms, which we cannot ſtand here to treat of. Therefore to contract the work a little, take notice, that all the cuſtomary poles being mentioned, ſaving only thoſe of 20 and 28 feet, which we ſuppoſe are ſomewhat rarely uſed, having never heard nor read of them, but in Mr. Holwell; all the reſt are capable of being divided into half yards: and therefore, if inſtead of ſquaring the half feet, you ſquare the half yards of both poles, and work with them, you will attain the ſame end without any regardable difference, the ſmall diverſity that there is, being generally in the uſeleſs remainders, not at all affecting the deſired quotient that gives the anſwer near enough for uſe.

As for example.

```
 11
 11
----
 11
11
----
121
----
 16
 16
----
 96
16
----
256
```

If we had ſquared 11 the number of half yards in the ſtatute-pole, which would make 121, and alſo 16 the number of half yards in the Cheſhire-pole, which would make 256, and then multiplied the firſt product 672693 by 121, the ſecond product would have been 81319853, which being divided by 256, the quotient would have been, as before, 317952. And this way is in a manner co-incident with Mr. Holwell's firſt method.

Take notice alſo once for all, that whether you uſe either of theſe or the following methods, you need not reduce the particular ſquares, triangles, or trapezia's ſeverally; but ſum up all their products together and then reduce all at once.

But if you would reduce ſtatute-meaſure into cuſtomary by multiplication only, take notice of this preſent table following.

The content by the ſtatute-pole being multiplied by		Gives the content by the pole of		
	.84027		18	Feet.
	.68062		20	
	.61734		21½	
	.53777		22	
	.47265		24	
	.34725		28	

The uſe of this table.

When you have multiplied lengths by breadths, or baſes by half perpendiculars, multiply theſe products by the decimal fractions anſwering to the cuſtomary-meaſure, into which you would reduce ſtatute-meaſure, and from that latter product, firſt cut off five places towards the right hand, as not to be regarded, being only parts of a ſquare link, then cutting off five more, and proceeding to multiply by 4, and then by 40, as hath been often ſhewn, you will have the content by that cuſtomary-meaſure.

Example.

Suppoſe the length of a cloſe meaſured by Gunter's chain, and multiplied by the breadth meaſured alſo by the ſame, produced 672693 ſquare links; and it is deſired, that the content may be given in Cheſhire meaſure of 24 to the pole; you muſt multiply 672693 by 47265, the decimal fraction anſwering to 24 feet, and from that product, being 31794834645, cut off and caſt away 5 places, and the reſt being 317948, are in the uſual way eaſily reducible into 3 acres, 0 roods, and 28 perches, as here appears, agreeable to what it amounted to in the former method.

```
 3|17948
       4
--------
  |71792
      40
--------
28|71680
```

But if you meaſured by a chain of cuſtomary-poles, and deſire to know what the content is in ſtatute-meaſure, this following table is for your purpoſe.

The content meaſured by the pole of	Feet.	being multiplied by		gives the content by the ſtatute-pole.
	18		1.19008	
	20		1.46923	
	21		1.61983	
	22½		1.85950	
	24		2.11570	
	26		2.87970	

To underſtand which, take this example.

Suppoſe the length and breadth of a long ſquare being meaſured by a chain of 24 feet to the pole, and multiplied together, make their product 317952, let this be multiplied by 2.11570, which anſwereth to 24 feet, and the latter product will be 67269104640; from which, if you cut off and caſt away 5 places towards the right-hand, the remainder is 672691; which, in the uſual way, is eaſily reduced to 6 acres, 2 roods, and 36 perches.

```
 6|72691
       4
--------
 2|90764
      40
--------
36|30560
```

One thing more, and we have done with this buſineſs of reduction. If the content to be reduced, be caſt up into acres, roods, and perches, reduce all into perches, and then in other reſpects work as before, either by the Rule of Three, or by this laſt method of multiplication only. So ſhall you have the content in ſquare perches, according to the meaſure deſired, which you may reduce into acres by dividing them by 160; and if any thing remain, that remainder being divided by 40, will give you the roods in the quotient, and the latter remainder the number of ſquare perches.

For trial of which rules, remember the anſwer of theſe two following queſtions wrought all three ways.

Queſt. 1. *How many acres, roods, and perches according to the pole of* 18 *feet, are contained in* 5 *acres,* 3 *roods, and* 11 *perches, ſtatute-meaſure?*

Anſ. 4 acres, 3 roods, and 22 perches, as here appears.

I. *Method.*

```
              A. R. P.
  33    36    5 : 3 : 11
  33    36    4
 ----  ----  ----
  99   216   23
 99    108   40
 ----  ----  ----
1089  1296  931

1089 . 931 : : 1296
      1089
     ------
      8379
     7448
    9310
   1013859

1296) 1013859 (782
       9072
      ------
       10665               160) 982 (4
       10368                    640
      ------
        2979                40) 142 (3
        2592                    120
       ------                  -----
         387                     22
```

II. *Method.*

```
  11     12      121 . 931 : : 144
  11     12            121
 ----   ----          -----
  11     24            931
 11      12           1862
 ----   ----          931
 121    144          -----
             144) 112651 (782
                  1008
                 ------
                   1185
                   1152
                  ------
                    331
                    288
                   -----
                     43
```

160

```
160) 782 (4 ⎤        ⎡ 40) 782 (19
     640    ⎥        ⎢     40
     ———    ⎥  Or    ⎢     ———
 40) 142 (3 ⎬ thus:  ⎨     382    4) 19 (4
     120    ⎥        ⎢     360       16
     ———    ⎦        ⎣     ———       ——
      22                    22        3
```

III. *Method.*

```
 .84027
    931
 ———————
  84027                  160) 782 (4
 252081                       640
756243                        ———
———————————               40) 142 (3
782.291 37                    120
                              ———
                               22
```

Queſt. 2. *How many acres, roods, and perches of ſtatute-meaſure, are contained in* 8 *acres,* 3 *roods, (or quarters) and* 21 *perches of* 21 *feet to the pole?*

Anſw. 14 acres, 1 rood, and 21 perches, as appears by the three following works in the ſeveral methods.

I. *Method.*

```
A. R. P.
8 : 3 : 21                 42    33
4                          42    33
——                         ——    ——
35                         84    99
 40                       168    99
———                       ————  ————
1421                      1764  1089
       1764 . 1421 : : 1089
              1764
              ————
              5684
             8526
            9947
           1421
          ———————
   1089) 2506644 (2301
         2178
         ————
          3286
          3267
          ————
            1944
            1089
            ————
             855

      160) 2301 (14
           160
           ————
            701
            640
            ———
       40)  61 (1
            40
            ——
            21
```

II. *Method.*

```
 14    11    196 . 1421 : : 121
 14    11           196
 ——    ——           ————
 56    11           8526
 54    11          12789
 ——    ——          1421
196   121          —————
      121) 278516 (2301
           242
           ———
            365
            363
            ———
             216
             121
             ———
```

```
160) 2301 (14 95
     160
     ———
     701
     640
     ———
      61
 40)  61 (1
      40
      ——
      21
```

III. *Method.*

```
 1.61983            160) 2301 (14
    1421                 160
 ———————                 ———
  161983                 701
 323966                  640
647932                   ———
161983              40)  61 (1
————————                 40
2301.77843               ——
                         21
```

How to meaſure a piece of land with any chain of what length ſoever and howſoever divided; even with a cord or cart-rope, being a good expedient when inſtruments are not at hand of a more artificial make.

If you can procure a chain, and find it is not divided as before hath been ſhewn, but into feet or quarters of yards, or any ſuch vulgar diviſions, make no reckoning of the diviſions at all, but meaſure it as exactly as you can find out the true length of the whole chain; and if it fit none of thoſe lengths mentioned before, nor any of their halfs, make it fit by taking off a link or two, or pieceing it out with a ſtring; then dividing the length of that chain by 100, or the half of it by 50, find the true length of a link according to our artificial diviſions, and having got a long ſtick or rod, ſet as many of thoſe link-lengths upon it as it will hold; then may you meaſure all the whole chains by your regulated chain, and the odd links of every line by your divided ſtick or rod, as is manifeſt in this example following.

Being far from any inſtrument, and requeſted by a friend to meaſure him a cloſe, you muſt procure a pair of compaſſes, an ordinary carpenter's rule of two foot, divided into inches and quarters, and alſo with a piece of an old chain ſeemingly divided into feet, meaſure it by the rule, and finding it to be 45 feet long, and ſome odd meaſure, piece it out with a pretty ſtrong cord that will not ſtretch much, to 48 feet exactly; then it will ſerve for half a chain of 24 feet to the pole: this 48 multiply by 12, the number of inches in a foot, and that product being 576, divided by 50, the number of links in half a decimal chain, and the quotient is 11 $\frac{66}{100}$ inches, or 11 inches and an half, and a trifle over: dividing therefore a long ſtick throughout into ſuch parts, each containing 11 inches and a half, beſides the breadth of the nicks, you are provided of tools to meaſure lines to a link with exactneſs enough.

In like manner you proceed with a cord or rope, having fitted them to ſome known length or other; and then for protracting, it were eaſy with the compaſſes to make a plain ſcale of a large ſort, either upon paper, or an even piece of wood. This for once may ſerve a man's turn well enough.

Beſides, there is a way of meaſuring the perpendiculars of triangles and trapezias upon the ground itſelf, ſo as to prevent the neceſſity of a ſcale; for if you have a little ſquare with a hole in it to turn upon the head of a little ſtick, which you may fix where you pleaſe, as you are meaſuring the baſe of a triangle, or the diagonal of a trapezium, you may by a very few trials find the place where the one leg will be juſt in the line you are meaſuring, and the other point at the angle from which the perpendicular falls on it, and then the ſpace between your ſtick and that angle truly meaſured, is the perpendicular.

If you have not ſuch a ſquare, a ſquare trencher, or any end of a board that hath one right angle, and two true ſides, will ſupply the want of it.

And we ſhall make bold to add, that this is a good way to meaſure a trapezium, though it be protracted afterwards; for by meaſuring the perpendiculars as aforeſaid, and obſerving at how many chains and links end the ſaid perpendiculars meet the common baſe, the whole trapezium may be truly protracted without going about it; this little ſquare competently ſupplying the place of an inſtrument, which is uſually called a croſs or ſquare, made up, as it were, of two ſmall indices, like thoſe for a plain table, but much leſs, with fore-ſights and back-ſights, and cutting one another at right angles put together, and having an hole at the center.

Concerning dividing of land artificially and mechanically.

1. To divide a triangle into any parts required; divide the baſe as the demand imports, then ſhall lines drawn from the points of diviſion to the oppoſite angle, finiſh the diviſion of the triangle.

Example.

Fig. 20. A C, the baſe of the triangle A B C, being divided into 12 equal parts, a line drawn from the angular point B to the point 6, divides the triangle into two equal parts; 2 lines drawn to 4 and 8, divide it into three equal parts; 2 lines drawn to the points noted with 3, 6, and 9, divide it into four equal parts; and ſo lines drawn to 2, 4, 6, 8, 10, divide it into ſix equal parts.

Alſo it is very obvious, that if the ſame triangle were ſo to be divided, that the one part ſhould be double to the other, a line drawn from B to 4 or 8, doth the work, or if it be required to divide it into two parts, ſo as the one ſhall be triple to the other, a line drawn from B to 3 or 9, compleats the work. So alſo a line from B to 2 or 10, divides it into two parts, whereof the one is quintuple, or five-fold, to the other, and a line from B to 1 or 11, divides it into two parts, whereof the one is 11 times as large as the other.

Farther yet, if it were required this triangle ſhould be ſo divided, that the two parts ſhould in quantity bear proportion, as 5 and 7, a line from B to 5 or 7, will anſwer the intention.

The diviſions will indeed be ſometimes a little more intricate than this, yet not ſuch, but that the ſeeming difficulty may be eaſily overcome by obſerving the following method.

Suppoſe a large triangle of common land to be divided amongſt three tenants, A, B, and C, according to the quantity of their tenements, A, having 19 acres of land to his tenement, B 13, and C 7, the baſe of the triangle being found by meaſure to be 17 chains and 27 links; and the demand is, where the point of the diviſion muſt be placed in the baſe, ſo as lines drawn from thence to the oppoſite angle, ſhall truly limit each man's part.

To anſwer this, let us add 13 and 07 to 19, and
19 they give 39: ſo is the work plainly reduced to the
13 rule of fellowſhip; and therefore to find every man's
07 diſtinct portion, we need only to multiply the baſe by
— his particular number, and divide that product by 39,
39 the ſum of all their numbers.

A

29 . 17.27 :: 19
19

15543
172

39) 32813 ($841\frac{14}{29}$
312

161
156

53
39

14

B

39 . 17.27 :: 13
13

5181
1727

39) 22451 ($575\frac{26}{29}$
195

295
273

221
195

26

C

39 . 17 . 27 :: 7
7

39) 12089 ($309\frac{38}{39}$
117

389
351

38

From theſe operations it is plain, that if we ſet off from the angular point where the baſe begins, 8 chains, 41 links, and a little above the third part of a link upon the baſe for A, and where that ends, 5 chains and 75 links and $\frac{2}{3}$ of a link for B, and conſequently leave between this ſecond diviſion and the other end of the baſe 3 chains and almoſt 10 links for C; lines drawn from thoſe points of diviſion to the oppoſite angle, will give each man his due.

What has been ſaid touching the diviſion of triangles upon their baſes, will, with a little variation, ſerve for the dividing of all ſorts of parallellograms, whether ſquares, long ſquares, rhombus's, or rhomboides; all the difference is, that inſtead of drawing lines from points in the baſe to the oppoſite angle, you muſt draw parallel lines from points in one oppoſite ſide to another, as will be ſufficiently plain by this one inſtance.

Fig. 7. Suppoſe the ſquare figure to repreſent a cloſe of ſix acres, and you are to cut off an acre at the ſide A C; having ſet off the 6th part of the line C D, from C towards D, and alſo from A towards N, a parallel drawn between thoſe points, takes off exactly a 6th part of an acre.

If it be not thought convenient, as in ſome caſes it is not, to cut off a piece ſo long and narrow, you may by the Rule of Three find what other length of any greater breadth will limit an equal quantity to it. Or you may multiply the breadth by 2, 3, or any other, and divide the length by the ſame number that you multiplied the breadth by. Or laſtly, if you ſet out a double proportion that is $\frac{2}{6}$ or $\frac{1}{3}$, from C towards D, and from the point where it falleth, draw a line to the angle A, you will have a triangle equal to $\frac{1}{6}$ of the ſquare A C D N.

But to return to triangles, the moſt ſimple and primitive of all rectilinears, and therefore the moſt conſiderable in this caſe of partition, as giving laws often to the reſt, it may fall out that a triangle muſt be divided, by a line from ſome point in a ſide, ſo as that line may either be parallel to ſome other ſide, or not parallel to any.

Fig. 21. Let A B C be a triangle given, and it is required to cut off $\frac{3}{5}$ by a line parallel to A B. Firſt, on the line A C deſcribe the ſemi-circle A E C, whoſe diameter C A divided into five equal parts according to the greater term, and upon three of thoſe parts, the leſſer term, erect the perpendicular D E, which cutteth the arch line in E; then ſet the line from C E from C to F, and from thence draw the line E G parallel to A B; ſo will the triangle C G F contain $\frac{3}{5}$ of the triangle A B C, as was required.

Fig. 22. Now, for the latter caſe, when the line of partition goes not parallel with any ſide, take this example:

Let A B C be a triangle given to be divided into two parts which ſhall bear proportion to one another, as 3 and 2, by a line drawn from the point D in the baſe, or line A C.

From the limited point D, draw a line to the angle B; then divide the baſe A C into five equal parts, and from the third point of the diviſion draw the line to E parallel to B D. Laſtly, from E draw the line E D. So ſhall the trapezium A B E D be in content as 3 to 2, to the new triangle D E C.

We ſhall have now done with the diviſion of triangles, when we have added the three following advertiſements.

1. You muſt be ſure to take very exactly the diſtance of every point, where a dividing line cutteth any ſide, to one of the ends of the ſame ſide, as in this laſt figure, the diſtances BE and AD; which diſtances being applied to the ſcale by which the triangle was protracted, will ſhew at how many chains and links end you are to make your dividing line on the field itſelf.

2. The proportions by which you are to divide, are not always ſo formally given as in the former examples, but are

ſometimes to be found out by arithmetical working, as in this caſe.

Suppoſe a triangular field of 6 acres, 2 roods, and 31 perches, muſt be divided ſo as the one of the two parts ſhall be four acres, 3 roods, and 5 perches, and the other, conſequently, 1 acre, 3 roods, and 26 perches; reduce both meaſures into perches, and the one will be 705, and the other 306. Their ſum is 1701, which, by their common meaſure, being reduced into their loweſt terms of proportion in whole numbers, will be 5, 2, and 7, which ſhews that the triangle being divided in 7 equal parts, the one muſt have 5 of thoſe 7 parts, and the other 2. And obſerve, that it will be ſufficient to find the common meaſure between the ſum of your terms, and either of the terms; the method whereof is ſhewn in every arithmetic-book for reducing fractions into their loweſt terms.

But the reader may multiply either of the parts; as ſuppoſe 765, by the length of the baſe, which we will ſuppoſe to be 8 chains and 75 links, or 87 links; and that product divided by 1071, the content of the whole cloſe in perches, gives the rule of three direct, 625 links, or 6 chains and 1 pole, the true diſtance from either end of the baſe, that his mind or occaſions may direct him to begin with, to the point of diviſion; for the diviſion muſt be not only for proportion or quantity, but alſo as to poſition or ſituation of parts upon the paper, as it is required to be on the ground.

3. In theſe and all other diviſions of land, where a ſtrict proportion in quantity is to be obſerved, you muſt have reſpect to the rules given hereafter concerning meaſuring of uneven ground, eſpecially if one part prove much more uneven than another: and if there be any uſeful pond, or well to draw your line of diviſions through it; but if it be an uſeleſs pond, lake, or puddle; or if there be any boggy or barren ground, that muſt be caſt out in the diviſions, meaſure that firſt, and ſubſtract it from the content of the whole cloſe, and then lay the juſt proportion of the remainder on that ſide that is free from it, that the other may have its juſt part alſo, beſides that which is uſeleſs.

What hath been ſaid, with an ordinary meaſure of diſcretion, may ſufficiently inſtruct a young artiſt to divide triangles, parallellograms, and regular polygonials, in an artificial way; but becauſe many cloſes and open grounds are trapezias, and many irregular polygons, and even thoſe that are regular enough, may fall under an irregular diviſion, in regard of the quality of the land, woods upon it, or quaries in it, or the conveniences of ways, currents of water, ſituation in reſpect of adjacent lands, &c. we ſhall propoſe a method, which though it hath ſomewhat of the mechanick in it, will be ſingularly uſeful in ſuch caſes.

Let A B C D be a trapezium to be divided betwixt a young heir and his mother, ſo as his part may be double to her's. Having by the diagonal B C divided it into two triangles, you will find the content of the triangle A B C to be 138550 ſquare links, and the triangle B C D to contain 103468, in all 242018 ſquare links, which, if reduced, as hath been formerly taught, would amount to 2 acres, 1 rood, and 27 perches.

But for the preſent work, they are in a better order already. Dividing then 242018 into three parts, each of them is 80676 and $\frac{2}{3}$, two therefore of thoſe third parts muſt contain 161353 and $\frac{1}{3}$, which $\frac{1}{3}$ being inconſiderable, regard them not.

Then if you reſolve to lay out the double part towards the line B D, ſtrike at adventures the line E F, and meaſuring the trapezium bounded by that line, and the oppoſite ſide B D, together with the interjacent parts of the lines A B and C D, which you will find to contain 119140 ſquare links; but becauſe it ſhould have been 161353, ſubſtract 119140, out of 161353, and their difference is 42213, and perceiving that the lines A B and C D are very near parallel, and finding their diſtance where they are cut by the line E F, to be 326 links, or 3 chains and 26 links, divide 42213 by 326, and the quotient is 129 links, and almoſt half, at which diſtance draw the line G H parallel to E F; ſo ſhall the trapezium G B D H be the heir's part.

Another way whereby the ſame thing may be performed is this. Finding the triangle A B C to contain 138650 ſquare links, ſubſtract it out of the heir's part, viz. 161353, the difference 22803, ſhews how many ſquare links muſt be taken out of the triangle B C D, and added to the triangle A B C; which to perform with all neceſſary exactneſs, ſuppoſe the ſide or line B D to be the baſe, which by meaſure proves to be 344 links, or 3 chains and 44 links. Say by the Rule of Three direct, if the whole content of the leſſer triangle, viz. 103468, give 344; what ſhall 22803 give? So will the reſult be 75 links, and ſomewhat more than $\frac{4}{5}$, of a link, for 22803 multiplied by 344, gives 7844232, which being divided by 103468, the quotient is 75 $\frac{184132}{103468}$; or according to decimal diviſion, 75, 8131, which is ſomewhat more than 75 links and $\frac{4}{5}$, wherefore extending your compaſſes upon the ſcale to almoſt 76 links, ſet that diſtance upon the line B D, from B to I, and draw the line C I: ſo ſhall the trapezium A B I C be double to the triangle I C D, within ſo ſmall a matter as is not worth regarding, though the land were a rich meadow.

We hope it will be unneceſſary to tell any man of ſenſe, that if he pleaſe he may begin with the leſs part, and take out that; or if there be many partners, he may divide betwixt any one and all the reſt, putting their parts together, and then by the ſame method ſub-divide amongſt them till each hath his due ſhare; nor to ſpend many words in telling him he muſt ſubſtract where he hath, by ſeparating a line at adventures, or by chooſing out a triangle, taken too much, as we added, when we took too little. Nor laſtly, that theſe methods are not only applicable to trapezias, but to any triangular figure whatſoever, whether regular or irregular.

Concerning the boundaries of land, where the lines to be meaſured muſt begin and end.

If there be no agreement between the parties concerned, for if there be, that muſt be obſerved, reaſon and cuſtom are the ſurveyor's guide.

The farmer ſpeaks loudly, that when a piece of arable or meadow-land, is let for a year to be ſown or mown, no more ſhould be meaſured, nor expected to be paid for, either to the letter or workmen, than the plow or ſcythe can go over. So alſo when a parcel of land is let for paſture by meaſure to a farmer, it ſeems very reaſonable, that all, and only ſo much ſhould be meaſured, as is uſeful to that purpoſe.

But commons to be incloſed are uſually meaſured, except it be otherwiſe agreed, to the uttermoſt bounds of every man's particular proportion, without any allowance for ditch or fence, every man being to make them upon his own of what breadth he pleaſes. Nor is this unreaſonable, for it is as good for one as another, and the rate paid to the lord is uſually very little, ſometimes nothing.

It is alſo very uſual in meaſuring betwixt lord and tenant, in caſe of leaſes for lives, and long terms of years, to extend the lines to the utmoſt bounds of the tenant's claim, taking in the very walls, hedges, and ditches: but this is accounted very hard, and oft proves very unequal among the tenants of a lordſhip, ſome being forced to make much more waſte of their ground this way, than others that hold as much or more. But where the cuſtom obtains, the ſurveyor muſt obſerve it; for it is others work to appoint what muſt be meaſured, and his only to meaſure truly what is ſo appointed. A good landlord may, and will be apt, to conſider it in his rates, and a bad one it is like will be tenacious of a cuſtom to his own advantage.

Laſtly, in caſe of a ſale by meaſure at a rate agreed upon per acre, no boundaries being ſpecified in the bargain, the rule is to extend the lines to the quick wood-row, that is, to the place where the quick wood actually groweth, or where, according to cuſtom, it ought to be ſet.

Containing a deſcription of the plain table, the protractor, and lines of chords.

Though what hath been already ſaid, may competently ſuffice to inſtruct the young artiſt in meaſuring a cloſe of land, yet, to advance him a degree higher in uſeful knowledge, we ſhall take occaſion to deſcribe unto him the plain table, which conſiſts of ſeveral parts.

1. The table itſelf, which is a parallellogram of wood fourteen inches and a half long, and eleven inches broad, or thereabouts, and for neceſſity may be made by an ordinary country workman of one board; but for neatneſs, convenience of carriage, and freedom from warping, it is

uſually made of three little boards joined together ſide ways, with a ledge at each end to hold them faſt together, and upon the middle board a ſocket of braſs fixed with three ſcrews, and with a fourth to be faſtened on the head of a three legged ſtaff; of which anon.

2. A frame of wood fixed to it, ſo as a ſheet of paper being laid on the table, the frame being forced down upon it, ſqueezeth in all the edges, and makes it lie firm and even, ſo as a plot may be very conveniently drawn upon it. This is uſually made with joints for more eaſy carriage, but a plain one may ſuffice. Upon one ſide of this frame ſhould be equal diviſions, for drawing parallel lines both long-wiſe and croſs-wiſe, as occaſion may require, over your paper, and on the other ſide the 360 degrees of a circle projected from a center of braſs conveniently placed in the table.

3. A box with a needle and card, to be fixed with two ſcrews to the table, very uſeful for placing the inſtrument in the ſame poſition upon every remove.

4. A three-legged ſtaff to ſupport it, the head being made ſo as to fill the ſocket of the table, yet ſo as the table may be eaſily turned round upon it, when it is not fixed by the ſcrew.

5. An index, which is a large ruler of wood, or rather braſs, at the leaſt ſixteen inches long and two inches broad, and ſo thick as to make it ſtrong and firm, having a ſloped edge, by which we draw the lines, called uſually the fiducial edge, and two ſights of one height, whereof the one hath a ſlit above, and a thread below, and the other a thread above, and a ſlit below, ſo ſet in the ruler, as to be perfectly of the ſame diſtance from the fiducial edge. Upon this index it is uſual to have many ſcales of equal parts, and there might be a diagonal ſcale if the inſtrument-maker pleaſe, and lines of chords of ſundry lengths; but if you have ſuch a ſcale as before deſcribed, you need not to have them here.

The protractor is an inſtrument ſo well known and ſo eaſy to be made and procured, that we ſhall be very brief in the deſcription of it. As it is uſually made, it conſiſts of two parts, a ſcale and a ſemi-circle, but the ſcale is no neceſſary part of it, but ſerving, if you be not otherwiſe provided, for other uſes before-mentioned in the caſe of plain ſcales.

But the ſemi-circle is more eſſential, and it may be made of braſs, or other metal of any convenient ſize, as four inches, more or leſs, for the ſtrait ſide, this ſemi-circle being bounded as all others are by two lines, the one right or ſtrait, the other circular.

The right line is divided in the preciſe middle, by a point which is in the center, upon which the circular boundary is drawn, and two other arches concentrical with it.

The center, when the ſemi-circle goes alone without the ſcale, ſhould be guarded with two little lips, on each ſide one, or a little loop, for more convenient turning of the inſtrument about upon a pin fixed in a paper.

The arched or circular edge is divided into 180 degrees, or equal parts, numbered by tens, upon the upper concentrick arch from 0 to 180, and in the lower from 180 to 360. So that by applying the ſtrait edge of the protractor twice to any line, keeping the center right upon a pin fixed in the line, that is, with the ſemi-circle firſt above it, and then below it, or contrarily, you may draw a whole circle by the guidance of the arch, or ſet out any number of degrees, as will appear more plainly hereafter.

A line of chords is a line divided into 90 unequal parts, whereof 60, and the radius upon which the circle was drawn, are equal, and the diviſions upon that line are equal to the next extent in a right line, of ſo many degrees from the beginning of the quadrant, as anſwer thereunto.

When lines of chords are cut upon wood, it is both uſual and neceſſary that there be two ſtuds of braſs, the one at the beginning, and the other at 60 degrees, with little holes for the feet of the compaſſes, when you take the extent of the radius, to preſerve the line from being wounded by the compaſſes; and being thus fenced, it will for need do the work of a protractor, but not altogether ſo commodiouſly.

How to take the true plot of a field by the plain table, upon the paper that covers it, at one or more ſtations.

There are three ways or methods for doing this work, two more uſual and ordinary, the third more unuſual and extraordinary, though now pretty well known to moſt ſurveyors, and in late books publiſhed. The firſt performs the work by meaſuring every line from the inſtrument to every angle, and is a very ſure ſubſtantial way where it can be done, as it ordinarily may in moſt cloſes.

The ſecond doth it by meaſuring only the ſtation or the diſtances, and is very quick, but not ſo ſure and exact as the other; yet, if managed by a ſkilful artiſt, that knows how to plant his inſtrument, ſo as to avoid making acute angles unneceſſarily, it will come near enough the matter in many caſes; as in meaſuring for workmen, that take the mowing or reaping of fields by the acre, or when tythes are let at a ſmall value per acre, as in poor barren pariſhes they uſually are.

The third is the way of circulation or perambulation, the inſtrument being oft to be planted, and the plot to be meaſured about; by which not only difficult cloſes, but even the thickeſt woods, yea, bogs, meres, and pools of water, may be plotted, which by neither of the other methods can be performed.

In all theſe methods, two things are to be performed.

1. At every angle where there is no perſpicuous mark already, as a tree, buſh, ſtile, &c. one muſt be placed, as a white paper, or ſuch like; or elſe ſome one muſt go from angle to angle, and remain there as your mark to look at, till you bid him remove to another; only when angles are near you, this labour may be ſpared.

2. Whenever you have occaſion to plant your inſtrument more than once, as it will often fall out in the firſt method, and ever in the two latter, you muſt be ſure it ſtand juſt as it did the firſt time for ſituation; for which your needle, if well touched and hung, will be good direction, but is not thought ſufficient without backſight and fore-ſight. The firſt method is this.

I. When you go about to plot your parcels of land, find ſuch a place in it, if poſſible, from whence you can ſee all the angles, and in that place plant your inſtrument covered with a ſheet of paper, and turning it about till the needle playing at liberty, hang over the flower-de luce, or any other notable place that you make choice of, ſcrew it faſt. Then chooſing any convenient place in your paper for a center; and to repreſent your ſtation, or place where you fix your inſtrument, make a prick with the ſmall point of your compaſſes; to which prick applying the fiducial edge of the index, which is eaſily done if you keep the point of the compaſſes reſting in it, direct the index, by the ſight to all the angles; and when through the ſlit, or long ſight, you ſee the oppoſite thread, cut the mark in the angle, draw a neat dry line along the fiducial edge, to or from the center; then meaſuring from the inſtrument to every angle, ſet the meaſure by a ſcale and compaſſes from the center towards the angle upon the line that points at it, making a prick in the line where the chains and links reckoned from the center truly end; then ſhall lines drawn by a ſtrait line from prick to prick, give you the perfect plot upon your paper, which you may divide, as hath been before ſhewed, into trapezias and triangles, and ſo find the true content. To make which plain, mark this example.

Fig. 24. Suppoſe A B C D E F G H to be a field; having planted the plain table, as before directed, at a convenient advantage, ſo as to ſee all the angles, as at I, a prick to repreſent the ſtation in the little circle ⊙ marked with I; upon which laying the fiducial edge of my index, and directing the ſights to all the angles, draw dry lines toward A, and all the reſt of the angles in order from the center; and then meaſuring upon the ground from the inſtrument to the angle A, find it to be 3.45, which ſet from the center to the point A, and ſo upon all the reſt according to their due meaſures, and then black lines drawn from point to point, as from A to B, from B to C, &c. limit the true figure of the field according to the ſcale uſed, viz. of 400 in an inch.

And now, before we paſs to farther varieties, let the reader take notice of theſe following things.

1. From henceforth we ſhall forbear to take any notice of the meaſures of lines meaſured from the inſtrument to the ſeveral angles, having ſo often ſhewed how to meaſure by a ſcale.

2. When we ſpeak of meaſuring from or to the inſtrument, we always mean from or to that part of ground

that is perpendicularly under the head of the inſtrument, where you are to draw your plot, which will ever be encloſed with the three legs of your ſtaff.

3. That it is uſually the quickeſt way to meaſure firſt from the inſtrument to the firſt angle, and then back from the ſecond angle to the inſtrument, and ſo the reſt in order, ſtill one from the inſtrument, and the other to it.

4. It is no matter at all whether your plain table be placed towards the middle of a field, as was repreſented in this figure, or at an angle, as will appear hereafter.

5. In all workings by this inſtrument, you muſt have a care that the inſtrument be not moved out of its due place, till you have finiſhed the work of the preſent ſtation; for which purpoſe, caſt your eye now and then upon your needle, obſerving whether it continue to hang directly over the ſame point you ſet it at when you began your work, and to rectify your inſtrument if you ſee cauſe. But becauſe all tables have not needles, and where needles are, they are not accounted very accurate, make uſe of the following help.

When you have planted your inſtrument, and made a point or prick in your paper, repreſenting your ſtation, ſet the fiducial edge of your index to it, and turning it ſoftly about till you find one remarkable thing or other upon one ſide of the cloſe, and another on the oppoſite ſide, as you look through the ſights of your index, which we call fore-ſight and back-ſight, draw a remarkable line with ink, or rather with a black-lead pen quite over your paper, which in this figure is preſented by the black line K L; and then, if you ſuſpect that by any accidendal jog, or other caſualty, the inſtrument is any thing removed, you may eaſily try, and rectify it by applying the fiducial edge to the ſame line, and making uſe of fore-ſights and back-ſights again upon the ſame marks which you before obſerved upon the oppoſite ſides of the cloſe.

But if there be no convenient place for the placing of your inſtrument, whence you may ſee all the angles of the field, more ſtations muſt be made uſe of thus.

Fig. 25. Let A B C D E F G H I K L M N be a field whoſe angles cannot be all ſeen from any one angle, or other place in it. Plant your inſtrument at the angle A, and if it have a needle, mark what degree of the chord it cuts, or turn about the table on the head of the ſtaff, till the needle hang over ſome remarkable place, as ſuppoſe the flower-de-luce, and ſcrew it faſt; then ſetting up a ſtick with a white paper or cloth on the head of it, where you intend your ſecond ſtation, as here at Q, make a prick or point in your paper, to ſignify the point A upon the paper on the table: to which point you muſt apply the fiducial edge of the index, and when you ſee the white at Q, ſo as looking through the ſlit you ſee the thread cut it, draw the line O P quite through the paper with a black-lead pen, and then keeping the fiducial edge ſtill upon the ſame point, and turning it round by degrees, look at the angles B C D E F L M N, ſtill drawing dry lines with the points of your compaſſes, and ſetting on the meaſures from the ſtation A, to every angle meaſured to or from, as in the laſt example.

Then remove the inſtrument to the place of your ſecond ſtation, having ſet up a mark at A, and laying the fiducial edge to the line O P, turn about the table upon the head of the ſtaff, till through the ſlit of the back-ſight, you ſee the thread cutting the mark at A, and then ſcrew it faſt; ſo will the needle, if a good one, hang directly over the ſame point that it did at the firſt ſtation; but however that be, fore-ſight and back-ſight will do the buſineſs; for which purpoſe it is good to take back-marks as well as fore-marks at every ſtation, as was taught in the example of a ſingle ſtation, only taking notice that the back-mark, when the inſtrument is planted in an angle, muſt needs be out of the field; as ſuppoſe here at O.

Having meaſured the diſtance between the firſt and ſecond ſtation, and finding it to be 7, 10, ſet it upon the line O P, from A to Q; where make another point to repreſent the ſecond ſtation, and turning about the index with the fiducial edge upon that point, and ſo looking through the ſights at the angles G H I K, draw lines towards them on your paper, and having meaſured between every one of thoſe four angles, and the inſtrument, ſet thoſe meaſures, as you did the other, with your ſcale and compaſſes, from Q towards every angle upon his proper line; and then having the drawn black bounding-lines from A to B, from B to C, and ſo round about the cloſe, the protraction is finiſhed.

But here to make this figure yet more advantageous, remember the following advertiſements.

1. Sometimes a ſtation is ſo taken, that you may meaſure towards two angles at once, as here from Q to G and H, in which caſe you are to ſet down the chains and links where the firſt angle falleth, but ſtill be proceeding to the farther angle, cauſing the remainder of the chains at the fore-end to advance beyond the former angles; ſo going on with whole chains ſo far as you can, to which the odd links at the end are to be added.

2. If at any of your ſtations, as ſuppoſe A, you can ſee an angle, for example E, to which you cannot meaſure in a direct line without paſſing the boundaries of your parcel of land given to be meaſured; you may notwithſtanding take in that angle by a ſtrait meaſured line, as we have done, provided it may be lawfully done without treſpaſs, and conveniently without troubleſome paſſing of fences, otherwiſe it muſt be taken from another ſtation.

3. One of your ſtations was here taken at an angle, and the other within the body of the field, to ſhew the variety of working taught by other authors, and that it is no great matter where you make your ſtations, ſo you can ſee the angles; elſe it had been full as convenient to have taken the firſt ſtation alſo within the body of the field, as ſuppoſe at R.

4. Though this figure repreſents to your eye only two ſtations, A and Q, your fancy may multiply them at pleaſure; for ſuppoſe the angle H could not have been ſeen from A to Q, how eaſy had it been to have ſet up a mark at S, and then to have removed the inſtrument thither, obſerving the ſame directions that were given at the removal from A to Q?

II. In the ſecond method the inſtrument is to be planted twice, or oftener, as occaſion requires, the rules for removal of the inſtrument fore-ſight and back-ſight, and meaſuring the diſtance of ſtations, being the ſame as formerly taught; but inſtead of meaſuring to and from every angle, we only view each angle through the ſights from two ſtations, having applied the fiducial edge to the points repreſenting thoſe ſtations, and having drawn lines with the point of the compaſſes, or a protracting-needle, the interſections repreſent the angles, from which the boundary-lines may be drawn; ſo is the field protracted. Which that the reader may underſtand, let him note theſe three figures.

Fig. 26, 27, 28. In theſe three figures the angles are marked alphabetically, A B C D E F, &c. and the ſtations by a ſmall point in a ſmall circle numbered, 1, 2, or 1, 2, 3, according to their number and order.

Fig. 26. The firſt of theſe figures repreſents the plotting of a field at two ſtations within it, from both which all the angles may be ſeen.

Fig. 27. The ſecond performs the ſame work by two ſtations taken without the field, by which art a cloſe may be meaſured, though the preſent poſſeſſor will not give us leave to come into it.

Fig. 28. The third ſhews how the work may be performed at three ſtations or more, when two ſuch places cannot be found whence to view all the angles; which laſt having more of difficulty than the two former, though indeed not very much, and the explanation of that will ſufficiently help to the underſtanding of them, we ſhall a little explain the meaning of it in theſe particulars.

1. From the firſt ſtation taken according to the former directions, you ſee the angles A B C D F G K, and accordingly draw lines upon your paper towards them from the point repreſenting that ſtation, by the fiducial edge of your index with the point of your compaſſes.

2. Having removed the inſtrument to the ſecond ſtation, and in ſo doing, obſerved the rules before given, you will thence ſee the angles A B C D E F G H I K, and draw lines upon your paper towards them from the point repreſenting the ſecond ſtation. And now viewing my work, you find upon your paper interſections for the angles A B, D F, G K, but only ſingle lines toward the angles C E H I; therefore,

3. Removing the inſtrument regularly as before, to a third ſtation, you will thence ſee thoſe four angles C E H I, and drawing lines towards them, you will have interſections for them alſo; ſo that having drawn the lines A B B C, &c. from one interſection to another, you have the field perfectly protracted. For theſe bounding-lines from angle to angle, do not only ſignify the boundaries of a piece of land given to be meaſured, limiting the figure or ſhape thereof, and are to that purpoſe given in this and all other ſurvey-books, but alſo are the true diſtance by a ſcale from angle to angle for the plot upon the paper; we mean by the ſame ſcale by which the ſtationary diſtances were laid down upon their own lines. And this holds true in all kind of true plotting, whether in this method or any other.

III. The third method is that of circulation; and this hath ſeveral varieties, according to theſe three following caſes.

1. When the diſtance from angle to angle, without any exception, is meaſured quite round the plot, either within or without.

2. When the diſtance is taken only between ſome more notable angles, and the perpendiculars of the reſt meaſured as you paſs along their baſes, within the plot, proper for plain ſolid ground.

3. When the like is done without the plot, as in caſe of plotting thick woods, meres, pools, bogs, &c.

The firſt of theſe are very eaſy, conſiſting in nothing but planting the inſtrument at every angle, either within or without, as neceſſity and convenience determine it, obſerving the former directions for planting and removing the inſtrument, and alſo for meaſuring the ſtationary lines on the ground, and protracting them on the paper, as is manifeſt in this example.

Fig. 29. Let A B C D E F be a park-pond or cloſe to be protracted, firſt plant your inſtrument at A, and direct the ſights to a mark in the angle B, drawing a dry line from a convenient point on your paper towards B, on the ground, then having meaſured by your chain the diſtance A B, ſet it by a ſcale upon the correſpondent line from A to B, drawing a black line between them with ink or a lead pen, the extremities whereof are the points A and B on the paper, and the little pricked line that goes beyond B, repreſents the remainder of the dry line drawn at random, as to length, with the point of the compaſſes.

Then ſetting up a mark at A, if there was none before, remove your inſtrument to B, and laying the fiducial edge to the line A B, turn about the inſtrument upon the ſtaff, till through the ſight you perceive the thread cutting the mark at A, and the needle directly over the ſame point, that it was when it was planted at A; and ſo ſcrew it faſt.

Your next work is to lay the fiducial edge to the point B, and direct the ſights to C, drawing a dry line towards it, and ſetting the diſtance B C meaſured by the chain from B to C.

In this manner you are to proceed, ſurrounding the cloſe till you come at laſt to A, where you began, by planting the inſtrument at every angle, uſing the help of back-ſight and your needle, as at B, and then from the point repreſenting your preſent ſtation, directing the ſight to the next angle, as you did from B to C.

In the ſecond caſe, we do not plant the inſtrument at every angle, but at the more conſiderable, taking in the ſmaller by their perpendiculars from the baſe as we paſs along; of which the following figure may be an inſtance.

Fig. 30. Let A B C D E F G H I K L be a cloſe to be meaſured; by planting the inſtrument only at A C F and K, we have the main ſubſtance of the cloſe in the trapezium A C F K; and for the five ſmall triangles which muſt be added to the trapezium, they may be eaſily protracted by the help of ſuch a little ſquare as was formerly mentioned; for by finding at how many chains and links diſtance from A upon the ground, the perpendicular B *b* falleth upon the line A C; and having meaſured the length of that perpendicular, and taken in between the compaſs-points of the ſcale, we erect a perpendicular of that length at b, which is the point upon the paper, where ſo many chains and links determine, as were meaſured upon the ground, from the angles A, to the place where the perpendiculars fell on A *c*, viz. at *b*. Juſt in the ſame manner we raiſe the perpendiculars D *d*, and G *g*, I *i*; and then by the help of the perpendiculars, we draw the boundary lines A B, B C, C D, D E, F G, G H, H I, I L, K L, L A: which, together with the line E F between the angles E and F, give the true plot of the field in one large trapezium, and five ſmall triangles ready for caſting up.

The third caſe is like the ſecond, ſo that there needs no new direction concerning it, but to annex one plain diagram; all the difference conſiſting in this, that becauſe we cannot go within it, being ſuppoſed to be ſome pool, bog, or thicket, we muſt of neceſſity go on the out-ſide, and conſequently all the triangles made by inward angles, and their lines upon the meaſured baſes, muſt be excluded, by the boundary-lines, from being any parts of the plot.

Fig. 31. Suppoſing ABCDEFGHIKLMNOP to be a great pool, though here be fifteen angles, plant your table only five times, viz. at A E F H and M, and upon the dry lines A E, F H, H M, and M A, raiſe their perpendiculars in their proper places, and alſo of a right height; by which, and the five ſtationary angles, we may draw the bounding-lines of the plot, excluding all the triangles as foreign to it, they being no reſemblances of any part of the pool, but of land adjacent.

Concerning the plotting of many cloſes together, whether the ground be even or uneven.

Though we do not deſign to make the reader able to ſurvey lordſhips and foreſts, much leſs to draw maps of countries, but to meaſure a parcel of land with truth and judgment; yet we would have him ſo expert, as not to be puzzled, if any ſhould deſire him to draw a true map of a tenement or ſmall demeſne, conſiſting of ſeveral cloſes; for which purpoſe, let him obſerve the following method.

Fig. 32. Suppoſe ABCDEFGHIKLM to be a tenement or ſmall demeſne, divided into fourteen cloſes, to be meaſured and protracted according to their ſeveral ſhapes and ſituation, firſt draw the plot of the whole by the method of circulation, planting your inſtrument either at every angle, or only at the moſt conſiderable either within or without, as you find moſt convenient. This being done, a line from B to M, gives the triangle A B M from the firſt cloſe. In the next place go round the ſecond cloſe beginning at M, then to B, and ſo about to M again: and then for the third cloſe, plant your table at C, and go round to B, the line B C being protracted already, and ſo of all the reſt, ſtill obſerving which are common lines belonging to ſeveral cloſes, repreſenting the fences, that you may avoid the trouble of meaſuring thoſe lines oftener than once, and lay every part of every cloſe in its due place; and be ſure to keep the inſtrument throughout the whole work to its true poſition by needle, fore-ſight, and back-ſight.

There are divers other ways of doing this work, but none more ſure or plain, eſpecially if the ground be uneven; for in that caſe, if you protract according to the length of lines meaſured from your ſtation to the angles, you will put your cloſes into unproportionable ſhapes, except you reduce hypothenuſal lines to horizontal, by inſtruments, or otherwiſe, which is ſomewhat troubleſome; and the like may be ſaid when you plot with the chain only. Indeed the method of meaſuring only the ſtationary diſtances were very proper for ſetting out the figure of each particular cloſe, provided the diſtance of the ſtations be large, and taken, if poſſible, upon pretty even ground, which ſometimes may be done, though moſt of the cloſe be uneven; and the work ſo ordered, as not to make too accute angles; but becauſe this requires ſkill and care, we adviſe the young artiſt to uſe the circling way, as generally moſt commodious.

It is convenient when you plant your table, that the needle hang juſt over the north-point of the compaſs under it in the box; then may you by the lines overthwart the frame of the table, eaſily draw two lines quite thro' the plot, cutting one another at right angles, the one pointing at north and ſouth, and the other at eaſt and weſt. And if you mark the two and thirty points of the compaſs upon the place where they interſect, and draw the forms of the houſes, woods, and other remarkable things upon the demeſne, and the courſe of brooks and rivers running through it, it will add to your commendation.

And ſo it will alſo, if you take in ſuch parcels of land bounding it, whether common or peculiar to other men, as will make your plot look handſomely, like a perfect ſquare or oblong. But however that be, you muſt be ſure to protract truly all lanes going into it, or through it, and all cloſes of other men's mixed with it; and alſo all conſiderable ponds, ways, and out-lets, with the names of the cloſes, and quality of the ground, whether meadow, paſture, arable, &c.

Concerning ſhifting of paper.

In work of this kind, it ſometimes happen through the multitude and largeneſs of fields, that one ſheet will not hold your whole plot; in which caſe you may help yourſelf by ſhifting paper, as we call it, thus.

Fig. 33. Let A B C D repreſent the ſheet of paper that covers the table, upon which the plot of the large piece of land E F G H I K ſhould be drawn; having finiſhed your firſt ſtation at E, and the ſecond at F, and find your paper will not receive the line F G, draw it ſo far as it will go to the edge of the paper, and planting your table again at E, proceed in your circulation the contrary way to K and I, where you will find yourſelf again at a loſs for your line I H, but draw it alſo to the edge of the paper; then with the point of your compaſſes ſtriking the line P O parallel to the edge of the paper B C, and the line Q O parallel to D C, and cutting P O in O, throw it aſide for a while, covering the inſtrument with a new one, which mark with the figure (2) for your ſecond ſheet.

Fig. 34. Upon which ſecond ſheet, the leading part whereof is repreſented by the three lines meeting in the angular points, A and B, draw P O parallel to A B, the leading edge of the paper, and croſſing it at right angles in the point O, by a parallel to B C, viz. the line O R, being of the ſame diſtance from B C, that Q O in the former ſheet was from D C; then with a rule and a ſharp penknife cut off the end of the firſt ſheet at the line P O, and applying the edge of it to the line P O of the ſecond ſheet, ſo as it may touch that line all along, and the line Q O of the former touch the line O R in the latter, ſo as to make one line with it, draw the lines P G, being the remainder of the line F G, and the line O H, being the remainder of the line I H, and from their extremities the line G H. And if the plot required it, you might proceed on in the ſecond ſheet, and annex a third and a fourth, &c. as there is occaſion.

Theſe ſheets may be pieced together with mouth-glew or fine paſte, applying the edge of the former, as you did upon the table, to the line P O of the latter.

And note here once for all, that when we ſpeak of applying the edge of the paper to a line, we mean the preciſe edge cut by the line P O; but when we ſpeak of drawing lines to the edge of the paper upon the table, we hope none will think us ſo abſurd as to mean the edge that is concealed under the frame, but that the meaning is, that the lines muſt be continued on the paper till they touch the frame.

Concerning the plotting of a town-field, where the ſeveral lands, butts, or doles, are very crooked: with a note concerning hypothenuſal, or ſloping boundaries.

Fig. 35. Suppoſe A B C D E divided, in the manner of a common field, into ſeven parts or doles, belonging to ſeven ſeveral men: firſt, plot the whole, as before hath been taught, then meaſuring from A to B upon the land, note down, as you go along, at how many chains or links, or both, the diviſion is between dole and dole, and accordingly mark them out by the help of ſcale and compaſſes in the line A B on the paper-plot. In the very ſame manner you muſt meaſure and mark out the lines O C and E D; which being done, take the paper from the inſtrument, and laying it before you on a table, with the ſide A E towards you; the compaſſes muſt be ſo opened and placed, as by a few trials they may, that one foot reſting upon the table, the other may paſs through the points of diviſion upon all the three lines, viz. A B, O C, and E D, as in this figure they do.

If the content of any one or more of theſe parts, butts, or doles, be deſired without plotting, it may eaſily be done, without your plain table, thus: take the breadth by your chain at the head, middle, and lower end, and adding theſe numbers together, the third part of their ſum is the equated breadth; by which multiplying the length meaſured down the ridge, or middle, the product gives the content.

But both in this caſe, and that mentioned before, the figure of a plot may be ſomewhat diſordered, not only by the unevenneſs of the ground within, but alſo by the great declivity of the ground where the boundary lines go, either of the whole plot, or particular parcels. For whereas in plotting, every line is preſumed to be horizontal, or level, that it may paſs from angle to angle the ſhorteſt way, and that every part may be duly ſituated, and none thruſt another out o its right place, if it be not level, but falling down towards a valley, or riſing up hill, or compounded of both, a line over ſuch ground, will be falſe as to the plot, and therefore muſt be reduced to a level, and ſo taken off the ſcale, and protracted. For the doing of this, there are ſeveral inſtruments very proper, eſpecially Mr. Rathburn's quadrant upon the head of his peracter, and divers others. But ſuppoſe our country friend to have no other but ſuch as we have already deſcribed, we ſhall ſhew him a plain eaſy way much uſed by practical ſurveyors.

Fig. 36. Suppoſe A B C to be a part of a hill falling within your plot, your boundary line going crookedly from A to B, following the ſurface of the ground. To find the horizontal line, equal to A C, cauſe one to ſtand at the point A, the foot of the hill, and to hold up the end of the chain to a convenient height, and gently aſcending the hill, you muſt draw it level, and make a mark where it toucheth the hill, obſerving the number of links betwixt your aſſiſtant's hand, and that place where he muſt take his ſecond ſtanding, and hold it up as before, and ſo draw it out level again, till it touch the place where he muſt take his third ſtanding, noting the links as before, and ſo proceed, till at laſt, from his fifth ſtanding, you draw the chain level to the higheſt point within your plot, viz. the point B. And now as the pricked lines of this figure put together are evidently equal to the line A C, ſo are the links noted down at every ſtation, when ſummed up, equal to the horizontal line of that part of the hill.

In the very ſame manner, only inverting the order, you may find the horizontal lines going down hill, where that is moſt convenient: and if there be both aſcents and deſcents in one line betwixt two angles, the horizontal lines of both muſt be found and joined together in protraction.

All this concerning declivities of riſing or falling ground, is to be underſtood when they are conſiderable, and a very exact plot required; for ſmall ones, eſpecially when much exactneſs is not expected, are not regardable.

Concerning plotting a piece of ground by the degrees upon the frame of the plain table ſeveral ways, and protracting the ſame.

Hitherto we have ſhewn the uſe of the plain table as ſuch, and our directions have been near as plain as the inſtrument itſelf. We will now ſhew how the plot of a field may be taken by the degrees on the frame by two methods, whereof the one is proper for an ordinary cloſe, where all the angles may be ſeen from one ſtation within it, the other fitting any parcel of land, though much larger, whatever be the figure of it.

For the former, take this example.

Fig. 37. Let A B C D E repreſent the figure of a field to be plotted by the plain table in rainy weather, put on the frame without a paper, the graduated ſide upwards, and plant it in ſome convenient place, whence you can ſee all the angles, as at O; then placing the index upon the table, ſo as the fiducial edge may, at the ſame time, go through the center upon the table, and the lines upon the frame of the table cutting it perpendicularly at 360, where the degrees begin and end, and 180, the exact half, turn about the table upon the ſtaff-head, till through the ſights, the ſide marked with 180 being next your eye, ſee the angle A, and then ſcrew it faſt, obſerving where the needle cutteth, and by back ſight cauſing a mark to be ſet up in the line C D at the point F, that the inſtrument may be kept firm from moving, or be rectified if it be moved, during the work. And now the line A O F paſſing upon the land from the angle A, directly under the ſights of the inſtrument to the mark at F, is, as it were, the prime diameter whence the degrees of the angles are to be numbered, and accordingly you muſt mark the angle A in the table hereafter to be exemplified with 360 degrees. Then turning the index with the fiducial edge upon the center, till you ſee the thread cutting the mark at B, the ſaid edge will cut upon the frame at 76 deg. 15 min. which note down for that angle. The like muſt be done, turning the ſights to C D and D, but not to F, for there is no angle, but only a mark in the boundary, and you will find the index to cut for every angle as we have marked them within the pricked circle of the laſt figure, viz. 157 deg. 35 min. for C, 225 deg. 20 min. for D, and 278 deg. and 50 min. for E.

Then meaſure, or cauſe to be ſtrictly meaſured by others, the diſtances betwixt the place where the inſtrument ſtands, and every angle, and you will find them to be as ſet down upon the pricked lines in the little circle, viz. A 4 chains 20 links, B 4 chains 3 links, C 3 chains 84 links, D 5 chains 35 links, E 5 chains 6 links. And now your table both for lines and angles is thus perfected, and the work is ready for protraction within doors.

	D	M	C	L
A	360	00	4	20
B	76	15	4	03
C	157	35	3	84
D	225	20	5	35
E	278	50	6	06

Your judgment will eaſily inform you, that in ſuch weather we ſhall hardly ſtand to make our table neat and formal, but any thing, how rude ſoever, that we can underſtand, doth the feat. A Welſh ſlate with a ſharp ſtile, or for want thereof, a black-lead pen, and a ſmooth end of an hard board like a trencher, is more convenient at ſuch a ſeaſon, than pen, ink, and paper. But of all, we would commend for expedition a red-lead pen, whereby you may mark out every angle neatly with one touch upon the table itſelf, juſt where it toucheth the frame by help of the fiducial edge, and cloſe by it the length of the line from the center to that angle: all which may be eaſily cleared off by a wet ſpunge or cloth ſo ſoon as you have protracted.

Fig. 37. Now to protract our obſervation; draw upon a paper the line A F at adventure, ſo it be long enough, and ſtick a pin in it at pleaſure for the center O, upon which place the center of the protractor, ſo as the ſtraight ſide may juſt lie upon the line A F, the limb or arch-ſide being upwards towards B; by help whereof make a prick or point on the paper 76 degrees 15 minutes for B, and at 157 degrees 35 minutes for C, according to the number neareſt to the limb.

Then turning the protractor about on the pin with the arch or limb down towards D and E, till the diameter lie again juſt upon the line A F, number downwards from the right hand towards the left, by that rank of figures that are nearer to the center, beginning 190, 200, &c. and over againſt the places where 225 degrees 20 minutes and 278 degrees 50 minutes fall, prick the paper at the ſide of the limb, and through thoſe four points draw ſo many ſeveral lines, upon which, and alſo upon the line A O, mark out by points the true meaſure of every line, by a ſcale, from the center, and from thoſe points drawing the lines A B, B C, C D, D E, and E A, you have the true plot of the field.

Having proceeded in the field as before, and made your table for lines and angles, or done that which is equivalent by a red-lead pen, draw the line A F, and having extended the compaſſes to the radius, or 60 degrees, on a line of chords, ſet one foot towards the middle of the line A F, and with the other deſcribe a circle like that in this figure of a five angled field, but much larger, according to the length of the radius: then extending the compaſſes from the beginning of the line, to 76 degrees 15 minutes, ſet one foot in the interſection of the circle by the line A, and with the other foot make a mark in the circumference of the circle upwards, towards the right hand, and through it draw the dry line B O.

In the next place ſubſtract the angle 76. 15 from 157. 35, where the index cut for the angle C, and there remains 81 degrees 20 minutes, which take off the line as before, and ſet it upon the circumference from the interſection by B O, toward the end of the diameter marked with F, and through the point where it falls, draw the dry line C O.

In like manner ſubſtract 157 degrees 35 minutes from 225 degrees 20 minutes, and the difference is 67 degrees 45 minutes, which ſet from the interſection by the line C O, downwards paſt the prime diameter A F, and through the point where it falleth, draw the line D O.

Laſtly, having ſubſtracted 225 degrees 20 minutes from 278 degrees 50 minutes, there remains 53 degrees 30 minutes, which muſt be ſet downward towards the left-hand from the interſection by D O; and through the point where that falleth, draw the line E O. And now having ſet the particular meaſures upon every line, and drawn the boundary lines, as you muſt have done if you had uſed a protractor, the plot is finiſhed.

But for better aſſurance that you have done your work well, take the meaſure of the remaining angle A O E upon its proper arch, viz. from the interſection of the circumference by AF, to the interſection by E O, and applying it to the line of chords, you will find it to be 81 degrees 10 minutes, as it ought to be, for it ſhould be the complement of 276 degrees 50 minutes to 360.

And for farther ſatisfaction, ſum up the degrees and minutes of all the five angles, which for plainneſs-ſake we have noted in every one of them on the out-ſide of the circle in the figure ſo often referred to, and their ſum is 360, as it ought to be.

$$\begin{array}{r} 76.\ 15 \\ 81.\ 20 \\ 67.\ 45 \\ 53.\ 30 \\ 81.\ 10 \\ \hline 360.000 \end{array}$$

The reader may now expect that we ſhould teach him how to take a plot at two or more ſtations, when all the angles cannot be ſeen from one: but becauſe this is ſo eaſy from the principles already laid, to any that is ingenious, and in part rendered unneceſſary by the method preſently following, we ſhall only give this general hint.

When you have from one ſtation taken in all the angles you can ſee from thence, and then are to remove to your ſecond ſtation, do juſt as you would do if the table were covered with a paper; only it is at your choice, whether you would guide your ſelf for back-ſight by a line that may be rubbed off, drawn upon the table itſelf, from the center to the degrees, on the frame along the fiducial edge, or by noting only what degrees it cuts on either ſide of the center, the edge paſſing through it, that by the help thereof and the needle, the inſtrument may be placed in the ſame line and ſituation as before, for taking in the reſt of the angles, if it can be; if not, another ſtation muſt be taken after the ſame manner.

Fig. 38. Let A B C D E be the figure of a field to be plotted, the weather being bad; ſend your aſſiſtants to find the length of every ſide, beginning at A, who return you ſuch an account of every ſide, in chains and links, as are noted upon the figure, and in the table following, viz. A B 3 chains 73 links, B C 4 chains 91 links, &c. In the mean time you are to find the angles; in order to which plant the inſtrument at B, and laying the index on the center look at C, and find the index cutting 10 degrees 15 minutes, and looking at A, it cuts 126 degrees 45 minutes; out of which if you ſubſtract 10 degrees 15 minutes, there remains 116 degrees 30 minutes for the angle A; but becauſe it will not be ſo convenient to ſubſtract there, you may ſet them down thus: $B\begin{matrix} A & 126.\ 45 \\ C & 10.\ 15 \end{matrix}$ the meaning whereof is, that B notes the angle, and C A the lines meeting there, cutting ſuch degrees on the frame; and the reaſon why A is ſet above, is for more ready ſubſtracting afterwards; then removing to the angle C, and thence looking at B and D, you will find the index to cut as is here expreſſed, $C\begin{matrix} B & 153.\ 10. \\ D & 15.\ 40. \end{matrix}$

In like manner at D thus, $D\begin{matrix} C & 96.\ 05 \\ E & 28.\ 50 \end{matrix}$

At E thus, $E\begin{matrix} D & 141.\ 20. \\ A & 11.\ 45. \end{matrix}$

And laſtly, at A thus, A E 98. 30
B. 9. 20

An.	D	M	Side.	Ch.	L.
A	89	10	A B	3	73
B	116	30	B C	1	91
C	137	30	C D	4	88
D	67	15	D E	9	64
E	129	35	E F	2	29

This being done, you may retire under covert, and by ſubſtraction find 116 degrees 30 minutes for the angle B, 137 degrees 30 minutes for C, 67 degrees 15 minutes for D, 129 degrees 35 minutes for E, and 89 degrees 10 minutes for A, as you will find them on the figure, and in this table, together with the length of the lines.

Note, that there is a way to find the angles without ſubſtraction, if at every ſtation you lay the fiducial edge over the center, and the diviſions 180 and 360, turning about the head of the inſtrument upon the ſtaff, till through the ſights you ſee one of the neighbouring angles, for the index turned upon the center to the other angle, will give you the quantity of the angle you are at, but this exact planting at every angle is more tedious than the other, and therefore not ſo fit for wet weather. But now to protract this plot :

Firſt, by your ſcale, rule, and compaſſes, draw the line A B in length 3 chains 73 links, ending at the point B ; then laying the center of my protractor upon the line A B, ſo as the center of it be upon the point A, and that end of the diameter from which the numbers are reckoned on the arch or limb towards B, make a point for the angle A at 89 degrees 10 minutes, by the direction whereof, and the point A, draw the line A E, which according to your ſcale, muſt be 2 chains 29 links.

In like manner placing the diameter upon A E, juſt as it was upon A B, and the center upon the point E, mark out by the limb, for the angle E, 129 degrees 20 minutes, by which draw the line E D, 6 chains 64 links.

In the next place, bring the center of the protractor to the point D, its diameter lying on the line E D, and its limb towards A, by which prick out 67 degrees 15 minutes for the angle at D, and draw the line 1 chain 88 links.

Laſtly, the center being at C, and the diameter upon the line D C, in ſuch manner as before at other angles, prick out by the limb or arch 137 degrees 30 minutes, and draw the line C B, for at B your plot ſhould cloſe ; and if rightly done, the angle at B will be 116 degrees 30 minutes, and the ſide B C 4 chains 91 links, which you will find it to be by meaſure.

But if you plot by a line of chords, you are not bound to this order, but may go from A to B, and ſo round that way if you pleaſe, which you could not ſo well do with a protractor, without reckoning the numbers backward, yet it muſt be granted that a line of chords neither doth the work ſo quickly nor conveniently : this is the way.

When you have drawn the line A B of a proper length, ſet the compaſſes to the radius, and placing one foot of the compaſſes in the point B, and with the other deſcribe an arch of a competent length, beginning at that ſide of the line A B that is deſigned not to be the inward ſide, and upon this arch, 116 degrees 30 minutes muſt be ſet ; but becauſe the line of chords gives only 90, ſet them firſt on from the line A B, and then take off the remainder 26 degrees 30 minutes, joining them to the 90 upon the arch, making a point, through which the line B muſt be drawn of a due length. In the like manner you muſt do at C E, but the angles at A and D need no ſuch piecing, being capable of being meaſured out by a line of chords at once.

Nor do your angles only give you trouble in this kind of work, but your lines alſo will be often found too ſhort to receive the touch of an arch upon the radius, eſpecially if the line of chords be large, and your ſcale little ; and ſo it may often fall out when you uſe the protractor upon ſuch ſhort lines as A E and C D of this laſt figure : in which caſe a rule muſt be applied to them, and they muſt be extended to a due length, that the arches may meet them without the figure. And if thoſe extenſions of lines, and deſcribing of arches, ſpoil the beauty of your plot, the matter is not great, it is ſo eaſy to be retrieved ; for if you lay on a clean paper, and prick through every angle, lines drawn between thoſe points, will give you the plot neat and perfect.

The artiſt ſometimes loſeth his labour of protraction through ſome error in the field, ſo that his plot will not cloſe ; it is therefore proper to know, before you begin that work, whether it will or no ; for which purpoſe if we take a number leſs by two than the number of angles in the plot, and thereby multiply 180, that product being found to be equal to all the angles, the plot will cloſe, this appears by our plot in the preſent work ; the multiplier being 3, becauſe the angles are 5, and the multiplier muſt be two leſs than the number of angles.

	Deg.	Min.
180	89	10
3	116	30
——	137	30
540	67	15
	129	35
	540	

This kind of trial is grounded upon two principles of Euclid and Ramus, mentioned in the beginning of this article, ſhewing that in all plain triangles, all the angles taken together are equal to two right angles, and that the ſides, conſequently the angle alſo, of every triangle figure, are more by two than the triangles of which it conſiſteth.

Concerning taking inacceſſible diſtances by the plain table, and acceſſible altitudes by the protractor.

Fig. 39. The ſubſtance of what is to be ſaid for the firſt of theſe, is gathered from the inſtructions given for plotting a field, by meaſuring only the ſtationary diſtance ; but to make the caſe more plain to an ordinary capacity, ſuppoſe the line A C to be the unknown breadth of a river, over which a bridge of boats is to be laid, and the general, that he may inform himſelf what ſtore of boats and planks is neceſſary to be brought down, commands you to tell him the true diſtance from A, where he is at preſent, to C, a little boat-houſe on the other ſide the water.

To ſatisfy his demand, plant your table covered with a paper at A, cauſing one to ſet up a mark at B, at a good diſtance from you, along the bank of the river, the farther the better, if diſtance do not hinder ſight : then having choſen a point to repreſent A, and laid the fiducial edge upon it, direct your ſights towards C and B, and ſtrike lines towards them. Which done, ſet up a mark at A, and from thence meaſure to B, 6 chains 32 links, and ſo plant your inſtrument at B, laying the fiducial edge to the line A B, and turning about the head of the inſtrument upon the ſtaff, till through the ſights you ſee the mark at A, and then ſcrew it faſt.

In the laſt place take 6 chains 32 links off your ſcale, and ſet it on the line A B, from A to B, and laying the fiducial edge to the point B, from thence direct the ſights to C, and draw the line B C, meeting or cutting the line A C in C : ſo ſhall the ſpace A C meaſured on the ſcales viz. 8 chains 29 links, be the diſtance deſired, and becauſe the chain is 22 yards long, if you multiply 8.29 by 22, the product is 182 yards and $\frac{38}{100}$ of a yard, which by reduction is ſome little more than 13 inches and $\frac{3}{5}$ of an inch.

Now, to take the height of a tree, tower, or ſteeple by a protractor, without any arithmetical operation, hang a plummet with a fine ſilk thread at the center of it, and hold it ſtedfaſtly with that end to your eye, where the numbers begin, then look ſtrait along the diameter, ſtill removing backward and forward as there is occaſion, till you ſee the top of the tree, tower, or ſteeple, and the thread at the ſame time fall upon 45 degrees, ſo ſhall the diſtance from your eye to the tree, tower, or ſteeple, meaſured in an horizontal or level line, together with the height of your eye above the bottom of it, be equal to the height of the object.

If either for convenience of ſight, or any other reaſon, you think proper to ſet the other end of the diameter to your eye, then the thread for the above trial muſt fall upon 135 deg. inſtead of 45.

Of caſting up the content of land by a table.

Links	R.	P.
100000	4	00
90000	3	24
80000	3	08
70000	2	32
60000	2	16
50000	2	00
40000	1	24
30000	1	08
20000	0	32
10000	0	16
8750	0	14
8125	0	13
7500	0	12
6875	0	11
6250	0	10
5625	0	09
5000	0	08
4375	0	07
3750	0	06
3125	0	05
2500	0	04
1875	0	03
1250	0	02
625	0	01

This table conſiſts of three columns, the firſt containing links, the ſecond roods, or quarters of acres, the third perches; and the uſe of it is thus:

Suppoſe a field to be 7 chains and 25 links long, and five chains 50 links broad, theſe by multiplication make 398750, whereof 5 figures being cut off towards the right hand, the figure 3 ſignifies acres, and the reſt, viz. 98750 denote parts; and to reduce them into roods and perches, firſt ſubſtract from 98750 the greateſt number of links in the table that can be ſubſtracted from it viz. 90000, and put down for it 3 roods 24 perches, which you find over againſt it in the annexed columns, and the remain being 8750, look in the table, and find over againſt it 14 perches, which by addition makes 3 roods 38 perches; ſo is the whole content of the field 3 acres, 3 roods, 38 perches.

```
 7.25
 5.50
------
 36250
3625
3625
------
3.98750
```

```
A R P
------
3 3 24
    14
------
3 3 38
```

But note here, that if the remainder after the firſt ſubſtraction cannot be found in the table, you may take the neareſt to it, ſo the error will be but part of a perch.

As for example.

7.35 being the half perpendicular, and 9.23 the baſe, give for their product 6.78405. The 6 ſignifies acres, and from the reſt 70000 being ſubducted, to which 2 roods 32 perches anſwer, there reſteth 8405; which, becauſe you cannot find in the table, you muſt take the neareſt, which is 8125, to which 13 perches anſwer; ſo the whole content of that triangular cloſe, is 6 acres, 3 roods, and 5 ſquare perches, and a little better.

```
A R P
6 2 32
    13
------
6 3 05
```

SUSSINGLE, or *Surcingle*, the girt which comes over the ſaddle, and binds it firmly to the horſe.

SWAMP, a hollow, watery place, in any part of a field; a bog. *See* Bog.

SWANG, a freſh piece of green ſward lying in a bottom among arable or barren land.

SWARD, the ſurface of the ground.

SWARM, a large number of bees, ſeeking a proper ſettlement. *See the article* Bee.

SWATH, or *Swarth*, a line of graſs, &c. cut down by the mower.

SWATH-BAUK, a ſwarth, or line of new mown graſs or corn.

SWATH-RAKE, a rake about two yards long, with iron teeth, and a bearer in the middle, to which a man fixes himſelf with a belt, and when he has gathered as much as his rake will hold, he raiſes it and begins again. This inſtrument is in ſome counties called a dow-rake, and much uſed in Eſſex for gathering barley after mowing.

To SWEAL, to ſinge, or burn off the hair, &c.

SWILL, a veſſel to waſh in ſtanding on three feet.

SWINE. *See the article* Hog.

SWINE-CRUE, a hog's-ſty.

SWINE-HERD, a keeper of ſwine.

SWINHULL, a hog's-ſty.

SYCAMORE, the name of a tree well known in many parts of England. It grows to a large ſize; the wood is ſoft and very white, and therefore valued by the turners; but is not eſteemed very valuable for other purpoſes. However, as this tree will thrive better than moſt other ſorts near the ſea, it is frequently cultivated to ſcreen plantations of other ſorts of trees from the ſpray of the ſea.

SYTHE. *See* Scythe.

T.

TABERN, a cellar.

TAGGE, a ſheep of the firſt year.

TAIL-SOAKED, a diſeaſe incident to cows, by which the joint of the tail near the rump, will, as it were, rot away. The cure is generally performed by cutting a deep gaſh into the part affected, then rubbing a handful of ſalt into the wound, and binding it up with a rag. Others mix ſoot and a clove of garlick with the ſalt.

TAN, the bark of oak, chopped and ground by a tanning mill into a coarſe powder, to be uſed in the tanning or dreſſing ſkins.

Tan is of great uſe in gardening: firſt, by its fermentation, when laid in a body, which is always moderate and of a long duration, which renders it of great ſervice to hot-beds: and, ſecondly, after it is well rotted, it becomes excellent manure for all ſorts of cold ſtiff land; upon which one load of tan is better than two of rotten dung, and will continue longer in the ground.

The uſe of tan for hot-beds has not been many years known in England; the firſt hot-beds of this ſort, which were made in England, were at Blackheath, in Kent, about fifty-five years ago: theſe were deſigned for raiſing of orange-trees; but, the uſe of theſe hot-beds being but little known at that time, they were made but by two or three perſons, who had learned the uſe of them in Holland and Flanders, where the gardeners ſeldom made any other hot-beds: but in England there were very few hot-beds made of tanner's bark, before the ananas were introduced into this country, which was in 1719, ſince which time the uſe of theſe hot-beds have been more general; and are now made in all thoſe gardens, where the ananas plants are cultivated, or where there are collections of tender exotic plants preſerved: and the gardeners here are now better ſkilled in making and managing of theſe hot-beds, than in moſt other countries; which might render it leſs neceſſary to give a full deſcription of them here: but, yet, as there may be ſome perſons in the remote parts of England, who have not had an opportunity of informing themſelves of the uſe of tanners bark for this purpoſe, I ſhall inſert the ſhorteſt and plaineſt method of making and managing theſe hot-beds, as they are practiſed by the moſt knowing perſons, who have long made uſe of theſe hot-beds: and, firſt, I ſhall begin with the choice of the tan.

The tanners in ſome parts of England do not grind the bark to reduce it into ſmall pieces, as is commonly practiſed by the tanners near London; where there is great difference in the ſize of the bark, ſome being ground much ſmaller than the other, according to the different purpoſes for which it is intended; but in many places the bark is only chopped into large pieces, which renders it very different for the uſe of hot-beds; for, if the tan is very coarſe, it will require a longer time to ferment, than the ſmall tan; but, when it begins to heat, it will require a much greater degree, and will retain the heat a much longer time than the ſmall; therefore, where there is choice, the middling-ſize tan ſhould be preferred; for it is very difficult to manage an hot-bed when made of the largeſt tan: the heat of which is often ſo great, as to ſcald the roots of plants, if the pots are fully plunged into the bed; and I have known this violent heat continue upwards of two months; ſo that it has been unſafe to plunge the pots more than half their depth into the tan, till near three months after the beds have been made: therefore, where the perſons, who have the care of theſe beds, do not diligently obſerve their working, they may in a ſhort time deſtroy the plants which are placed in the beds: on the other hand, if the tan is very ſmall, it will not retain the heat above a month, or five weeks; and will be rotten and unfit for an hot-bed in a ſhort time; ſo that, where the middle-ſized tan can be procured, it ſhould always be preferred to any other.

The tan ſhould be always ſuch as has been newly taken out of the pits; for if it lies long in the tanner's yard, before it is uſed, the beds ſeldom acquire a proper degree of heat; nor do they continue their heat long: ſo that when it has been more than a fortnight or three weeks out of the pit, it is not ſo good for uſe as that which is new. If the tan is very wet it will be proper to ſpread it abroad for two or three days to drain out the moiſture, eſpecially if it is in the autumn or winter ſeaſon; becauſe, then, as there will be little ſun to draw a warmth into the tan, the moiſture will prevent the fermentation, and the beds will remain cold: but, in the ſummer-ſeaſon, there is no great danger from the moiſture of the tan; the heat of the ſun through the glaſſes will be then ſo great, as ſoon to cauſe a fermentation in the tan.

Theſe tan-beds ſhould always be made in pits, having brick walls round them, and a brick pavement at the bottom, to prevent the earth from mixing with the tan; which will prevent the tan from heating; theſe pits muſt not be leſs than three feet deep, and ſix feet in width; the length muſt be in proportion to the number of plants they are to contain: but if they are not ten feet in length, they will not retain their heat long: for, where there is not a good body of tan, the out-ſide of the bed will ſoon loſe its heat; ſo that the plants which are there plunged will have no benefit of the heat; nor will the middle of theſe beds retain their heat long; ſo that they will not anſwer the purpoſe for which they are intended.

When the tan is put into the bed, it muſt not be beaten or trodden down too cloſe; for that will cauſe it to adhere, and form one ſolid lump; ſo that it will not acquire an heat; nor ſhould it be trodden down at the time when the pots are plunged into the beds; to avoid which there ſhould be a board laid croſs the bed, which ſhould be ſupported at each end to prevent its reſting on the tan; upon which the perſon ſhould ſtand, who plunges the pots; ſo that the tan will not be preſſed down too cloſe. When the tan is quite freſh, and has not been out of the pits long enough to acquire an heat, then the beds will require a fortnight or three weeks time, or ſometimes a month, before they will be of a proper temperature of warmth to receive the plants: but, in order to judge of this, there ſhould be three or four ſticks thruſt down into the tan, about eighteen inches deep, in different parts of the bed; ſo that by drawing out the ſticks, and feeling them at different depths, it will be eaſy to judge of the temper of the beds; and it will be proper to let a few of theſe ſticks remain in the bed, after the plants are plunged, in order to know the warmth of the tan; which may be better judged of by feeling theſe ſticks, than by drawing out the pots, or plunging the hand in the tan.

When the tan is good, one of theſe beds will retain a proper degree of heat for near three months; and when the heat declines, if the tan is forked up, and turned over, and ſome new tan added to it, the heat will renew again, and will continue two months longer: ſo that by turning over the tan, and adding ſome new tan every two months, or thereabout, as the bed is found to decline of its heat, they may be continued one year: but every autumn it will be proper to take out a good quantity of the old tan, and to add as much new to the bed, that the heat of the bed may be kept up in winter; for, if the heat is ſuffered to decline too much during the cold ſeaſon, the plants will ſuffer greatly: to prevent this, there ſhould always be ſome new tan added to the bed in winter, when the heat is found to decline; but the tan ſhould be laid in a dry place, a week or ten days, to dry, before it is put into the bed; otherwiſe the moiſture will chill the old tan in the bed, and prevent the fermentation: ſo that unleſs the tan is turned over again, there will be little or no heat in the beds: which often proves fatal to the plants which are plunged into them: therefore, whoever has the management of theſe beds, ſhould be very careful to obſerve conſtantly the warmth of the tan; ſince, upon keeping the beds in a due temperature of warmth, the whole ſucceſs depends; and, where this caution is not taken, it frequently happens, that the ananas plants run into fruit very ſmall, or the plants are infeſted by inſects; both which are occaſioned by the growth of the plants being ſtopped by the decline of the heat of the tan; therefore great regard muſt be had to that, eſpecially in winter.

The great advantages which theſe tan-beds have of thoſe which are made of horſe-dung, are, the moderate heat which they acquire; for their heat is never ſo violent as thoſe of horſe dung; and they continue this heat much longer; and, when the heat declines, it may be renewed, by turning the beds over, and mixing ſome new tan with the old, which cannot be ſo well done with horſe-dung; and likewiſe the beds will not produce ſo great ſteams, which are often injurious to tender plants; ſo that theſe tan-beds are much preferable to thoſe of horſe-dung for moſt purpoſes. *Miller's Gard. Dict.*

Tan, when it is well rotted, is alſo an excellet manure for all cold and ſtiff lands: and if it is laid upon graſs-ground in autumn, that the rains in winter may waſh it into the ground, it will greatly improve the graſs; but when it is uſed new, or in the ſpring of the year, when dry weather comes, it is apt to cauſe the graſs to burn; which has occaſioned the diſuſe of tan in many places; but, if properly uſed, it will be found an excellent dreſſing for all ſtiff lands. *See the article* BARK.

TANSEY, the name of a plant often cultivated in kitchen gardens, and of which there are three varieties, that have all been produced accidentally from the ſeeds of the common tanſey. All the varieties are eaſily propagated by the creeping roots, which, if allowed to remain undiſturbed, will overſpread the ground where they are permitted to grow; ſo that wherever tanſey is planted in a garden, the ſlips ſhould be placed two feet aſunder, and in particular beds, where the paths round them may be often dug, to keep their roots within bounds. They may be tranſplanted either in ſpring or autumn, and will thrive in almoſt any ſoil or ſituation.

Wild TANSEY. *See the article* SILVER-WEED.

TARES. *See the article* VETCHES.

TEAM, a number of horſes or oxen drawing at once the ſame carriage.

To TEAM, to pour or lade out of one veſſel into another.

TEAZLE, or *Fuller's Thiſtle*, a ſpecies of the thiſtle cultivated for the uſe of clothiers, who dreſs their cloth with them.

The teazle is propagated by ſowing the ſeeds in March, upon a dry ſoil. About one peck of the ſeed will ſow an acre; for the plants ſhould have room to grow; otherwiſe the heads will not be ſo large, nor in ſo great quantity. When the plants are come up, you muſt hoe them in the ſame manner as is practiſed for turneps, cutting down all the weeds, and ſingling out the plants to about ſix or eight inches diſtance; and as the plants advance, and the weeds grow again, you muſt hoe them a ſecond time, cutting out the plants to a wider diſtance; for they ſhould be, at laſt, left at leaſt a foot aſunder; and you ſhould be particularly careful to clear them from weeds, eſpecially the firſt ſummer; for when the plants have ſpread ſo as to cover the ſurface of the ground, the weeds will not ſo readily grow between them. The ſecond year after ſowing, the plants will ſhoot up heads, which will be fit to cut about the beginning of Auguſt; at which time they ſhould be cut and tied up in bunches, ſetting them in the ſun, if the weather be fair; but if not, they muſt be ſet in rooms, to dry. The common produce is about an hundred and ſixty bundles, or ſtaves, upon an acre, and they will ſell for about one ſhilling a ſtave. *Miller's Gard. Dict.*

M. de Chateauvieux extended the new huſbandry even to the culture of the teazle, or fuller's thiſtle, which grew to a ſurprizing height, and produced an extraordinary number of the fineſt and beſt heads that the fullers in his country had ever ſeen.

“ I am well informed, ſays an ingenious correſpondent of the editors of the Muſeum Ruſticum, that the principal place in the kingdom for the cultivation of the teazle, is about Wrington in Somerſetſhire, many of the inhabitants of that, and the neighbouring pariſhes, being chiefly employed therein; and from theſe places the cloth manufactories in the counties of Glouceſter, Somerſet, and Wilts, are ſupplied, and even a great many packs carried annually into Yorkſhire.

“ The land moſt ſuitable for this plant is that of a thin, ſweet ſurface, and marly bottom, though a clay or ſtone-traſh bottom will do, and produce large crops: rich loam, or ſtrong clay, is very improper, as on them the plant is apt to grow luxuriant, and thereby cauſe the heads to be large and coarſe-hooked, and, in a moiſt ſummer, ſubject to mildew and rot before they bloſſom and are fit to cut.

“ As to ſituation, a ſouthern aſpect, on the decline of a hill, is to be preferred, though any other will do; but upland ground is to be moſt eſteemed, more eſpecially in an encloſed country, that the wind may aſſiſt in carrying off the natural humidity of the plant in moiſt ſeaſons, which ſometimes, in low and ſmall encloſures, is retained ſo long as to cauſe the heads to taint, and become rotten.

“ Having made choice of a piece of ground, (an old lay is preferable) in February cauſe it to be ploughed in ridges of three bouts each, at a depth ſuitable for a crop of beans, taking care that the furrows be laid ſtrait, and as even as may be; the middle of the ridge higheſt, and a fleſh furrow ploughed in the furrow between each ridge; after which let a man go along each ridge, and with a mattock, hoe, or ſpade, raiſe earth in ſmall clods, at ſuitable diſtances from each other, to produce earth, when meliorated, to heal or cover the ſeed.

“ Having done thus much, let it remain as it is until the time for ſowing the ſeed, which will be about a week or ten days in April, as then the earth is generally moiſtened with rain.

“ At this time cauſe a middle-ſized harrow to be drawn over the land once or twice in a place, to fill the crevices between each furrow, and level the ſurface; after which ſow the ſeed broad-caſt, in the proportion of two buſhels on an acre; then harrow it in, the ſame as turnep ſeed, and let it remain until the plants are come up, and grown into ſix or eight leaves each; when ſome perſon or perſons ſhould go over the field with a hoe, and cut out the plants, where they are too thick, to the ſize of about two feet from each other every way, if the ground be in heart; if it be thin poor land, ſixteen or eighteen inches diſtance is ſufficient.

“ After this they may remain until the latter end of Auguſt, when they muſt be gone over as before, with this difference, the perſon ſhould have a ſpade made about four inches broad, and eighteen inches long in the bit, or pan, with a tree in it of three feet ſix inches long: with this tool the workman muſt go backward, and turn the whole ſurface over, about two inches deep, in long ſpits, turning the ſpade from the plant, to turn the ſpit ſo as no earth may fall into the heart of the plant: but it would be adviſeable, at the time of firſt ſizing the plants, to leave more than are neceſſary to ſtock the ground, to have ſome to fill up the vacancies where any may happen to die, which is often the caſe during the ſucceeding winter, and more eſpecially ſhould it prove froſty.

" Having done thus much, in this ſtate they are to remain during the winter; only care muſt be taken that no cattle get into the field, eſpecially ſheep, which will eat out the cabbage of the plant, and ſpoil it.

" About the latter end of the ſucceeding February, the plants ſhould be digged between as in Auguſt, being very careful that none of the earth falls into the middle of them; and in May, when the plants begin to ſhoot into ſpindle, the ground muſt be digged over again, with this difference, inſtead of being laid plain, it muſt be raiſed into ſmall hillocks about each plant, to ſtrengthen them in the ground, ſo that the wind may not blow them down when loaded with heads.

" This being done, they are left till the ſeaſon for cutting, which will be a work of ſome time, as the heads become fit, which is known by their blowing: it is to be obſerved that the bloſſom firſt appears near the bottom of the head in ſmall, pale, blue flowers; and when theſe appear to have blown ſomewhat more than half way up, ſuch head is fit for cutting, which is generally done in this manner; a man has a knife, the blade about two inches long, with a ſtring in the haft to put over the hand, and a pair of ſtrong gloves to defend him againſt the ſharp prickles on the ſtalks.

" Being thus equipped, he muſt go along each furrow, and cut with one hand, putting them into the other, till he has as many as he can eaſily gripe; when cutting one which is a little more ripe than the others, and the ſtem about eighteen inches long, he binds the handful together with it, (the others are generally cut about nine inches long) which done, the handful is toſſed to ſome open ſpot, in order to be carried to the place for drying, which is done in the following manner.

" Some ſmall poles of aſh, willow, or any ſtrait-growing wood, about the ſize of a hedge-ſtake, and ten or twelve foot long, muſt be provided; at the great end of which, about eighteen inches from it, a hole muſt be made, and a peg put through, to extend three or four inches on each ſide. The poles thus prepared, the handfuls of teazels muſt be put on them, by running the ſmall end through the handful, until the pole be filled: in this condition they muſt be ſet on one end to dry; but it is to be obſerved, that they ſhould be carefully carried into a houſe or ſhed every night, and brought out at days; and in the houſe ſet ſo as for the poles not to touch each other, leſt they taint, which, for want of a free circulation of air, they are very ſubject to, and more ſo, if it be cloſe moiſt weather.

" When they are dry, ſo as to be free from moiſture, they may be carried into ſome upper room, and placed up cloſe together: over a cow-houſe, or place where cattle are fed in winter, is to be preferred, becauſe their breath is ſuppoſed to help to brighten them in colour; wherefore they are the better eſteemed, and ſuppoſed to be more tough in hook than otherways they would.

" When they have by this means acquired from the gradual moiſture of the air an additional elaſticity to the hooks, and are brightened in colour, which will be completed a little after Chriſtmas; the time that generally the heads are ſorted, and made out in the following manner. The handfuls are brought from the ſtorehouſe into ſome large room, uſually a barn-floor, where they are untied one at a time; and generally made four ſorts of. The largeſt heads which are found, and are ſuch as grow on the middle ſtem of each branch, are thrown for the firſt ſort, and called kings. The next ſmalleſt which are found, and are commonly ſuch as grow as ſide heads on each branch, are thrown for a ſecond ſort, and are called middlings. Another, or third ſort, are ſuch of the largeſt, or thoſe which grew on the middle ſtem, as are damaged by the mildew, wet, or other accident; and which would have been kings, had not ſuch defect rendered them unworthy that appellation. Theſe therefore are thrown to a third ſort, and denominated ſcrubs. The laſt, or fourth ſort, is the refuſe of all, and are ſuch as are too ſmall, or too much damaged for any uſe; and are therefore thrown away.

" When a quantity is thus ſeparated, they are made out in the following manner: the perſons who do it, put of the kings ten in each handful. Firſt, ſix of the larger, in the manner of a fan extended: and four leſſer of the ſame ſort, in the boſoms of the ſix; and then bind their ſtems together with a ſpleet of willow, or ſome tough wood, by wrapping it about them three or four times, and tucking the end under. When the kings are tied up in handfuls in this manner, a ſtraight ſtick of about three-fourths of an inch diameter, and two feet ſix inches long, is ſplit to within four inches of one end. Twenty-five of theſe handfuls are put on this ſtick, alternately head to ſtem; letting two of the middle ſtems of each handful be in the cleft, to hold them ſecure: then a ſmall wreath, made of ſpleet, is ſlipped on the upper end of the ſtaff, which holds it together, and keeps the whole from falling about. In like manner are the ſcrubs, or third ſort, alſo made out and put in ſtaves. But of the middlings, or ſecond ſort, double the number of heads are put in one handful, by making two fan-like rows of ſix each, and four in their boſoms on each ſide; and theſe are put into ſtaves of three feet long each, ſpilt as the former, and thirty handfuls in each ſtaff. When they are thus made out, they are fit for ſale, and are to be laid by for that purpoſe in ſome convenient place, where they may not be bruiſed. Thirty ſtaves of the firſt and third ſort are accounted a pack; and forty ſtaves of middlings make alſo a pack.

" An acre of land, if well grown, and what is deemed a full crop, often produces nine packs of kings, nineteen of middlings, and two of ſcrubs. The common price per pack of the firſt ſort, is twenty, the ſecond ſort fourteen, and the third ſort eight ſhillings. But in a French war, they are generally double theſe prices.

The expences attending a crop per acre are,

	l.	*s.*	*d.*
1ſt, Rent of the ground for the crop, which is one year and a half	5	0	0
2d, Ploughing and ſowing	0	15	0
3d, Firſt dreſſing or delving	1	0	0
4th, Second delving	0	10	0
5th, Hilling	0	15	0
6th, Cutting and carrying home	1	15	0
7th, Tythe	0	5	0
8th, Clearing off the ſtalks, and binding them in bundles	0	5	0
9th, Making out, at two ſhillings per pack, ſpleets, ſtaves, and wreaths included	3	0	0
All which make the total expence, attending one acre of teaſels	13	5	0

" This, excluſive of ſeed, which is not often bought, becauſe enough may be ſaved in making out the crop in winter: but if the ſeed be bought, it is generally valued equally with wheat. Therefore, if two buſhels be ſown on the acre, ten ſhillings may be added as the medium price; which makes the whole expence of one acre thirteen pounds fifteen ſhillings, if it ſhould produce thirty packs. But ſuch produce is not always the caſe, for twenty is to be eſteemed a middling crop.

" With reſpect to crops of corn, raiſed amongſt the plants, it is practiſed in many places; and indeed it has been mine to plant field beans, or garden beans, at about three feet diſtance ſingly from each other, in a promiſcuous manner over the teaſel land: which crop of beans, by the cultivation neceſſary for the teaſel, is greatly forwarded in growth, and often produces from four to five and ſix ſtalks from one bean, well loaded with cods. This crop is no injury to the teaſel crop the firſt year, and frequently pays the expence of labour attending the whole.

" The crop, which generally ſucceeds the teaſel, is wheat. The ground, by being frequently delved and kept clean, during the teaſel crop, becomes very fit for this grain, and generally produces very large crops. Forty buſhels per acre is not uncommon, though the land in itſelf is often ſuch as is not annually worth more than ten ſhillings per acre. Hence, I think, it is evident, that a crop which well ſhades the ground, (in ſummer) and that has been two or three times turned and cleaned from all weeds, before ſuch ſhading, greatly fertiliſes the land on which it grows. But I have frequently obſerved an error, to which the occupiers of ſuch land are too liable after theſe fertiliſing crops. This error is the ploughing away (by over cropping) the profits that would enſue. If after its being thus fertilized by the crops of teaſels, it were to be laid down with ſuitable artificial graſs-ſeed, ſown amongſt wheat, and properly managed afterwards, it would, I am experimentally ſenſible, be a laſting improvement." *Muſeum Ruſticum, vol.* III. *pag.* 237, *and vol.* VI. *pag.* 1.

To TED, to ſpread abroad new mown graſs, which is the firſt thing done in order to its being dried, and made into hay.

TEDDER, *or* TETHER, a rope with which a horſe is tied in the field, that he may not paſture too wide.

To TEEM, to be pregnant; to engender young.

TENDRIL, the claſper of a vine, or other climbing plant.

TENEMENT, any thing, as a houſe, &c. held by a tenant.

TENURE, the manner in which tenants hold their lands, &c. of their lord.

TERRAGON, the name of a ſpicy plant, often cultivated in kitchen-gardens.

It is propagated by ſeeds, ſlips, or cuttings. March or April is the proper time for ſetting them, and they may be tranſplanted again in the ſummer. The plants ſhould ſtand at leaſt a foot aſunder every way, and they ſhould be kept clean from weeds. They will endure great cold; and even extraordinary drought will not hurt them, if they are but a little watered, or if the earth about them is kept looſe and well ſtirred. A very few of their leaves mixed with a ſallet, particularly of lettuces, give it a high aromatic flavour. The tendereſt and freſheſt are the beſt for this purpoſe.

THATCH, ſtraw laid on the top of a building, rick, &c. to keep out the weather.

THEAVE, *or* THIEF, an ewe of the firſt year.

THETCHES. *See the article* VETCHES.

THICKET, a cloſe knot, or tuft of trees; a cloſe wood.

THILL-HORSE, *or* THILLER, the laſt horſe in a team; the horſe that goes between the thills or ſhafts.

THISTLE, a well known prickly weed growing in corn-fields.

Where-ever thiſtles grow naturally, it is a ſure ſign that the land is ſtrong: but they are, at the ſame time, a great annoyance to every plant intended to be cultivated. The beſt way to deſtroy thiſtles is to cut them up by the roots before their ſeeding time, which is in the autumn; for cutting of them too young, will only make them branch the more: or, which Mr. Liſle prefers, to pluck the thiſtles up by hand, when the ground is reaſonably moiſt, before they are grown to the ſize at which they are uſually cut. They may then be eaſily drawn up with their roots, by the thumb and two fingers; and the weeder may guard againſt their prickles by putting on a glove, or falſe fingers, made of hard leather. Chalking of land is a good way to deſtroy this very noxious growth: but thorough tillage, ſummer fallows, and repeated good harrowings, are the moſt effectual of all.

By an excellent regulation in France, a farmer may ſue his neighbour who neglects to thiſtle his land at the proper ſeaſons, or may employ people to do it at the other's expence. And it were to be wiſhed, that a ſimilar law was enacted here, to prevent the wide-ſpreading miſchiefs occaſioned by the feeding of this pernicious weed; among which may be reckoned, beſides its choaking the young corn, that if wheat, in particular, be not well thiſtled, the reapers take up the grips ſo tenderly, leſt they ſhould prick themſelves, that, by their looſe handling of them, they ſometimes leave upon the ground corn enough to ſow the whole field.

THISTLING, the action of cutting or pulling up thiſtles, in order to deſtroy them.

THRESHING, the action of beating out the corn.

Though the flail be the beſt inſtrument yet known for threſhing of corn, becauſe it ſeparates the grain from the ſtraw and huſks very effectually and expeditiouſly; yet, as it always bruiſes a great many ſeeds, even ſo as to render them incapable of growing, it were much to be wiſhed that ſome method could be found, by which this eſſential inconvenience might be avoided. Some engine or other, provided with a number of flails, or other pieces anſwering the ſame end, might ſurely be made to move by water, wind, or a horſe, ſo as to perform the buſineſs of threſhing ſtill cheaper and more expeditiouſly, and with leſs damage to the health of the huſbandman, which is frequently thought to be injured by the duſt, &c. which ariſes in the common way of threſhing, as well as by the very great laboriouſneſs of the work. This well deſerves the attention and endeavours of ſkilful mechanics. At all events, the threſher ought not to wear thick iron-clouted ſhoes whilſt he is at work, eſpecially if he is to threſh new corn, and particularly wheat; becauſe they will be apt to bruiſe it. His ſhoes for this buſineſs ſhould be ſoled with an old hat, or ſome other ſoft ſubſtance.

Mr. Mortimer eſteems it a day's labour for a man to threſh four buſhels of wheat or rye, ſix buſhels of barley, five buſhels of oats, or five buſhels of beans and peas, if the corn threſh well. But Mr. Liſle ſays a good threſher aſſured him that twelve buſhels of oats or barley are reckoned a good day's threſhing; that this very man had threſhed fourteen buſhels of oats daily, and winnowed them, for ſeveral days together; but that thoſe oats yielded indeed extraordinary well: that five or ſix buſhels of wheat are a very good day's threſhing; and if the corn be clung, and yields ill, ſometimes three buſhels are as much as can be threſhed in a day. He rates the common price of threſhing at eight-pence for a quarter of corn; and obſerves, which may account for the difference between his eſtimate and Mr. Mortimer's, that ſix buſhels of wheat of the growth of a warm gravelly vale are as eaſily threſhed in a day, as four buſhels of the produce of cold hilly land; becauſe the ſtroke of the flail muſt be forced down ſtronger to beat out the grain of this laſt, than it need to be for the former: and alſo, that as the ſtraw of corn of the growth of a light ſoil is ſhorter than that of a ſtrong clayey ground, more ſheaves, and conſequently more ears of this firſt ſort may be laid together on a floor of equal extent, than can be of the laſt, whoſe longer ſtraw requires proportionably more room.

The worſe wheat is, though it be never ſo dry, the rougher it will feel when handled; becauſe thin and coarſe wheat is not ſo plump and globular as fine wheat, but is apt to be pitted and wrinkled, which of courſe renders it leſs ſlippery. It will handle cooler out of a ſtack two years old, than it will out of one that is only a year old: for in that time the miſts and rimes, eſpecially in a hilly country, will be driven into the ſtack.

Mr. Liſle, who makes this remark, adds, from his own experience, that wheat threſhed in damp weather generally yields but little flour, with a great deal of bran, when it is ground; and that if it be put into ſacks, it will grow muſty in leſs than three weeks, let the weather be ever ſo dry afterwards: but if it be threſhed when the air is perfectly clear and dry, it will keep well in ſacks, for a long time; eſpecially if theſe are laid upon treſtles high enough to ſecure them from the dampneſs of the ground or floor.

For the keeping of meal, in general, there is no better way than firſt to bolt it, and clear it from the bran, which is very apt to corrode and putrify it, and make it muſty; then to tread it down as hard as poſſible, and head it up cloſely, in clean, dry, tight, and well bound caſks, which muſt be laid in a cool dry place.

The beards of barley come off beſt, in threſhing, when the ſwarths of this corn have taken the dew before their being houſed. It will keep well in the mow, unthreſhed, for one year; and for making it into malt, which muſt be done before the heat of the ſummer comes on, it ſhould not be kept above a year and a half, or at moſt two years: otherwiſe it will be filled with weevils; unleſs it has been previouſly cured in a ſtove or kiln.

Oats, being defended with a double huſk, are the grain leaſt ſubject to harbour vermin. The beſt way to keep them after they are threſhed, is to dry them well on a kiln, and then to barrel them up in clean cloſe caſks: but they ſhould not be threſhed earlier than Chriſtmas, becauſe they are not fit for keeping before that time.

Fig.1.

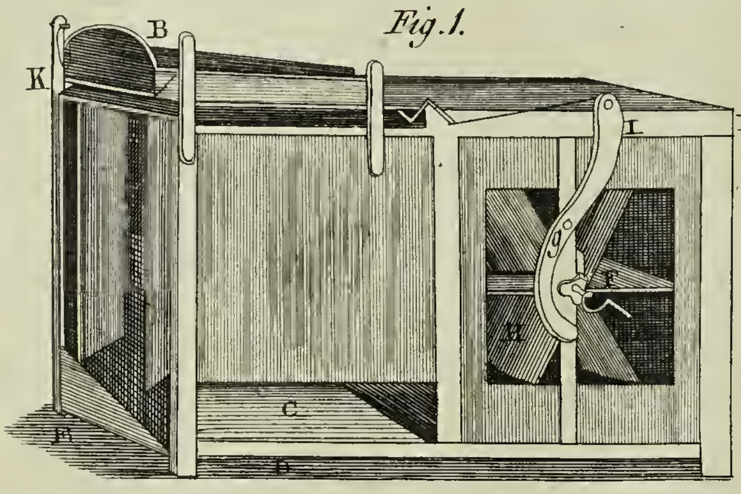


Fig.2.

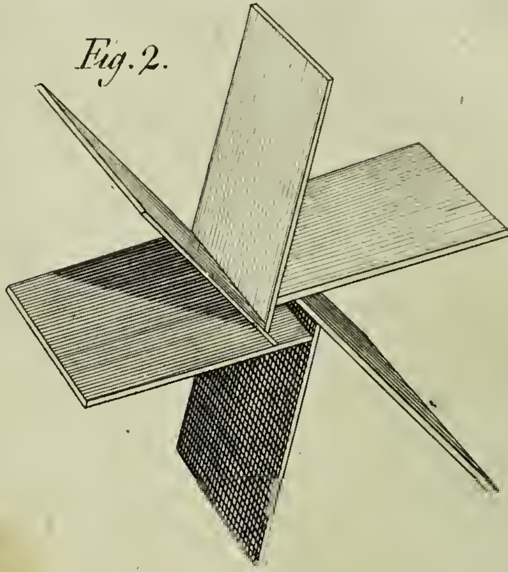
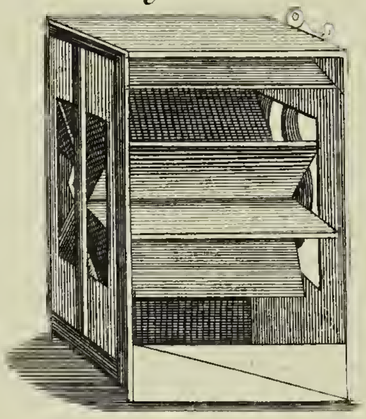
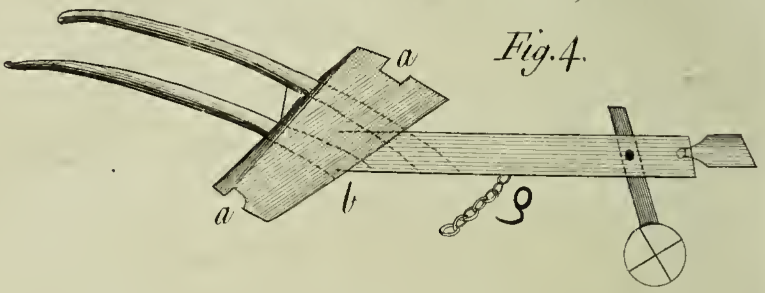


Fig.3.



The common Horse hoe

Fig.4.



Ventilators

Fig 7

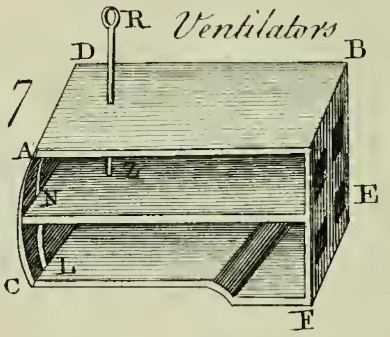


Fig.9.

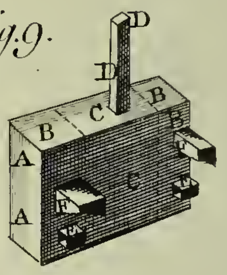
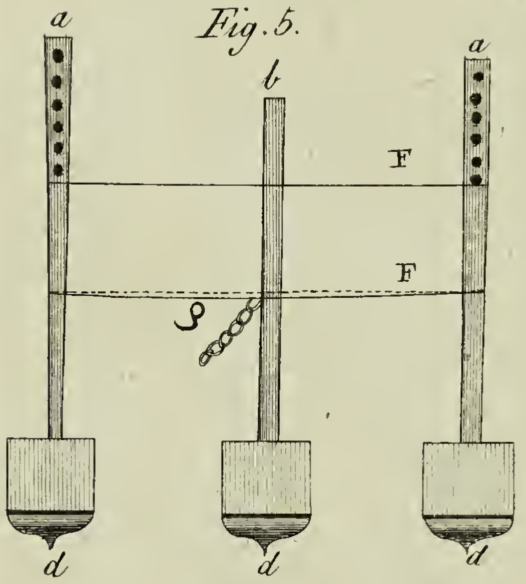


Fig.5.



Turnep cabbage. Fig.6.

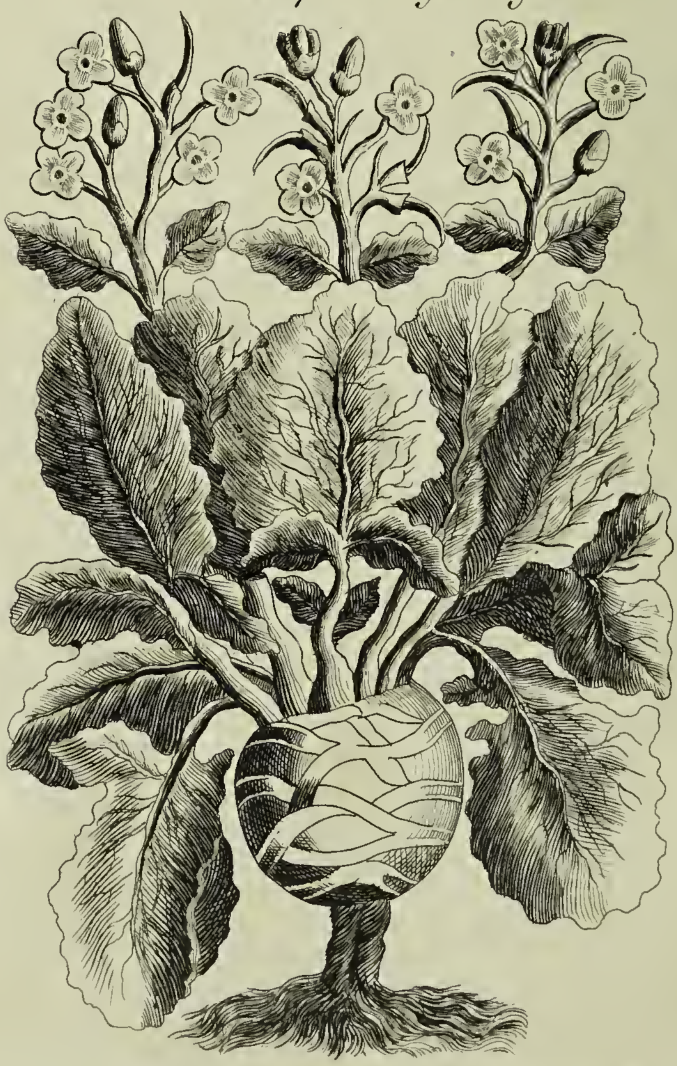
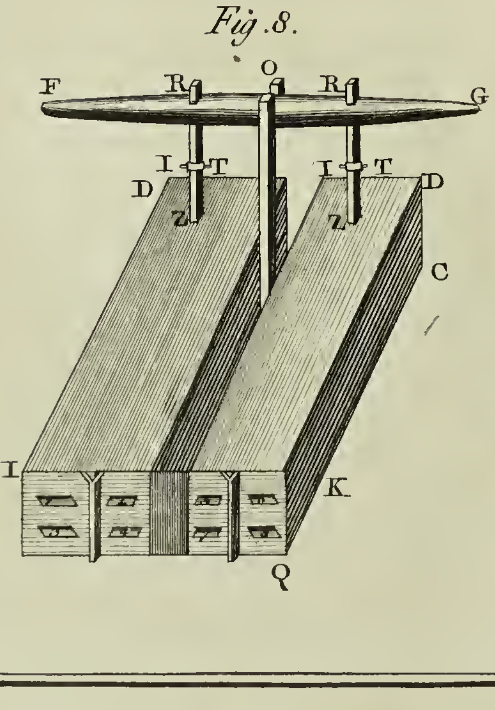


Fig.8.



Beans and peas always threſh beſt after they have ſweated in the mow, which they are very apt to do, becauſe, as the whole crop of either of them never ripens all together, the green parts heat, and communicate their ferment to the whole heap. The danger to be guarded againſt here is, that the ripe ſo heated do not give fire to the green, by which both might be either rotted or conſumed; to which the bigneſs of their leaves, and hardneſs of their ſtalks, which continue moiſt and ſappy a long time, will alſo contribute very much. For this reaſon farmers generally chooſe to ſtack them without doors, rather than to houſe them; that they may be the more thoroughly dried by the ſun and air. But the beſt way of all is to kiln-dry them, or dry them well in the ſun; after which they will keep many years, without turning or any other care, though they be laid ever ſo thick in the granary. As beans are a very large ſeed, and conſequently full of moiſture, it is found beſt to let thoſe that are intended for keeping ſweat in the mow till March, when they may be threſhed without danger: for beans never give again, after they have once been thoroughly dried.

Peas are, of all grain, the moſt ſubject to rottenneſs and imperfection, becauſe they are the moſt apt to breed worms, weevils and mites, by reaſon of the luſciouſneſs and ſweetneſs of their grain. The better they are dried, either in the kiln or ſun, the former of which will generally be found moſt effectual in this country, the longer they will keep ſound, and the fitter they will be for the food of cattle, by helping to make them thirſty; it being a juſt obſervation, that if cattle drink well, they will feed well. What is intended for the food of men ſhould not be dried too much; becauſe that would make the peas require double the time in boiling: nor need they be threſhed for this uſe, but as they are wanted; or elſe they may be put into cloſe caſks, and headed up. In granaries, they keep beſt in thick heaps, or in bins; ſpreading of them thin upon the floor being apt to dry them too ſoon, and to take from them much of their ſweetneſs and goodneſs.

Vetches wanted for ſowing immediately after they are cut, may be threſhed very well on a hurdle, with a cloth; though they may then be too ſoft, notwithſtanding their being ripe, to be threſhed on a floor, where the flail, and the threſher's feet, would bruiſe and break them.

When a careful huſbandman opens and ſpreads his ſheaves, he will pick out of them at leaſt all the largeſt and moſt apparent weeds, before he begins to threſh. As he proceeds in his work, he will, from time to time, remove all the long ſtraw from the corn beaten out of it, which laſt always lies underneath, with a prong or fork; and then the pieces of ſtraw, broken ears, &c. with a wooden rake. He will then ſhovel the remaining grain up on one ſide of the floor, and repeat this till he has threſhed out enough to make what is commonly called a clearing.

This heap is then paſſed through a wide ſieve, which retains only the bits of ſtraw, and ſuch fragments or ends of the ears as have eſcaped the flail. Theſe frequently contain very good corn; though the farmer ſeldom grudges giving them to his poultry, or binding them up with ſtraw intended for fodder. A few of them incloſed in a ſmall truſs bound at both ends, the better to keep them in, will entice horſes to eat heartily of this ſtraw, which affords them good nouriſhment: and M. Duhamel judges that they would alſo be excellent and profitable winter-food for ſheep, when there is a ſcarcity of graſs.

A great deal of labour may be ſaved in the uſing of this ſieve, by faſtening a loop to its rim, and reſting it thereby on a hook ſuſpended by a rope. This will ſuſtain half the weight of the corn, and the winnower may eaſily give it the neceſſary circular motion. But a yet more convenient method, is to place a ſquare ſieve, of wire is beſt, with thin boards for its ſides, upon two poliſhed rods of iron, to throw the corn up into it with a ſhovel, and to puſh it backward and forward upon theſe rods, on which it moves eaſily, and will ſift a great deal of corn in a ſhort time.

For ſeparating the chaff, which is the next buſineſs, the caſting-ſhovel is much more expeditious than either the wicker fan, or the common winnow with ſails. When this ſhovel is uſed, the wind muſt blow through the barn, either in at one door and out at the other, or in at a window, and out at the oppoſite door. The winnower then, placing himſelf under the wind, and cloſe to the heap of corn that is to be cleanſed, takes it up, one ſhovelful after another, and, with a circular motion, throws it ſcattered in the air, againſt the wind, towards the oppoſite ſide of the barn. The beſt grains, which are the heavieſt, go fartheſt; the leſſer fall ſhort of them; and the very ſmall, ſhrivelled, and much damaged, with the ſeeds of cockle, darnel, and ſeveral other weeds, fall ſtill nearer to the man who throws them; while the lighter ſeeds of other weeds, with the bits of ſtraw, chaff, duſt, &c. are blown from all the reſt, by the wind. From time to time, the winnower quits his ſhovel, and ſweeps away the ſecond ſized corn, which would be too much intermixed with the ſmalleſt, if the heap was left alone and ſuffered to accumulate till the end of the winnowing; and when the whole is done, he ſhovels up the fineſt grain. The leaſt of all, which borders on the chaff, &c. is alſo then collected, and the three ſorts, after being ſifted or ſcreened, to cleanſe them from any remaining duſt, are laid up ſeparately; the firſt for ſale, the next for domeſtic uſes, and the third, if the farmer can afford it, chiefly for the food of poultry. The ſhort ſtraws and chaff are ſifted in a pretty fine ſieve, to clear them likewiſe of duſt, and are frequently given to oxen and cows.

Mr. Liſle obſerves that the ſeeds cannot be ſeparated from any grain by the common fan, but that it may be done with the ſcreen; of which he therefore adviſes the conſtant uſe for all ſorts of corn deſigned for ſowing.

Though wind is, in all caſes, the chief agent in the cleanſing of ſeeds, which being intrinſically heavier than their coats or huſks, are, by the ſame force applied to both, carried to different diſtances, in proportion to their weight, and thereby conſequently ſeparated; yet the natural action of this aſſiſtant is liable to many inconveniences: it blows not conſtantly; but frequently diſappoints the winnower in his time of greateſt need: when it does blow, it is not always in the beſt direction to anſwer the ſituation of his barn; and without doors it is intirely uſeleſs to his purpoſe, if it be not attended with fair weather. Beſides, when its force can be applied in the beſt way, it is even then not equal; but generally acts by ſudden blaſts, which, as is well known, diſorders the whole work, and occaſions a conſiderable waſte of ſeed.

The Dutch avoid theſe inconveniencies by uſing a machine (Plate XXVI. Fig. 1.) which creates an artificial wind, uniform and ſteady in its action, and always ready at command.

The fan, (Fig. 2.) which is the acting part of this engine, produces a wind proportioned to the velocity with which it is turned on its axis, and therefore capable of ſeveral degrees of ſtrength, as beſt ſuits the purpoſe of the winnower.

This fan is incloſed in a large caſe or box, K L, and occupies one half of it; which is repreſented ſeparately, and in a different view, in Fig. 3. It is ſuſpended freely on its axis, and turned by the handle A. The other half of the box is empty, and receives the ſeed as it falls down from the hopper B, to the ſloping floor viſible at C, along which it ſlides out at D, while the force of the wind which is confined within this winnow, and always acts in the ſame direction, viz. lengthways of the machine from A to E, carries the chaff, light and rotten grains, dirt, &c. out at E. In this paſſage, the wind meets the ſeed conſtantly falling from the hopper, and impels it more or leſs toward the end E, according to its weight. Good ſeed never goes quite ſo far, but comes down within the box.

The hopper here is ingeniouſly contrived to ſave labour. It hangs by ſtrings upon four pegs, and moves with ſuch eaſe, that the neceſſary motion may be communicated to it by the ſame hand that moves the fan, without any hinderance to the workman. To this purpoſe, a triangular board *f*, is fixed upon the handle of the fan, and turns with it. The angles of this board, in their rotation, preſs againſt the lower end of a little lath, incurvated as in the figure, which moves freely upon a peg at *g*. This end accordingly recedes from the preſſure towards H, and conſequently the upper end moves the contrary way, towards I, and by a ſtring faſtened from it to the hopper, draws this laſt after it, out of its natural ſituation. When this preſſure ends, and the ſides of the little triangle are next to the lath, the hopper hangs freely, returns to its former place, and takes the lath along with it, till the next angle of the little triangle begins to act ; and ſo alternately as long as the fan moves. As the hopper is thus in continual motion, the ſeed ſheds down, and is winnowed as it falls.

The next care is to cleanſe the corn from all foreign bodies, which could not be carried off by the wind, ſuch as ſtones, bits of earth, &c. Theſe are ſeparated by running the grain through a ſieve wide enough to let it paſs with eaſe, while bodies of a larger bulk are retained : and it is likewiſe often neceſſary afterwards to uſe a fine ſieve, which lets through only the duſt, ſeeds of weeds, and other bodies ſmaller than the corn.

As the farmers in many places feed their cattle, and particularly their ſheep, in the winter, with half-threſhed ſtraw ; and as new ſtraw is good food for horſes, which are induced to eat it very readily when it ſtill contains ſome grain ; there is, in this reſpect, an advantage in threſhing the corn only by degrees ; beſides, that the grain itſelf is allowed to improve in its quality when preſerved in the ear, ſo as to attain the moſt perfect maturity, to ſweat out its moiſture, and to acquire a degree of hardneſs which fits it for long keeping. About three months after it has been cut, is generally reckoned the beſt time for threſhing wheat that is intended for keeping ; and accordingly our prudent huſbandmen make this the buſineſs of winter, when their preſence is leaſt wanted in the field. But, on the other hand, ſeed wheat cannot well be too ſoon cleared from the chaff, as M. de Chateauvieux's experiments have proved ; and the beſt way of doing this, is by ſtriking the ears againſt a beam. By this method the huſbandman will obtain fine, long, unbruiſed ſtraw, fit for binding up his next year's ſheaves, for thatching, and for various other uſeful purpoſes. Of this he ſhould always ſave, and ſtack, as much as he can ſpare, when it proves long and good ; for wheat ſtraw will keep perfectly well a year or two ; and if there be no occaſion for it in that time, it will make litter and dung at laſt. Barley-ſtraw is likewiſe very ſerviceable for thatching, or to throw over ſtacks of barley, or peas, till they can be thatched : but oat-ſtraw is of no great uſe, unleſs it be to cover an oat-rick, peas for fatting hogs, or corn for fowls. In general, an empty ſpace ſhould be left in the barn, if it can be done conveniently in harveſt time, to receive the litter, and foddering ſtraw, that is threſhed out before cattle come to fodder ; or it ſhould be laid under ſome cover, for otherwiſe it will rot.

THRASHING-FLOOR, the floor on which the corn is thraſhed. *See the article* Barn.

THRAVE, a ſhock of corn conſiſting of twenty-four ſheaves.

THREAF, a handful, a bundle, a pottle.

THROATING, the action of mowing beans againſt their bending, which is never done but in a thin crop.

THROATWORT, the name of a perennial weed common in paſture grounds. The ſtalk is cornered and undivided. The flowers grow in bunches at the top of the ſtalk. They are erect, of a beautiful purple colour, and divided in the middle into five acute ſegments.

THYME, a well known aromatic plant propagated in kitchen gardens.

Botaniſts enumerate nine different ſpecies of thyme, beſides ſeveral varieties ; but they are all propagated either by ſeeds or parting the roots.

The moſt uſeful ſort, either for culinary purpoſes, or for medicine, is the broad leaved thyme, moſt commonly cultivated in the kitchen-garden ; for the narrow leaved kind never grow ſo large. Their culture is, however, exactly the ſame.

The ſeeds of thyme, if it be raiſed from thence, ſhould be ſown either in March or October, but the former of theſe months is beſt, in a well dug bed of light earth ; taking care, as they are very ſmall, not to drop them too cloſe together, nor to bury them deep, for this laſt would make them rot. When the plants are come up, they ſhould be carefully over looked and cleared from weeds, and if the ſeaſon be dry, their growth will be greatly promoted by watering them twice a week, for ſome time. In June, if it be a ſpring ſowing, the plants ſhould be thinned to the diſtance of ſix inches aſunder every way, that they may have room to ſpread : and thoſe which are drawn out may be ſet in other beds, at the ſame diſtance from each other. They muſt be watered till they have taken root, and will then require no farther care, except weeding them, till the winter, when they may be pulled up, and laid by in a dry place, for uſe. The autumnal ſowing ſhould be thinned as before, early the next ſpring, if it be let ſtand till then ; for there will be little danger of its reſiſting the ſevereſt winter of this country, eſpecially if the plants grow on a dry, poor, and ſtony land. In rich ground, indeed, where they grow luxuriantly, they are ſometimes deſtroyed by ſevere froſts. Thyme will even flouriſh upon a ſtone wall.

If the plants are propagated by parting their roots, this ſhould alſo be done in March or October. The old plants ſhould be taken up, their roots ſhould be ſlipt into as many parts as can be, and theſe ſlips ſhould be ſet ſix or eight inches aſunder every way, in beds of freſh light earth. If the ſeaſon is dry, they muſt be watered there till they have taken root ; and with only weeding of them afterwards, they will ſoon be fit for uſe.

To ſave the ſeeds of thyme, ſome of the plants ſhould be left unremoved till the next ſpring. They will then flower in June, and their ſeeds will ripen in July. Theſe muſt be pulled up and beaten out as ſoon as they are ripe ; for the firſt ſhower of rain would otherwiſe waſh them all out of their huſks.

Thyme is ſo great an impoveriſher of the earth, that no crop will thrive well where that ſtood the year before, unleſs the ground be trenched deeper than the thyme rooted, and at the ſame time enriched with dung, or ſome other ſuitable manure.

TICHING, ſetting up turfs in ſuch a manner as they may be dried by the ſun, and fit for being burnt for their aſhes upon the land.

TIKE, an inſect found in dogs, ſheep, cows, &c.

TILLABLE, arable, fit for the plough.

TILLAGE, the act or practice of tilling, or cultivating land. *See the article* Ploughing.

" I was much pleaſed, ſays a correſpondent of the editors of the Muſeum Ruſticum, with an account which I received about ſix weeks ago, of a peculiar management of tillage at Market-Weighton, in the eaſt-riding of Yorkſhire, given to me by a ſenſible man of veracity, who was born and bred a farmer in that neighbourhood.

" The inhabitants of Market-Weighton have it ſeems five fields, two of a ſandy ſoil, and three of a ſtrong clayey ſoil ; the former, as will eaſily be conjectured, deſtined to rye, and the others to wheat. Their ſandy lands are diſpoſed in four ſwathes breadth ; and finding by experience that conſiderable parts of each land, towards each furrow, are ſtarved by the coldneſs of the water dripping from the higher parts of the lands, they have for many years altered their former method : and only ploughed the half of each land, viz. the two middle ſwathes : ſo that they have now excellent rye growing on the higher and dryer half of every land, and excellent meadow growing on the lower and wetter half, which being juſt two ſwathes, is mowed with great eaſe and exactneſs.

" It will, perhaps, be thought by ſome, that by making narrower lands, they might have more dry land, and conſequently more corn. But I apprehend, theſe induſtrious huſbandmen find by experience, that when they make their lands narrower, and conſequently with leſs deſcent, the water ſtagnates in the higher parts, and conſequently ſpoils their whole crop. Nor could they, I ſuppoſe, ſow more corn on their lands, in their preſent diſpoſition, with convenience, as their preſent method allows them juſt one ſwathe on each ſide.

" They have rye and meadow in one of their two ſandy fields every other year, and a fallow the next year. The having half of the field in graſs, affords good graſs for their ſheep, &c. in that year ; and allows them to keep a good ſtock thereon ; and this ſtock, in return, manures the ground conſiderably, both the fallow and the ſwarth. One of their wheat-fields affords them plenty of worſe or ſpring corn ; and thus they are ſupplied with wheat, rye, ſpring corn, meadow, and ſummer graſs, from their five fields, which in any other management they could ſcarcely be.

" It is obſervable alſo, that by this management they only plough as much as four fields, and conſequently can afford one fifth more ploughing to every piece of ground in tillage, than they otherwiſe could, on ſuppoſition that their fields are all of the ſame extent.

“ Theſe provident people, gentlemen, have another piece of management well worthy the attention of others. They have two great fairs for ſheep; one in ſpring, and the other in autumn. They hold the former of theſe fairs in one of their fallow fields, which is to be ploughed up in ſpring. The concourſe of ſheep, horſes, &c. manures this field ſurpriſingly, and then they turn in the dung before it be evaporated or baked. Their later fair is held on the other fallow field, which is ſoon to be ſown with hard corn. And here they receive equal benefit.

“ Whether they have their ſpring fair on the rye or wheat field, I know not; but I apprehend them to have it on the former: as rye is ſown ſooner than wheat; and the time of ſowing might be too late for their autumnal fair.

“ Whoever has ſeen the uſeleſs naſtineſs which is made by ſheep at fairs, in the ſtreets of great towns, will think this management of the Market-Weightoners highly deſerving of imitation; eſpecially in the latter end of the year, when the rains bring in much ſoil with the ſheep.

“ I would, however, venture to recommend one improvement to theſe ſenſible people, viz. after a certain number of years to plough up one of their ſandy fields intirely, and to croſs-plough it, and endeavour to mix the ſoil of the ridges and furrows thoroughly together, and then to make the furrows where the ridges were, &c. and to ſow down the outward ſwathes of each land with ſeeds proper to the ſoil. The advantages hence reſulting, are ſo obvious, that it would be an affront to their underſtandings to inſiſt upon them.” *Muſeum Ruſticum, vol.* VI. *pag.* 83.

TILLER, a branch or ſtem of corn.

To TILLER, to ſpread or ſhoot out.

TILLS, tares, or vetches.

TILTH, *or* TILT, the condition of the earth after ploughing, &c.

TIMOTHY-GRASS, the name of a graſs now cultivated in England, of which it is a native, though the ſeeds of it were carried from Virginia, by one Mr. Timothy Hanſon, to North Carolina, where it is now cultivated by the inhabitants; and from this circumſtance it received the name it now bears.

It thrives moſt in low, damp, marſhy grounds; for in ſuch ſoil and ſituation it will produce a fine turf in three weeks from the time of ſowing the ſeed. It is very luxuriant, grows to a conſiderable height, and has in ſome ſort the appearance of wheat or rye, having a broad blade or leaf.

All ſorts of cattle are very fond of this herb whilſt in a green growing ſtate; and it will not be improper to add, that they are nearly, if not quite, as fond of it, when dried and made into hay: but when it is intended for this uſe, it ſhould always be mown when it is in full ſap, juſt before it flowers, for if it is left longer before it is cut, being ſo luxuriant and quick a grower, it becomes harſh, and is much dryer and more chirky food, than when it is cut in its prime.

“ Timothy-graſs, ſays an experienced farmer, in a letter to Dr. Templeman, is in appearance a coarſe graſs, very little promiſing to be a paſture agreeable to cattle. Indeed, its appearance ſo ſtrongly prejudiced many againſt it, that it would have been at once condemned to neglect, had it not been reſcued by the enterprizing diſpoſition of Mr. Rocque, who had ſown a conſiderable ſpot of ground with the ſeed firſt ſent from America; yet the fact is, that, whilſt in ſap, it is more agreeable to horſes and cattle than any other graſs has been obſerved to be. Mr. Rocque's horſe ſoon gave him a convincing proof of this; for having got looſe, he left very fine lucerne, and the moment he reached the Timothy-graſs, inſtead of ranging about, as uſual with horſes, he eat clean before him.

“ Deer, which are very nice in their food, are ſo fond of it, that, as I am well aſſured by gentlemen from North-America, they ſow Timothy-graſs there on the ſkirts of their corn land near the woods; in order to keep the deer from eating their corn; the Timothy-graſs being much more agreeable to them than even corn.

“ The dry hay of the Timothy-graſs is exceedingly agreeable to cattle, as appears from a remarkable inſtance mentioned in a converſation in the Society for the encouragements of arts, &c. A worthy huſbandman, who had himſelf often experienced how fond his cows and horſes were of it, carried a friend into the field, that he might have ocular demonſtration of it. The huſbandman took a tuft of dry Timothy-hay in his hand, and as ſoon as one of the cows ſaw it, ſhe came inſtantly to feed on it, though there was plenty of good graſs under foot. Another cow ſoon followed the firſt, and both eat greedily of it: but each of them refuſed to eat the hay of common graſs, which happened to be mixed with it. So fond were the horſes and cows of this hay, that they would follow a perſon having ſome of it in his hand, as readily as they would one who carried corn for them.

“ A very great advantage attending the Timothy-graſs is, that it thrives well in ſuch wet marſhy land as will ſcarcely yield any other good graſs; and here, its numerous and matted roots make ſo ſtrong a ſward, that land which was before a looſe mire, ſhall become ſo firm as to bear cattle and even carriages without their ſinking into it.

“ It is almoſt needleſs to add, that in order to ſow Timothy-graſs ſeed in ſuch marſhy land, it muſt be drained, and then all the inequalities common in ſuch land, as well as the ſtrong matted roots of coarſe graſs, ſhould be taken up and burnt. The land being then ploughed and laid ſmooth, the aſhes ſhould be ſpread upon it, and the ſeed may be ſown early in the autumn; or rather, the plants ſhould be raiſed in a nurſery, and ſet in it at ſix or eight inches diſtance, every way, from each other. This graſs will alſo thrive well on a clay bottom, where water is apt to ſtagnate in rainy ſeaſons.

“ The Timothy-graſs will grow to the height of three or four feet high. I have been aſſured by a gentleman, that he has ſeen it between five and ſix feet high in Virginia. If it is cut down before the ſeed ripens, it will ſoon ſhoot anew, and yield a good ſecond crop. The fowl meadow graſs grows to the height of about three feet, and will ripen its ſeed twice in a ſeaſon: we may therefore infer, that it may be cut for hay thrice in a ſeaſon. It is not an early graſs; but as ſoon as it begins to ſhoot, it makes up for that loſs by its ſpeedy growth. During the drought of laſt ſummer, the ſecond crop made a ſurprizingly quick progreſs. Its not being an early graſs is perhaps no loſs; for as it delights in rather moiſt meadows, the ground might be poached, were cattle tempted to go early to feed on it.

“ If from ſome imperfection in the ſoil, the plants of either of theſe graſſes do not fill the ground ſufficiently, they may be let run to ſeed, which falling in the vacant ſpaces, ſoon ſupply the want. So far as we have yet obſerved in this country, theſe ſelf-ſown plants do not arrive at the ſize of the parent plants, which were ſet at due diſtances: and this affords good reaſon to think, that if the ſeed was ſown in broad-caſt, and the plants came up thick, they would in the ſame manner be ſtinted in their growth.

“ The ſucceſs of the Timothy-graſs, when ſown alone, demonſtrates the utility of ſowing the ſeeds of each graſs ſeparately, in order to form a juſt eſtimate of their comparative values: for though this graſs is a native of England, being a ſpecies of the fox-tail, it has hitherto been rather neglected than cultivated, even though nature has pointed it out as an uſeful plant in wet meadows, by its early verdure and growth. I make no doubt but that the practice of raiſing graſſes ſeparately, will bring other no leſs valuable graſſes to light.”

TINE, a tooth or ſpike. And hence the common phraſe, of giving two or three tinings, ſignifies to draw the harrows twice or thrice over the ſame ſpot of ground.

TIT, a ſmall horſe.

TORE, rowen, or winter-graſs.

TOVET, or *Toſet*, half a buſhel.

TRAMEL, an inſtrument or device, made ſometimes of leather, but more uſually of ropes, fitted to a horſe's legs to regulate his motion, and teach him to amble.

Tramel alſo ſignifies an iron inſtrument hanging in the chimney, whereon to hang pots or kettles over the fire.

TRANSPLANTING, the act of removing trees or plants from the places where they are ſowed, or raiſed, and planting them in others. *See the articles* LUCERNE, PLANTING, &c.

TREE, the firſt and largeſt of the vegetable kind, conſiſting of a ſingle trunk, out of which ſpring forth branches and leaves.

Standard-trees are ſuch as naturally riſe to a great height, and are not topped. For the choice of trees of this kind to be tranſplanted out of a nurſery, Quintiney recommends us to ſuch as are ſtraight, ſix feet high at leaſt, and five or ſix inches thick at bottom, and three or four at top; the bark pretty ſmooth and ſhining, as a token of their youth, and of the good ſoil they grew in.

Dwarf-trees are ſuch as are kept low, and never ſuffered to have above half a foot or ſtem.

Heat is ſo eſſential to the growth of trees, that we ſee them grow larger and ſmaller in a ſort of gradation, as the climates in which they ſtand are more or leſs hot. The hotteſt countries yield in general the largeſt and talleſt trees, and thoſe alſo in much greater beauty and variety than the colder do; and even thoſe plants which are common to both arrive at a much greater bulk in the ſouthern, than in the northern climates; nay, there are ſome regions ſo bleak and chill, that they raiſe no vegetables at all to any conſiderable height. Greenland, Iceland, and the like places, afford no trees at all; and what ſhrubs grow in them are always little and low. In the warmer climates, where trees grow to a moderate ſize, any accidental diminution of the common heat is found very greatly to impede vegetation; and, even in England, the cold ſummers we ſometimes have, give us an evident proof of this; for though the corn and low plants have ſucceeded well enough, and gooſeberries, currants, raſberries and other low ſhrubs, have brought forth fruit in ſufficient plenty, yet the production of taller trees has been found very much hurt; and wallnuts, apples, and pears, have been very ſcarce among us.

Heat is heat, be it from what cauſe it will, and acts as well upon vegetation one way as another. Thus the heat of dung, and the artificial heat of coal fires in ſtoves, is found to ſupply the place of the ſun.

Great numbers of the Indian trees in their native ſoil flower twice in a year, and ſome flower and bear ripe fruit all the year round; and it is obſerved of theſe laſt, that they are at once the moſt frequent and moſt uſeful to the inhabitants; their fruit, which hang always on them in readineſs, containing cool juices, which are good in fevers, and other of the common diſeaſes of that hot country.

Plantations of uſeful trees might be made to very great advantage in many places in every country, and the country greatly enriched by it, while the public would be alſo benefited by it, ſince it would raiſe a continual ſupply of timber uſed in ſhip-building, and on other public as well as private occaſions.

We have, in many places, heaths, and other barren and uncultivated lands, of very great extent; and how great an advantage would it be to the public, to bring theſe to be truly valuable? Many, if not all of theſe heaths, would be found on trial capable of producing trees; and ſome of them are truly the remains of deſtroyed foreſts; and, though the profits to be reaped from the planting theſe would come late, yet the expence of doing it would be very trifling in compariſon of that profit, and the means eaſy.

The authors who have given rules for planting, having employed themſelves only about ſmall ſpots of ground, the eſtabliſhing orchards, or parks, are by no means to be ſuppoſed proper guides in attempts of this kind; and Monſieur de Buffon, who had a great opinion of the knowledge of our Evelyn and Miller, who ſeem to ſpeak of every thing from their own experience, found, when he ſet about large plantations, that their opinions and rules were erroneous; and was obliged to have recourſe to experiments only; which he varied a thouſand ways: and, though many of them proved unſucceſsful, yet they all gave hints towards others, by which the attempt might afterwards be brought to ſucceed.

This ſagacious enquirer into the operations of nature in the growth of vegetables, having ſet apart a conſiderable quantity of land for the trial, and procured a number of young trees, firſt divided the whole quantity into a number of ſmall ſquares, and, having made a plan of it, examined the nature, depth, and other circumſtances of the ſoil in each, and minuted the whole down on a proper part of the plan; that himſelf or whoever ſucceeded him might judge, from the different growths of a number of trees planted in the ſame ſtate in the different ſoils, the different advantages and diſadvantages of every circumſtance in the depth and nature of the ground, in regard to the growth of uſeful trees. Different numbers of labourers were employed about different ſpots of this ground, and the acorns for the young growth planted at different ſeaſons; but the reſult in general was, that what ſhould ſeem the beſt methods ſucceeded the worſt; and thoſe pieces where many labourers were employed, and the acorns planted before winter, were much thinner of young oaks, than thoſe where the leaſt labour had been beſtowed upon the ground, and where the acorns had been planted in the ſpring; but thoſe places which ſucceeded beſt from the ſowing, were thoſe which had the acorns planted in holes made by a pickax, without any preceding culture of the ground. And thoſe where the acorns had only been laid upon the earth, under the graſs, afforded a great number of vigorous young trees, though the greater part had been carried away by birds, and other devouring animals. Thoſe ſpots of ground where the acorns were ſet ſix inches deep, were much worſe furniſhed with young ſhoots, than thoſe where they had been buried but at an inch deep; and in ſome places where they were buried at a foot deep, not one ſhoot appeared, though in others where they had been buried at nine inches there were many.

Thoſe acorns which had been ſteeped for eight or nine days in wine lees, and in the water of the common ſewers, appeared out of the ground much earlier than thoſe which were put in without this previous management.

But the moſt ſucceſsful of all the trials was that of planting in the ſpring ſuch acorns as had been ſown together in another place, and had time to ſhoot there; of theſe ſcarce any failed, and the plantation was perfectly flouriſhing, though the growth of theſe young ſhoots was not ſo quick and vigorous as thoſe of the acorns which had remained, when firſt ſown; which was probably owing to the injury the tender radicles received in tranſplanting.

Thus ſucceeded the experiments by ſowing, while, of thoſe made by planting young trees, ſuch as had been brought out of woods, and places under covert, ſucceeded much worſe than thoſe which had grown in more expoſed places.

The young trees of the ſeveral parts of the plantation kept on their growth in the manner they had begun to ſhoot, thoſe of the more laboured parts continuing more weak, and lower than thoſe of the leſs laboured.

Thus were a number of neceſſary experiments carefully tried, and the reſult of the whole was, that to make a plantation of oaks, on a ſoil of the common clayey or loamy kind, the moſt ſucceſsful method is this: the acorns muſt be preſerved during the winter in the earth in this manner: let there be made a bed of earth ſix inches deep, on this place a layer of acorns two inches deep, over theſe lay a bed of another half foot of earth, over that another layer of acorns, and ſo on ſucceſſively, till as many are employed as there will be occaſion for; the whole is then to be covered with a foot depth of earth, to preſerve all from the froſt. In the beginning of March, theſe beds are to be opened, and the acorns which will by that time have ſhot out, and are then in reality ſo many young oaks, are to be planted out at a foot diſtance each, and the ſucceſs of a plantation of this kind need not be feared. This is a manner of planting that is done at a ſmall expence, and even that might be in a great meaſure ſpared, were it not for the birds and other devouring animals; ſince, could the acorns be defended from theſe, they might be only laid on the ſurface of the ground under the graſs in autumn, and they would infallibly ſhew themſelves in ſo many young oaks the ſucceeding ſpring.

It is eaſy to continue the carrying the acorns, when taken out of their winter's bed, to the place where they are to be planted, without doing them much injury; and the ſmall ſtop the tranſplanting puts to their growth, is in reality rather an advantage than an injury; ſince it only retards the young ſhoots for about three weeks, or leſs than that: and by that means ſecures them from the few cold mornings that may be expected about the time of their natural appearance.

For the planting, pruning, felling, grafting, &c. of trees, *ſee the articles* PLANTING, PRUNING.

TREFOIL, a genus of plants, the flower of which has a tubulous permanent empalement of one leaf: it is of the butterfly kind, drying in the empalement. The ſtandard is reflexed, the wings are ſhorter than the ſtandard, and the keel is ſhorter than the wings: it has ten ſtamina, nine are joined, and one is ſeparate, terminated by ſingle ſummits, and an almoſt oval germen ſupporting an awl-ſhaped ſtyle, crowned by a ſingle ſtigma. The germen afterward becomes a ſhort pod with one valve, containing a few roundiſh ſeeds.

Mr. Miller enumerates twelve different ſpecies of trefoil, the firſt of which is well known in England by the name of red clover; and the manner of cultivating this plant has been already deſcribed under the article CLOVER.

The ſecond ſort, namely, the white Dutch clover, grows naturally in moſt of the paſtures in England, and is generally known among the country people by the name of white honey ſuckle.

This is an abiding plant, whoſe branches trail upon the ground, and ſend out roots from every joint, ſo that it thickens and makes the cloſeſt ſward of any of the ſown graſſes; and it is the ſweeteſt feed for all ſorts of cattle yet known: therefore when land is deſigned to be laid down for paſture, with intent to continue ſo, it ſhould be ſown with the ſeeds of this plant. The uſual allowance of this ſeed is eight pounds to one acre of land; but this ſhould never be ſown with corn, for if there is a crop of corn, the graſs will be ſo weak under it, as to be ſcarce worth ſtanding; but ſuch is the covetouſneſs of moſt farmers, that they will not be prevailed on to alter their old cuſtom of laying down their grounds with a crop of corn, though they loſe twice the value of their corn by the poorneſs of the graſs, which will never come to a good ſward, and one whole ſeaſon is alſo loſt; for if this ſeed is ſown in the ſpring without corn, there will be a crop of hay to mow by the middle, or latter end of July, and a much better after-feed for cattle the following autumn and winter, than the graſs which is ſown with corn will produce the ſecond year. The ſeed of this ſort may alſo be ſown in autumn, and this autumnal ſowing, if the ſeeds grow kindly, will afford a good early crop of hay the following ſpring; and if, after the hay is taken off the land, the ground be well rolled, it will cauſe the clover to mat cloſe upon the ground, and become a thick ſward.

The ſeeds of this white Dutch clover is annually imported from Flanders, by way of Holland, whence it received the name of Dutch clover; not that it is more a native of that country than of this, for it is very common in moiſt paſtures, in every county in England: but the ſeeds were never collected for ſowing in this country till of late years; nor are there many perſons here, even now, who ſave this ſeed, though it may be done if the ſame method, as is practiſed for the red clover, be taken with this ſort; it ſhould therefore be recommended to every farmer, who is deſirous of improving his land, to ſow carefully an acre or two of this white clover for ſeed, which will ſave him the expence of buying for ſome years, when the price is great; and there will be a ſure market for any quantity he may have to ſpare.

The third ſort, namely hop-clover, called by ſome yellow meadow trefoil, grows naturally among the graſs in the upland paſtures of this country; but the ſeeds are frequently ſold in the ſhops, and are by many mixed with the other ſorts of clover and graſs-ſeeds, for laying down ground to paſture. This plant grows with upright branching ſtalks about a foot high, garniſhed with trifoliate leaves, whoſe lobes are oblong and heart-ſhaped, but reverſed, the narrow point joining the foot ſtalks. The flowers, which are yellow, grow from the wings of the ſtalk, upon long foot-ſtalks, collected into oval imbricated heads, having naked empalements lying over each other like ſcales, ſomewhat like the flowers of hops, from whence the plant had the name of hop-clover. But there are two ſorts of this clover, which grow naturally in England. The other is a much ſmaller plant than this, and generally known by the name of none-ſuch, or yellow hop-trefoil.

The hop-clover is ſtrongly recommended by the following circumſtances. 1. It not only grows, but flouriſhes on the moſt barren ſands, and therefore muſt be a very proper graſs to cultivate on ſuch unfertile ſoils, where any other graſs that is worth notice will not grow at all. 2. It is not apt to ſwell cattle, as the red clover does. 3. In good ground it will continue long, and bear a very good ſeed or crop, as Mr. Tull, though prejudiced againſt clovers, confeſſes; and, by its flouriſhing both on ſands and clay, which have not been ploughed for many years, it ſeems likely to continue long in any ſoil.

The fifth ſort grows naturally on chalky lands in many parts of England; and in ſome countries the ſeed is ſown after the ſame manner as the common red clover, eſpecially on chalky ground, where it will thrive, and produce a better crop than clover. The ſtalks of this are hairy, and grow erect to the height of two feet or more, garniſhed with trifoliate leaves, ſtanding upon long foot-ſtalks, whoſe lobes are longer than thoſe of the red-clover, and have no marks of white; they are of a yellowiſh green colour, and are covered with ſoft hairs. The flowers grow in oval ſpikes at the end of the branches; they are of a pale copper colour; their petals are long and tubulous, but the brim is divided into two lips, as the other ſorts.

This is known by the title of trefoil, in the places where it is cultivated; but the ſeedſmen ſell the hop-clover by that name, ſo they make no diſtinction between this, the hop-clover, and none-ſuch; therefore, by which of theſe three titles the ſeeds are bought, they prove the ſame.

This ſort of trefoil is much cultivated in that part of Eſſex which borders on Cambridgeſhire.

The ſixth ſort grows naturally in Spain and Italy; this has upright ſtalks near two feet high, which are hairy, garniſhed with trifoliate leaves, having roundiſh lobes, which are ſawed at their points. The flowers are produced at the top of the ſtalk in long, obtuſe, hairy ſpikes, of a bright red colour, ſo make a pretty appearance during their continuance. It is an annual plant, ſo is not proper for ſowing as fodder.

The ſeventh ſort is an annual plant, which grows naturally in the ſouth of France and Italy; it riſes with a ſtrong ſmooth ſtalk near three feet high, garniſhed with trifoliate leaves, whoſe lobes are two inches and a half long, and near a quarter broad, ſtanding upon long foot-ſtalks, which are embraced by ſtipulæ or ſheaths their whole length. The flowers are produced at the top of the ſtalks in very long ſpikes; they are of a beautiful red colour, ſo make a fine appearance. It flowers in July, and the ſeeds ripen in autumn.

The eighth ſort grows naturally in Spain and Italy; this riſes with a ſlender ſtiff ſtalk near two feet high, garniſhed with trifoliate leaves, whoſe lobes are very narrow and hairy. The flowers are produced at the top of the ſtalks in oblong conical ſpikes; the indentures of their empalements end in long briſtly hairs, which are almoſt equal in length; the ſpikes are hairy, and the flowers of a pale red colour.

The ninth ſort is the common hare's foot trefoil, which grows naturally upon dry gravelly land in moſt parts of England, and is a ſure indication of the ſterility of the ſoil, for it is rarely ſeen upon good ground. This plant is ſeldom eat by cattle, ſo is unfit for paſture, and is only mentioned here becauſe it is ſometimes uſed in medicine; it is an annual plant, whoſe root decays ſoon after it has perfected ſeeds.

The tenth ſort grows naturally on arable land in many parts of England; this has trailing ſtalks, which put out roots at their joints. The leaves ſtand upon long ſlender foot-ſtalks; the lobes are roundiſh, and ſawed on their edges; the flowers are collected in roundiſh heads, ſtanding upon ſlender foot-ſtalks, which riſe from the wings of the ſtalks; theſe have bladdery empalements, which terminate in two teeth. When theſe lie on the ground, their globular heads, having a little bluſh of red on their upper ſide toward the ſun, and the other part being white, have a great reſemblance of ſtrawberries, and from thence it was called ſtrawberry trefoil.

Theſe ſorts are preſerved in botanic gardens for variety; they are eaſily propagated by ſeeds, which may be ſown on an open bed of ground, either in autumn or ſpring.

The plants which come up in autumn, will grow much larger, and flower earlier in the ſummer than thoſe which are ſown in the ſpring, ſo from thoſe good ſeeds may be always obtained, whereas the others ſometimes miſcarry. When the plants come up, they require no other care than to keep them clean from weeds, and thin them where they are too cloſe.

The eleventh ſort is the common melilot, which is uſed in medicine, and has been already deſcribed under the article MELILOT, which ſee.

The twelfth ſort grows naturally in Bohemia and Auſtria, but has been long cultivated in England as a medicinal plant, though at preſent it is rarely uſed; it is annual. The ſtalks are large, hollow, and channelled; they riſe about a foot high, garniſhed with trifoliate leaves, whoſe lobes are oval, and ſlightly ſawed on their edges, ſtanding upon pretty long foot-ſtalks. The flowers are collected in oblong ſpikes, which ſtand upon very long foot-ſtalks, ſpringing from the wings of the ſtalk at every joint; they are of a pale blue colour ſhaped like thoſe of the common melilot; theſe appear in June and July, and are ſucceeded by ſmall yellow ſeeds, of a kidney ſhape, two or three being included in each ſhort pod. The whole plant has a very ſtrong ſcent like that of fenugreek, and periſhes ſoon after the ſeeds are ripe. *Miller's Gard. Dict.*

TRELLISES, a contrivance for ſupporting the branches of fruit-trees, conſiſting of laths of wood croſſing each other in the form of a lattice.

Some perſons who are very curious in their fruit, and who do not mind a little extraordinary expence, erect trelliſes againſt their walls, extending from the inſide of one pier to the neareſt inſide of the next; where the walls are built with piers, as they muſt be for this purpoſe. This frame-work is conſtructed in the ſame manner as that for eſpaliers, like which it need not be ſet up till the trees are well ſpread, and begin to bear fruit plentifully; for they may be trained till then againſt any ordinary low eſpalier of aſh poles or other ſlender ſticks, in order not needleſsly to expoſe the trelliſes to the injuries of the weather; becauſe theſe, being generally made of regularly cut yellow-deal, or oak, and run up higher, coſt more. Every fourth upright rail or poſt of the trellis ſhould be much ſtronger than the reſt, and faſtened to the wall with iron hooks, which it is beſt to fix in the wall at the time of building it. Theſe ſtrongeſt upright poſts ſhould be about three, but by no means more than four feet from each other. The croſs rails may be ſlight, as for common eſpaliers; but they muſt be laid much cloſer together. For peach, nectarine, and apricot trees, for example, which, for the moſt part, produce their fruit on the young wood, the ſquares of the trellis frame ſhould not exceed three or four inches; but for trees which continue to bear on the old wood, they may be five or ſix inches wide, and for vines, eight or nine inches. The ſhoots of the trees are faſtened to this frame with ozier twigs, rope yarn, or any other ſoft bandage, in the ſame manner as they are to eſpaliers: for they muſt not be nailed to either, becauſe that would injure the wood-work.

Theſe trelliſes, which ſhould project about two inches from the wall, are thought to contribute greatly to preſerve the beauty of the fruit, by preventing its lying too cloſe to the wall, whilſt it has at the ſame time all the advantages of the heat reflected therefrom: nor are the walls where theſe are uſed hurt by driving nails into their joints, and drawing them out again every year, at the hazard of pulling out ſome of the mortar with them, and conſequently of weakening the wall, and making holes in which ſnails and other vermin take ſhelter and breed.

TRENCH, a furrow cut in the earth for draining land. *See the articles* BOG and DRAINING.

TRENDLE, any thing that turns round.

To **TREFALLOW**, to plough land the third time before ſowing.

TROUGH, a long veſſel for holding water, &c.

TRUG, or TRUGG, a hod for mortar.

TRUNDLE, a ſort of carriage with low wheels, for carrying heavy and cumberſome loads.

TRUNK, the ſtem or body of a tree; or the part between the ground and the place where it divides into branches.

TRUSS, a bundle of hay, ſtraw, &c.

A truſs of hay muſt contain fifty-ſix pounds, or half a hundred weight; thirty-ſix truſſes make a load. In June, July, and Auguſt, a truſs of new hay muſt weigh ſixty pounds.

TRUSS *of flowers*, ſignifies many flowers growing together on the head of a ſtalk, as in the cowſlip, auricula, &c.

TUBEROSE, or PALIANTHES, the name of a genus of flowers greatly cultivated, and much admired.

The varieties of this plant are the tuberoſe with a double flower, the ſtriped-leaved tuberoſe, and the tuberoſe with a ſmaller flower; the laſt is mentioned by ſeveral authors as a diſtinct ſpecies, but is certainly a variety.

This ſort is frequent in the ſouth of France, from whence the roots have been often brought to England early in the ſpring, before thoſe roots have arrived from Italy, which are annually imported; the ſtalks of this are weaker, and do not riſe ſo high, and the flowers are ſmaller than thoſe of the common tuberoſe; but in other reſpects is the ſame.

The tuberoſe grows naturally in India, from whence it was firſt brought to Europe, where it now thrives in the warmer parts, as well as in its native ſoil. The Genoeſe are the people who cultivate this plant, to furniſh all the other countries where the roots cannot be propagated without great trouble and care, and from thence the roots are annually ſent to England, Holland, and Germany. In moſt parts of Italy, Sicily, and Spain, the roots thrive and propagate without care, where they are once planted.

This plant has been long cultivated in the Engliſh gardens, for the exceeding beauty and fragrancy of its flowers; the roots of this are annually brought from Genoa, by the perſons who import orange trees; for as theſe roots are too tender to thrive in the full ground in England, ſo there are few perſons who care to take the trouble of nurſing up their off-ſets, till they become blowing roots, becauſe it will be two or three years before they arrive to a proper ſize for producing flowers; and as they muſt be protected from the froſt in winter, the trouble and expence of covers is greater than the roots are worth; for they are generally ſold pretty reaſonable, by thoſe who import them from Italy.

The double flowering is a variety of the firſt, which was obtained from ſeed by Monſ. Le Cour, of Leyden in Holland, who for many years was ſo tenacious of parting with any of the roots, even after he had propagated them in ſuch plenty, as to have more than he could plant, that he cauſed them to be cut in pieces, that he might have the vanity to boaſt of being the only perſon in Europe who was poſſeſſed of this flower; but of late years the roots have been ſpread into many parts; and as there is no method to propagate this but by the off-ſets, moſt people who have had of this ſort are careful to multiply and increaſe it, which is done by planting the off-ſets upon a moderate hot-bed early in March, and covering the bed in cold weather with mats or ſtraw; in ſummer they muſt have plenty of water in dry weather. In this bed the roots may remain till the leaves decay in autumn; but if there ſhould happen any froſt before that time, the bed ſhould be covered to guard the roots from the froſt, becauſe if the froſt enters ſo low as to reach the roots, it will kill them; and if the leaves are injured by the froſt, it will weaken the roots. Where there is a due care taken to ſcreen them from froſt, and too much wet, it will be the beſt way to let the roots remain in the bed till the end of November, or the beginning of December, provided hard froſts do not ſet in ſooner; for the leſs time the roots are out of the ground, the ſtronger they will be, and the ſooner they will flower. When the roots are taken up, they ſhould be cleaned from the earth, and laid up in dry ſand, where they may be ſecure from froſt and wet; here they ſhould remain until the ſeaſon for planting them again: this ſame method ſhould be practiſed by thoſe who are deſirous to cultivate the ſingle ſort in England, and alſo that with ſtriped leaves muſt be propagated the ſame way.

We ſhall next give directions for the management of thoſe roots which are annually brought from Italy. And firſt, in the choice of the roots, thoſe which are the largeſt and plumpeſt, if they are perfectly firm and ſound, are the beſt, and the fewer off-ſets they have, the ſtronger they will flower; but the under part of the roots ſhould be particularly examined, becauſe it is there that they firſt decay. After the roots are choſen, before they are planted, the off-ſets ſhould be taken off; for if theſe are left upon the roots, they will draw away part of the nouriſhment from the old root, whereby the flower-ſtems will be greatly weakened.

As the roots commonly arrive in England in the month of February or March, thoſe who are deſirous to have theſe early in flower, ſhould make a moderate hot-bed ſoon after the roots arrive, which ſhould have good rich earth laid upon the dung, about ſeven or eight inches deep; this bed ſhould be covered with a frame, and when the bed is in a proper temperature for warmth, the roots ſhould be planted at about ſix inches diſtance from each other every way. The upper part of the root ſhould not be buried more than one inch in the ground; when the roots are planted, there ſhould be but little water given them, until they ſhoot above-ground, for too much wet will rot them, when they are in an inactive ſtate, but afterwards they will require plenty of water, eſpecially when the ſeaſon is warm. When the flower ſtems begin to appear, the bed ſhould have a large ſhare of air given to it; otherwiſe the ſtalks will draw up weak, and produce but few flowers; for the more air theſe plants enjoy in good weather, the ſtronger they will grow, and produce a great number of flowers; therefore, towards the beginning of May, the frame may be quite taken off the bed, and hoops faſtened over it, to ſupport a covering of mats, which need not be laid over but in the night, or in very cold weather, ſo that by enjoying the free open air, their ſtems will be large; and if they are well watered in dry weather, their flowers will be large, and a great number on each ſtem.

The firſt planting will require more care than thoſe which are deſigned to come after them; for in order to have a ſucceſſion of theſe flowers, the roots ſhould be planted at three different times, viz. the firſt the beginning of March, the ſecond the beginning of April, and the third at the end of that month, or the beginning of May; but the latter beds will require a much leſs quantity of dung than the firſt, eſpecially that bed which is the laſt made; for if there is but warmth enough to put the roots in motion, it is as much as will be required; and this laſt bed will need no covering, for many times thoſe roots which are planted in the full ground at this ſeaſon, will produce ſtrong flowers in autumn; but in order to ſecure their flowering, it is always the beſt way to plant them on a gentle hot-bed. As to the ſecond bed, that ſhould be arched over with hoops, and covered with mats every night, and in bad weather, otherwiſe the late froſts which frequently happen in May, will pinch them.

Theſe plants may remain in the beds until the flowers are near expanding, at which time they may be carefully taken up, preſerving the earth to their roots, and planted in pots, and then placed in the ſhade for about a week to recover their removal; after which time the pots may be removed into halls, or other apartments, where they will continue in beauty a long time, and their fragrant odour will perfume the air of the rooms where they are placed, and by having a ſucceſſion of them, they may be continued from Midſummer to the end of October, or middle of November; but as the ſtems of theſe plants advance, there ſhould be ſome ſticks put down by each root, to which the ſtem ſhould be faſtened, to prevent their being broken by the wind.

It is a common practice with many people, to plant theſe roots in pots, and plunge the pots into a hot-bed; but there is much more trouble in raiſing them in this method than in that before directed; for if the roots are not planted in very ſmall pots, there will be a neceſſity of making the beds much larger, in order to contain a quantity of the roots; and if they are firſt planted in ſmall pots, they ſhould be ſhaken out of theſe into pots of a larger ſize, when they begin to ſhoot out their flower ſtems, otherwiſe the ſtalks will be weak, and produce but few flowers; therefore the other method is to be preferred, as there is no danger in removing the roots, if it is done with care.

When the roots are ſtrong, and properly managed, the ſtems will riſe three or four feet high, and each ſtem will produce twenty flowers or more; and in this the great beauty of theſe flowers conſiſts, for when there are but a few flowers upon the ſtalks, they will ſoon fade away, and muſt be frequently renewed; for the flowers are produced in ſpikes coming out alternately upon the ſtalk, the lower flowers opening firſt; and as theſe decay, thoſe above them open; ſo that in proportion to the number of flowers upon each ſtalk, they continue in beauty a longer or ſhorter time.

The ſort with double flowers will require a little more care, in order to have the flowers fair; but this care is chiefly at the time of blowing, for the flowers of this ſort will not open, if they are expoſed to the open air; therefore when the flowers are fully formed and near opening, the pots ſhould be placed in an airy glaſs-caſe, or a ſhelter of glaſſes ſhould be prepared for them, that the dews and rains may not fall upon them, for that will cauſe the flowers to rot away before they open, and the heat of the ſun drawn through the glaſſes, will cauſe their flowers to expand very fair. With this management, Mr. Miller ſays he has had this ſort with very double flowers extremely fair, and upwards of twenty upon one ſtem, ſo that they have made a beautiful appearance; but where this has not been practiſed, it is very rare to ſee one of them in any degree of beauty. *Miller's Gard. Dict.*

TUBULATED Flower, a term uſed to expreſs thoſe ſmaller flowers, a great number of which go to compoſe one large compound flower. Theſe are called tubulated in diſtinction from another kind of them, which are from their ſhape called ligulated. The tubulated floſcules generally compoſe the diſk, and the ligulated ones the radius of the compound flowers. The tubulated ones are formed into a hollow cylinder, which expands into a mouth at the top, and is divided into five equal ſegments, which ſtand expanded, and in ſome meaſure bent backwards.

TULIP, the name of a flower ſo well known as to need no deſcription; and it would be to little purpoſe to enumerate the ſeveral varieties of theſe flowers, which may be ſeen in one good garden, ſince there is no end of their numbers; and what ſome people may value at a conſiderable rate, others reject: beſides, there are annually a great variety of new flowers obtained from breeders, ſo thoſe which are old, if they have not very good properties to recommend them, are thrown out and deſpiſed. I ſhall therefore point out the properties of a good tulip, according to the characteriſtics of the beſt floriſts of the preſent age. 1. It ſhould have a tall ſtrong ſtem. 2. The flower ſhould conſiſt of ſix leaves, three within, and three without; the former ought to be larger than the latter. 3. Their bottom ſhould be proportioned to their top, and their upper part ſhould be rounded off, and not terminate in a point. 4. Theſe leaves, when opened, ſhould neither turn inward, nor bend outward, but rather ſtand erect, and the flower ſhould be of a middling ſize, neither over large, nor too ſmall. 5. The ſtripes ſhould be ſmall and regular, ariſing from the bottom of the flower; for if there are any remains of the former ſelf-coloured bottom, the flower is in danger of loſing its ſtripes again. The chives ſhould not be yellow, but of a brown colour. When a flower has all theſe properties, it is eſteemed a good one.

Tulips are generally divided into three claſſes, according to their ſeaſons of flowering; as Præcoces, or early blowers, Medias, or middling blowers, and Serotines, or late blowers; but there is no occaſion for making any more diſtinctions than two, viz. early and late blowers.

The early blowing tulips are not near ſo fair, nor riſe half ſo high, as the late ones, but are chiefly valued for appearing ſo early in the ſpring; ſome of which will flower the end of February in mild ſeaſons, if planted in a warm border near a wall, pale, hedge, or other ſhelter, and a month after the others will ſucceed them; ſo that they keep flowering until the general ſeaſon for the late flowers to blow, which is towards the end of April.

The roots of the early-blowing tulips ſhould be planted the beginning of September in a warm border, near a wall, pale, or hedge, becauſe if they are put into an open ſpot of ground, their buds are in danger of ſuffering by morning froſts in the ſpring. The ſoil for theſe ſhould be renewed every year, where people intend to have them fair. The beſt ſoil for this purpoſe is that which is taken from a light loamy paſture, with the turf rotted amongſt it; and to this ſhould be added a fourth part of ſea-ſand. This mixture may be laid about eighteen inches deep, which will be ſufficient; for theſe need not be planted more than four or five inches deep at moſt. The off-ſets ſhould not be planted amongſt the blowing roots, but in a border by themſelves, where they may be planted pretty cloſely together, eſpecially if they are ſmall; but theſe ſhould be taken up when their leaves decay, in the ſame manner as the blowing roots, otherwiſe they would rot; for theſe are not ſo hardy as the late blowers, nor do they increaſe half ſo faſt as thoſe, ſo that a greater care is required to preſerve the off-ſets of them.

When theſe tulips come up in the ſpring, the earth upon the ſurface of the borders ſhould be gently ſtirred and cleared from weeds; and as the buds appear, if the ſeaſon ſhould prove ſevere, it will be of great ſervice to cover them with mats, for want of which many times they are blighted, and the flower-buds decay before they blow, which is often injurious to the roots, as alſo the cropping of the flowers ſo ſoon as they are blown, becauſe their roots, which are formed new every year, are not at that time arrived at their full magnitude, and are hereby deprived of proper nouriſhment.

If, when theſe flowers are blown, the ſeaſon ſhould prove very warm, it will be proper to ſhade them with mats, &c. in the heat of the day; as alſo if the nights are froſty, they ſhould be in like manner covered, whereby they may be preſerved a long time in beauty; but, when their flowers are decayed, and their ſeed veſſels begin to ſwell, they ſhould be broken off juſt at the top of the ſtalks, becauſe if they are permitted to ſeed, it will injure the roots.

When the leaves of theſe flowers are decayed, which will be before the late blowers are out of flower, their roots ſhould be taken up, and ſpread upon mats in a ſhady place to dry; after which they ſhould be cleared from their filth, and put up in a dry place, where vermin cannot come to them, until the ſeaſon for planting them again, being very careful to preſerve every ſort ſeparate, that you may know how to diſpoſe of them at the time for planting them again, becauſe it is the better way to plant all the roots of each ſort together, and not to intermix them, as is commonly practiſed in moſt other kinds of flowers; for as there are few of them which blow at the ſame time, ſo, when the ſeveral roots of one ſort are ſcattered through a whole border, they make but an indifferent appearance; whereas, when twenty or thirty roots of the ſame ſort are placed together, they will all flower at the ſame time, and have a better effect.

There are many curious perſons, who, in order to preſerve their ſeveral kinds of tulips, and other bulbous-rooted flowers ſeparate, have large flat boxes made, which are divided into ſeveral ſmall partitions, each of which is numbered in the ſame manner as the diviſions of their beds; ſo that when a catalogue of their roots is made, and the numbers fixed to each ſort in the beds, there is nothing more to do when the roots are taken up, but to put every kind into the diviſion marked with the ſame number which was placed to each ſort in the bed, which ſaves a great deal of trouble, and effectually anſwers the purpoſe of preſerving the kinds ſeparate.

The late-blowing tulips are ſo numerous, that, as I before obſerved, it would be to no purpoſe to attempt to give a catalogue of them. Theſe are generally obtained from breeders, which is a term applied to all ſuch flowers as are produced from ſeeds which are of one ſelf-colour, and have good bottoms and chives; theſe in time break into various beautiful ſtripes, according to the ground of their former ſelf-colour; but this muſt be entirely thrown off, otherwiſe they do not eſteem a flower well broken.

Of theſe breeders there hath been a great variety brought into England from Flanders of late years, which is the grand nurſery for moſt ſorts of bulbous-rooted flowers; but there are ſome curious perſons, who have lately obtained many valuable breeders from ſeed in England; and doubtleſs, were we as induſtrious to ſow the ſeeds of theſe flowers as the people of Holland and Flanders, we might in a few years have as great variety as is to be found in any part of Europe; for, although it is ſix or ſeven years from the ſowing before theſe flowers blow, yet, if after the firſt ſowing there is every year a freſh parcel ſown, when the ſeven years are expired, there will be conſtantly a ſucceſſion of roots to flower every year, which will reward the expectation, and keep up the ſpirit of raiſing; but it is the length of time at firſt, which deters moſt people from this work.

The manner of propagating theſe flowers from ſeeds is as follows: you ſhould be careful in the choice of the ſeeds, without which there can be little ſucceſs expected. The beſt ſeed is that which is ſaved from breeders which have all the good properties before related, for the ſeeds of ſtriped flowers ſeldom produce any thing that is valuable.

The beſt method to obtain good ſeeds is to make choice of a parcel of ſuch breeding tulip roots as you would ſave ſeeds from, and plant them in a ſeparate bed from the other breeders, in a part of the garden where they may be fully expoſed to the ſun, obſerving to plant them at leaſt eight or nine inches deep; for if they are planted too ſhallow, their ſtems are apt to decay before their ſeed is perfected.

Theſe flowers ſhould always be expoſed to the weather, for if they are ſhaded with mats, or any other covering, it will prevent their perfecting the ſeed. About the middle of July, a little ſooner, or later, as the ſummer is hotter or colder, the ſeeds will be fit to gather, which may be known by the dryneſs of their ſtalks, and the opening of the ſeed veſſels; at which time it may be cut off, and preſerved in the pods till the ſeaſon for ſowing it, being careful to put it up in a dry place, otherwiſe it will be ſubject to mould, which will render it good for little.

Having ſaved a parcel of good ſeed, about the beginning of September is the beſt ſeaſon for ſowing it, when there ſhould be provided a parcel of ſhallow ſeed pans or boxes, ſix or eight inches deep, which ſhould have holes in their bottoms to let the moiſture paſs off; theſe muſt be filled with freſh light earth, laying the ſurface very even, upon which the ſeeds ſhould be ſown as regularly as poſſible, that they may not lie upon each other; then there ſhould be ſome of the ſame light earth ſifted over them; about half an inch thick. Theſe boxes or pans ſhould be placed where they may have the morning ſun till eleven of the clock, in which ſituation they may remain until the middle of October, at which time they ſhould be removed into a more open ſituation, where they may enjoy the benefit of the ſun all the day, and be ſheltered from the north winds, where they ſhould remain until winter, when they muſt be placed on a ſouth border, to ſcreen them from froſt; but in the ſpring, when the plants are up, they ſhould be again removed to their firſt ſituation; and if the ſeaſon ſhould be dry, they muſt be refreſhed with water, while the plants remain green, but as ſoon as their tops begin to decay, there muſt be no more given them, leſt it rot their tender bulbs; therefore the boxes ſhould be placed in a ſhady ſituation during the ſummer ſeaſon, but not under the drip of trees.

Theſe plants, at their firſt appearance, have very narrow graſſy leaves, very like thoſe of onions, and come up with bending heads, in the ſame manner as they do; ſo that perſons who are unacquainted with them, may pull them up inſtead of graſs, whilſt they are very young, before their leaves are a little more expanded; which is not performed the firſt year, for they ſeldom appear before the middle of March; and they commonly decay about the latter end of May, or the beginning of June, according as the ſeaſon is hotter or colder.

The weeds and moſs ſhould alſo be cleared off from the ſurface of the earth in the boxes, and a little freſh earth ſifted over them ſoon after their leaves decay, which will be of great ſervice to the roots. Theſe boxes ſhould be conſtantly kept clear from weeds, which, if permitted to grow therein, when they are pulled up, their roots will be apt to draw the bulbs out of the ground. At Michaelmas they ſhould be freſh earthed again, and as the winter comes on, they muſt be again removed into the ſun as before, and treated in the ſame manner, until the leaves decay, when the bulbs ſhould be carefully taken up, and put into a cool ſhady room till the end of Auguſt, when they ſhould be planted in beds of freſh ſandy earth, which ſhould have tiles laid under them, to prevent the roots from ſhooting downward, which they often do when there is nothing to ſtop them, and thereby they are deſtroyed. The earth of theſe beds ſhould be about five inches thick upon the tiles, which will be ſufficient for nouriſhing theſe roots while they are young.

The diſtance which theſe young bulbs ſhould be allowed, need not be more than two inches, nor ſhould they be planted above two inches deep; but towards the end of October it will be proper to cover the bed over with a little tanner's bark, about two inches deep, which will preſerve the roots from the froſt, and prevent moſs or weeds from growing over them; but, if the winter ſhould be very ſevere, it will be proper to cover the bed either with mats or peaſe-haulm, to prevent the froſt from entering the ground, becauſe theſe roots are much tenderer while young, than they are after they have acquired ſtrength.

In the ſpring the ſurface of the ground ſhould be gently ſtoned to make it clean, before the plants come up; and if the ſpring ſhould prove dry, they muſt be frequently refreſhed with water, during the time of their growth; but this muſt not be given to them in great quantities, leſt it rot their tender bulbs; and when the leaves are decayed, the roots ſhould be taken up, and treated in the ſame way as before.

When the bulbs are large enough to blow, they ſhould be planted in freſh beds at the diſtance, and in the ſame manner as old roots, where, when they flower, ſuch of them as are worthy to be preſerved ſhould be marked with ſticks; and at the ſeaſon for taking up the bulbs, they muſt be ſeparated from the others, in order to be planted as breeders in different beds; but you ſhould by no means throw out the reſt until they have flowered two or three years, becauſe it is impoſſible to judge exactly of their value in leſs time; for many, which at firſt flowering appear beautiful, will afterwards degenerate ſo as to be of little value; and others, which did not pleaſe at firſt, will many times improve, ſo that they ſhould be preſerved until their worth can be well judged of.

Having thus given an account of the method of raiſing theſe flowers from ſeeds, I ſhall now proceed to the management of the roots which are termed breeders, ſo as to have ſome of them every year break out into fine ſtripes.

There are ſome who pretend to have a ſecret how to make any ſort of breeders break into ſtripes whenever they pleaſe; but this, I dare ſay, is without foundation; for from many experiments which I and others have made of this kind, I could never find any certainty in this. All that can be done by art is, to ſhift the roots every year into freſh earth of different mixtures, and to different ſituations, by which method I have had very good ſucceſs.

The earth of theſe beds ſhould be every year different; for although it is generally agreed that lean, hungry, freſh earth doth haſten their breaking, and cauſe their ſtripes to be the finer and more beautiful, yet, if they are every year planted in the like ſoil, it will not have ſo much effect upon them, as if they were one year planted in one ſort of earth, and the next year in a very different one; as I have ſeveral times experienced; and if ſome fine ſtriped tulips are planted in the ſame beds with the breeders, intermixing them together, it will alſo cauſe the breeders to break the ſooner.

The beſt compoſt for theſe roots is a third part of freſh earth from a good paſture, which ſhould have the ſward rotted with it, a third part of ſea-ſand, and the other part ſifted lime rubbiſh; theſe ſhould be all mixed together ſix or eight months at leaſt before it is uſed, and ſhould be frequently turned to mix the parts well together. With this mixture the beds ſhould be made about two feet deep, after the following manner: after the old earth is taken from out of the bed to the depth intended, then ſome of the freſh earth ſhould be put in about eighteen inches thick; this ſhould be levelled exactly, and then lines drawn each way of the bed chequerwiſe, at ſix inches diſtance; upon the center of each croſs, ſhould be placed the tulip roots, in an upright poſition; and after having finiſhed the bed in this manner, the earth muſt be filled in, ſo as to raiſe the bed ſix or eight inches higher, obſerving, in doing this, not to diſplace any of the roots, and alſo to lay the top of the beds a little rounding, to throw off the wet.

There are many perſons who are ſo careleſs in planting their tulip roots, as only to dig and level the beds well, and then with a blunt dibble to make holes, into which they put the roots, and then fill up the holes with a rake; but this is by no means a good method; for the dibble, in making the holes, preſſes the earth cloſely on each ſide, and at the bottom, whereby the moiſture is often detained ſo long about the roots as to rot them, eſpecially if the ſoil is inclinable to bind; beſides, the earth being hard at the bottom of the bulbs, they cannot ſo eaſily emit their fibres, which muſt certainly prejudice the roots.

Theſe beds ſhould be ſunk, more or leſs, below the ſurface, according to the moiſture or dryneſs of the ground; for the roots ſhould be ſo elevated as never to have the water ſtand near the reach of their fibres in winter, for moiſture is very apt to rot them; ſo that where the ſoil is very wet, it will be proper to lay ſome lime rubbiſh under the earth, in order to drain off the wet, and the beds ſhould be entirely raiſed above the level of the ground; but to prevent their falling down into the walks, after froſt, or hard rains, it will be proper to raiſe the paths between them, either with ſea-coal aſhes or rubbiſh, eight or ten inches, which will ſupport the earth of the beds; and theſe paths may ſlope at each end from the middle, which will make paſſage for the water to run off as it falls. But where the ſoil is dry, the beds may be ſunk eighteen or twenty inches below the ſurface, for in ſuch places the beds need not be more than four or ſix inches above the ſurface, which will be allowance enough for their ſettling.

During the winter ſeaſon there will be no farther care required. The roots being planted thus deep, will be in no danger of ſuffering by ordinary froſts; but if the winter ſhould prove very ſevere, ſome rotten tan or peaſe-haulm may be laid over the beds to keep out the froſt during its continuance, but this muſt be removed when the froſt is over; and in the ſpring, when their leaves begin to appear above ground, the earth upon the ſurface of the beds ſhould be ſtirred to clear it from weeds, moſs, &c. and when the flower-buds begin to come up, they ſhould be guarded from froſt, otherwiſe they are very ſubject to blight and decay ſoon after they appear, if the froſt pinches their tops; but they need only be covered in ſuch nights when there is a proſpect of froſt, for at all other times they ſhould have as much open air as poſſible, without which they will draw up weak, and produce very ſmall flowers.

When theſe breeders are in flower, you ſhould carefully examine them to ſee if any of them have broken into beautiful ſtripes, which, if you obſerve, there ſhould be a ſtick put into the ground by every ſuch root to mark them, that they may be ſeparated from the breeders, to plant amongſt the ſtriped flowers the following year; but you ſhould carefully obſerve, whether they have thrown off their former colour entirely, as alſo when they decay, to ſee if they continue beautiful to the laſt, and not appear ſmeared over with the original colour; in both which caſes they are very ſubject to go back to their old colour the next year: but if their ſtripes are diſtinct and clear to the bottom, and continue ſo to the laſt, which is what the floriſts call dyeing well, there is no great danger of their returning back again, as hath been by ſome confidently reported; for if one of theſe flowers is quite broken, as it is termed, it will never loſe its ſtripes, though ſometimes they will blow much fairer than at other, and the flowers of the off-ſets will be often more beautiful than thoſe of the old roots.

This alteration in the colour of theſe flowers may be ſeen long before they are blown, for the green leaves will appear of a fainter colour, and ſeem to be ſtriped with white, or of a browniſh colour, which is a plain proof, that the juices of the whole plant are altered, or, at leaſt, the veſſels through which the juice is ſtrained; ſo that hereby particles of a different figure are capable of paſſing through them, which, when entered into the petals of the flower, reflect the rays of light in a different manner, which occaſions the variety we ſee in the colours of flowers. This breaking of the colours in flowers proceeds from weakneſs, or at leaſt is the cauſe of weakneſs in plants; for it is obſervable, that after tulips are broken into fine ſtripes, they never grow ſo tall as before, nor are the ſtems, leaves, or flowers ſo large; and it is the ſame in all variegated plants and flowers whatever, which are alſo much tenderer than they were before they were ſtriped; ſo that many ſorts of exotic plants, which by accident have become variegated in their leaves, are often rendered ſo tender, as not to be preſerved without much more care, though indeed ſtriping of tulips doth never occaſion ſo great weakneſs in them as to render them very tender. The greateſt effect it hath on them, is in leſſening their growth; the more beautifully their ſtripes appear, the ſhorter will be their ſtems, and the weaker their flowers.

There is nothing more to be obſerved in the culture of ſtriped flowers than what has been directed for breeders, excepting that theſe ſhould be arched over with tall hoops and rails, that they may be ſhaded from the ſun in the day-time, and protected from ſtrong winds, hard rains, and froſty mornings, otherwiſe the flowers will continue but a ſhort time in beauty; but where theſe inſtructions are duly followed, they may be preſerved in flower a full month, which is as long as moſt flowers continue.

There are ſome perſons who are ſo extremely fond of theſe flowers, as to be at a great expence in erecting large frames of iron work to cover their beds of tulips, in ſuch a manner, that they may walk between two beds under the frames, over which are ſpread tarpawlings, ſo as to keep off ſun, rain, and froſt, whereby they can view the flowers without being at the trouble of taking off or turning up the tarpawlings, or being incommoded by the ſun or rain, which cannot be avoided where the covering is low; beſides, by thus raiſing the covers, the flowers have a greater ſhare of air, ſo that they are not drawn ſo weak as they are when the covering is low and cloſe to them; but theſe frames being expenſive, can only be made by perſons of fortune; however, there may be ſome of wood contrived at a ſmaller expence, which, being arched over with hoops, may anſwer the purpoſe as well as the iron frames, though they are not ſo ſightly or laſting.

When the flowers are faded, the heads of all the fine ſorts ſhould be broken off, to prevent their ſeeding; for if this is not obſerved, they will not flower near ſo well the following year, nor will their ſtripes continue ſo perfect: this will alſo cauſe their ſtems to decay ſooner than otherwiſe they would do, ſo that their roots may be taken up in June; for they ſhould not remain in the ground after their leaves are decayed. In taking the roots out of the ground, you muſt be very careful not to bruiſe or cut them, which will endanger their rotting, and, if poſſible, it ſhould be done a day or two after rain. When theſe roots are taken out of the ground, they muſt be cleared from their old covers, and all ſorts of filth, and ſpread upon mats in a ſhady place to dry; after which they ſhould be put up in a dry place, where vermin cannot get to them, obſerving to keep every ſort ſeparated; but they ſhould not be kept too cloſe from the air, nor ſuffered to lie in heaps together, leſt they ſhould grow mouldy; for if any of the roots once take the mould, they commonly rot when they are planted again.

The offsets of theſe roots, which are not large enough to produce flowers the ſucceeding year, ſhould be alſo put by themſelves, keeping each ſort diſtinct: theſe ſhould be planted about a month earlier in autumn than the blowing roots, in particular beds by themſelves, in the flower nurſery, where they may not be expoſed to public view; but the earth of the beds ſhould be prepared for them in the ſame manner as for larger roots; theſe ſhould not be planted above five inches deep, becauſe they are not ſtrong enough to puſh through ſo great covering of the earth as the old roots; they may alſo be placed much nearer together than thoſe which are to flower, and in one year moſt of them will become ſtrong enough to flower, when they may be removed into the flower-garden, and placed in the beds amongſt thoſe of the ſame kinds. *Miller's Gard. Dict.*

Tulip-Tree, a very beautiful American tree, which produces flowers, ſuppoſed like thoſe of the tulip.

This tree, which is a native of North America, and where it grows to be a tree of the firſt magnitude, is generally known through all the Engliſh ſettlements by the title of poplar. Of late years there has been great numbers of theſe trees raiſed from ſeeds in the Engliſh gardens, ſo that now they are become common in the nurſeries about London, and there are many of the trees in ſeveral parts of England, which do annually produce flowers. The firſt tree of this kind which flowered here, was in the gardens of the late earl of Peterborough at Parſons-green near Fulham, which was planted in a wilderneſs among other trees. Before this was planted in the open air, the few plants which were then in the Engliſh gardens, were kept in pots or tubs, and houſed in winter, ſuppoſing they were too tender to live in the open air; but this tree ſoon after it was planted in the full ground, convinced the gardeners of their miſtake, by the great progreſs it made, while thoſe which were kept in pots and tubs, increaſed ſlowly in their growth; ſo that afterwards there were many others planted in the full ground, which are now arrived to a large ſize, eſpecially thoſe which were planted in a moiſt ſoil. One of the handſomeſt trees of this kind near London, is in the garden of Waltham-Abbey; and at Wilton, the ſeat of the earl of Pembroke, there are ſome trees of great bulk; but the old tree at Parſons-green is quite deſtroyed by the other trees which were ſuffered to overhang it, and rob it of its nouriſhment, from a fear of taking down the neighbouring trees, and admitting the cold air to the tulip-tree, it ſhould injure it.

The young ſhoots of this tree are covered with a ſmooth purpliſh bark, garniſhed with large leaves, whoſe footſtalks are long; they are ranged alternate; the leaves are of a ſingular form, being divided into three lobes; the middle lobe is blunt and hollowed at the point, appearing as if it had been cut with ſciſſars. The two ſide lobes are rounded, and end in blunt points. The upper ſurface is ſmooth, and of a lucid green; the under is of a pale green. The flowers are produced at the end of the branches; they are compoſed of ſix petals, three without and three within, which form a ſort of bell-ſhaped flower, from whence the inhabitants of North America gave it the name of Tulip. Theſe petals are marked with green, yellow and red ſpots, ſo make a fine appearance when the trees are well charged with flowers. The time of this tree's flowering is in July, and when the flowers drop, the germen ſwells and forms a kind of cone; but theſe do not ripen in England.

This tree is propagated by ſeeds, which are now annually imported in great plenty from America. Theſe ſhould be ſown as ſoon as they arrive, in pots or tubs, filled with light earth, from the kitchen garden, or in a bed in the full ground. Thoſe which are ſown in the firſt way, may be placed on a very gentle hot bed, which will forward their growth; ſo that if they come up the ſame ſeaſon, the plants will acquire more ſtrength before winter. When the plants appear, they muſt be ſhaded in the heat of the day from the ſun, but freſh air muſt be admitted daily to prevent their drawing up weak; and as the ſeaſon advances, they muſt be gradually hardened to bear the open air. While the plants are young they do not care for much ſun, ſo they ſhould be either ſhaded, or placed where the morning ſun only ſhines upon them; they muſt alſo be conſtantly ſupplied with water, but not have it in too great plenty. As the young plants commonly continue growing late in the ſummer, ſo when there happens early froſts in autumn, it often kills their tender tops, which occaſions their dying down a conſiderable length in winter; therefore they ſhould be carefully guarded againſt theſe firſt froſts, which are always more hurtful to them than harder froſts afterwards, when their roots are better hardened; however, the firſt winter after the plants come up, it will be the better way to ſhelter them in a common hot-bed frame, or to arch them over with hoops, and cover them with mats, expoſing them always to the open air in mild weather.

The following ſpring, juſt before the plants begin to ſhoot, they ſhould be tranſplanted into nurſery beds, in a ſheltered ſituation, where they are not too much expoſed to the ſun. The ſoil of theſe beds ſhould be a ſoft gentle loam, not too ſtiff, nor over light; this ſhould be well wrought, and the clods well broken and made fine. There muſt be great care taken not to break the roots of the plants in taking them up, for they are very tender; then they ſhould be planted again as ſoon as poſſible, for if their roots are long out of the ground, they will be much injured thereby. Theſe may be planted in rows at about a foot diſtance, and at ſix inches diſtance in the rows; for as they ſhould not remain long in theſe nurſery-beds, ſo this will be room enough for them to grow; and by having them ſo cloſe they may be ſhaded in the ſummer, or ſheltered in the winter, with more eaſe than when they are farther apart.

When the plants are thus planted, if the ſurface of the beds is covered with rotten tanners bark, or with moſs, it will prevent the earth from drying too faſt; ſo that the plants will not require to be ſo often watered, as they muſt be where they are expoſed to the ſun and air; after this, the farther care will be to keep them clean from weeds, and if the latter part of the ſummer ſhould prove moiſt, it will occaſion the plants growing late in autumn, ſo their tops will be tender and liable to be killed by the firſt froſts. In this caſe they ſhould be covered with mats to protect them.

If the plants make great progreſs the firſt ſummer, they may be tranſplanted again the following ſpring; part of them may be planted in the places where they are to remain, and the other ſhould be planted in a nurſery where they may grow two years, to acquire ſtrength before they are planted out for good; though the younger they are planted in the places where they are to ſtand, the larger they will grow, for the roots run out into length; and when they are cut it greatly retards their growth, ſo that theſe trees ſhould never be removed large; for they rarely ſucceed, if tranſplanted when they are grown to a large ſize. Some indeed that have been removed pretty large, have ſurvived their removal; but young plants of two years old, which were planted near them, were much larger in fifteen years than the old ones.

When the ſeeds are ſown upon a bed in the full ground, the bed ſhould be arched over with hoops, and ſhaded in the heat of the day from the ſun, and frequently refreſhed with water; as ſhould alſo the plants when they appear, for when they are expoſed much to the ſun while young, they make but ſmall progreſs. The care of theſe in ſummer muſt be to keep them clean from weeds, ſupplying them duly with water, and ſhading them from the ſun in hot weather; but as theſe ſeeds will not come up ſo ſoon as thoſe which were placed on a hot-bed, they generally continue growing later in autumn, therefore will require ſhelter from the early froſts in autumn; for as the ſhoots of theſe will be much ſofter than thoſe of plants which had longer time to grow, ſo if the autumnal froſts ſhould prove ſevere, they will be in danger of being killed down to the ſurface of the ground, by which the whole ſummer's growth will be loſt; and ſometimes the plants are entirely killed the firſt winter if they are not protected.

As theſe plants will not have advanced ſo much in their growth as the other, they ſhould remain in the ſeed-bed to have another year's growth before they are removed; therefore all that will be neceſſary to obſerve the ſecond year, is to keep them clean from weeds; and now they will not be in ſo much danger of ſuffering from the warmth of the ſun as before, therefore will not require ſuch conſtant care to ſhade them, nor ſhould the watering of them be continued longer than the ſpring; for if the autumn ſhould prove dry, it will prevent the plants from ſhooting late, and harden thoſe ſhoots which were made early in the year, whereby the plants will be in leſs danger from the early froſts.

After the plants have grown two years in the ſeed-bed, they will be ſtrong enough to remove; therefore, in the ſpring, juſt at the time when their buds begin to ſwell, they ſhould be carefully taken up, and tranſplanted into nurſery-beds, and treated in the ſame way as has been before directed for the plants which were raiſed in pots.

There are ſome people who propagate this tree by layers, but the layers are commonly two or three years before they take root; and the plants ſo raiſed, ſeldom make ſuch ſtraight trees as thoſe raiſed from ſeeds, though indeed they will produce flowers ſooner, as is always the caſe with ſtinted plants.

This tree ſhould be planted on a light loamy ſoil, not too dry, on which it will thrive much better than upon a ſtrong clay, or a dry gravelly ground; for in America they are chiefly found upon a moiſt light ſoil, where they will grow to a prodigious ſize, though it will not be proper to plant theſe trees in a ſoil which is too moiſt, in England, becauſe it might endanger the rotting of the fibres of the roots, by the moiſture continuing too long about them, eſpecially if the bottom be a clay, or a ſtrong loam, which will detain the wet. *Miller's Gar. Dict.*

TUMBLER, a name given to a particular ſpecies of pigeon, called by Moore the columba revolvens.

It has its name from its peculiar property of tumbling, when it is in the air, which they are very fond of doing; and effect exactly in the ſame manner as our poſture-maſters do it, by throwing themſelves over backwards. It is a very ſmall pigeon, and is always ſhort-bodied, full-breaſted, thin-necked, narrow-beaked, and has a ſmall ſhort head; the iris of the eye, in this ſpecies, is uſually of a bright pearl-colour.

The Engliſh tumbler is uſually of one plain colour; black, blue, or white: the Dutch is much of the ſame make, but has different colours, and is feathered on the legs ſometimes: it has alſo a larger head, and thin ſkin round the eye. Some of the fineſt pigeons of this ſort are bred from a mixture of the Dutch and Engliſh kinds.

Theſe pigeons are remarkable for the height they fly to; they never ramble far from home, but will riſe almoſt perpendicularly, till they appear no larger than a ſparrow, or become quite out of ſight: they will often keep at this height five or ſix hours, and then come gradually down again: they will never tumble when they are at any great height, but only as they aſcend or come down again. There are particular times alſo, at which thoſe birds will take much higher flights than at others; but they ought to be kept by themſelves, and practiſed to it by the company of one of their own ſpecies; for if they mix, while young, with other pigeons, they will learn to fly as they do: a flight of a dozen of theſe birds ſent out together will keep ſo cloſe as to be all in a compaſs that might be covered with a handkerchief; but they ſhould never be turned out in foggy weather, or in high winds; in the firſt caſe they loſe ſight of their home, and perhaps never find it again, and, in the others, they are blown away; and, if they return, it is not till another day: in the mean time, lying out, they are in danger of cats, and other accidents.

Laſtly, the hen ſhould never be turned out with egg, for ſhe is then ſick, and not fit for flying; and, beſides, often drops her egg, and the breed is loſt by it. *Moore's Columbarium.*

TUMBREL, a dung-cart.

TUMOUR, a preternatural ſwelling or eminence riſing in any part of a horſe, and ariſes either from external injuries, or internal cauſes.

Swellings cauſed by external accidents, as blows and bruiſes, ſhould at firſt be treated with reſtringents; thus, let the part be bathed frequently with hot vinegar or verjuice, and, where it will admit of bandage, let a flannel wetted with the ſame be rowled on: if by this method the ſwelling does not ſubſide, apply, eſpecially on the legs, a poultice with red wine lees, ſtrong beer grounds, and oatmeal, or with vinegar, oil, and oatmeal; either of theſe may be continued twice a day, after bathing, till the ſwelling abates; when, in order to diſperſe it intirely, the vinegar ſhould be changed for camphorated ſpirit of wine, to four ounces of which, may be added one of ſpirit of ſal armoniac; or it may be bathed with a mixture of two ounces of crude ſal armoniac boiled in a quart of chamber-lye, twice a day, and rags dipped in the ſame may be rowled on.

Fomentation made by boiling wormwood, bay-leaves, and roſemary, and adding a proper quantity of ſpirits, are often of great ſervice to thin the juices, and fit them for tranſpiration; eſpecially if the injury has affected the joints.

But in bruiſes, where the extravaſated blood will not by theſe means be diſperſed, the ſhorteſt way is to open the ſkin, and let out the grumes.

Critical tumours, or ſwellings which terminate fevers, ſhould by no means be diſperſed; except when they fall on the paſtern or coffin joint, ſo as to endanger them: in this caſe the diſcutient fomentation ſhould be applied three or four times a day, and a cloth or flannel frequently wrung out of the ſame ſhould be bound on, in order to keep the joint continually breathing.

But if the ſwelling fixes under the jaws, behind the ears, on the poll, withers, or in the groins and ſheath, &c. it ſhould be encouraged and forwarded by ripening poultices, wherever they can be applied; oatmeal boiled ſoft in milk, to which a proper quantity of oil and lard is added, may anſwer this purpoſe; or the poultice recommended in treating of the ſtrangles: theſe muſt be applied twice a day, till the matter is perceived to fluctuate under the fingers, when it ought to be let out; for which purpoſe, let the tumour be opened with a knife or ſtrong launcet, the whole length of the ſwelling, if it can be done ſafely, for nothing contributes ſo much to a kind healing, as the matter's having a free diſcharge, and the openings being big enough to dreſs to the bottom.

Pledgits of tow ſpread with black or yellow baſilicon (or the wound ointment) and dipped in the ſame, melted down with a fifth part of oil of turpentine, ſhould be applied to the bottom of the ſore, and filled up lightly with the ſame, without cramming; it may be thus dreſſed once or twice a day, if the diſcharge is great, till a proper digeſtion is procured, when it ſhould be changed for pledgits ſpread with the red precipitate ointment, applied in the ſame manner.

Should the ſore not digeſt kindly, but run a thin water and look pale, foment as often as you dreſs, with the above fomentation; and apply over your dreſſing the ſtrong beer poultice, and continue this method till the matter grows thick, and the ſore florid.

The following ointments will generally anſwer your expectations in all common caſes, and may be prepared without, as well as with, the verdigreaſe.

> Take Venice turpentine and bees wax, of each a pound; oil of olives one pound and a half; yellow roſin twelve ounces: when melted together, two or three ounces of verdigreaſe finely powdered may be ſtirred in, and kept ſo till cold, to prevent its ſubſiding.
>
> Take of yellow baſilicon, or the above ointment without verdigreaſe, four ounces; and red precipitate finely powdered half an ounce: mix them together cold, with a knife or ſpatula.

This laſt applied early, will prevent a fungus, or proud fleſh, from ſhooting out; for if you dreſs too long with the above digeſtive, the fungus will riſe faſt, and give ſome trouble to ſuppreſs it; when it will be neceſſary to waſh the ſore as often as you dreſs, with a ſolution of blue vitriol in water, or to ſprinkle it with burnt allum and precipitate. If theſe ſhould not be powerful enough, touch with a cauſtic, or waſh with the ſublimate water, made by diſſolving half an ounce of corroſive ſublimate in a pint of lime-water.

But this trouble may in a great meaſure be prevented, if the ſore is on a part where bandage can be applied with compreſſes of linen cloth: for even when theſe excreſcences regerminate, as it were, under the knife, and ſpring up in ſpite of the cauſtics above-mentioned, they are to be ſubdued by moderate compreſſion made on the ſprouting fibres, by theſe means.

Authors on farriery have in general given very proper receipts to anſwer every intention of this kind by medicines; but as they have not, I think, laid down ſufficient rules for their application in thoſe caſes where they are moſt wanted, I hope the following general directions will not be unacceptable; as the difficulty in healing ſome kinds of ſores ariſes frequently from the unſkilful manner of dreſſing them.

It may be neceſſary then to obſerve here once for all, that the cures of moſt ſores are effected by the ſimpleſt methods, and that it is often of much more conſequence to know how to dreſs a ſore, than what to dreſs it with; and in this conſiſts indeed the chief art of this branch of ſurgery; for the moſt eminent in that profeſſion have long ſince diſcovered, that variety of ointments and ſalves are unneceſſary in the cure of moſt wounds and ſores, and they have accordingly diſcarded the greateſt part, formerly in repute for that purpoſe; repeated obſervations having taught them, that after the digeſtion, nature is generally diſpoſed to heal up the wound faſt enough herſelf, and that the ſurgeon's chief care is to prevent a luxuriancy, commonly called proud fleſh; which all ointments wherein lard or oil enters, are but too prone to encourage, as they keep the fibres too lax and ſupple; and which dry lint alone, early applied, as eaſily prevents, by its abſorbing quality, and light compreſſion on the ſprouting fibres.

Thus if a hollow wound or ſore is crammed with tents, or the dreſſings are applied too hard, the tender ſhoots of fleſh from the bottom are prevented puſhing up; and the ſides of the ſore in time from this diſtenſion may grow horney, and turn fiſtulous; nor has the matter by this method a free diſcharge.

On the other hand, if ſores of any depth are dreſſed ſuperficially, the external parts being more diſpoſed to heal and come together than the internal, they will fall into contact, or heal too ſoon; and the ſore not filling up properly from the bottom, will break out afreſh.

Hence we may juſtly conceive how little ſtreſs is to be laid on famous ointments, or family ſalves, unſkilfully applied; for unleſs this due medium is obſerved, or obtained in the dreſſing, no hollow ſore can heal up properly.

I thought it neceſſary to be a little explicit on this head, as gentlemen ſo frequently complain of being diſappointed in their cures, notwithſtanding the excellency of their ointment, or balſam; and to convince them that leſs confidence ſhould be put in theſe favourite medicines than is generally imagined; for where the habit is ſound, and the blood and juices in good condition, there are few ſimple dreſſings that will not ſucceed; and when otherwiſe, the moſt pompous will not avail, till theſe are rectified by proper internal medicines.

As ſoon then as a good digeſtion is procured (which is known by the thickneſs and whiteneſs of the matter diſcharged, and the florid red colour at the bottom of the ſore) let the dreſſings be changed for the precipitate medicine; or the ſore may be filled up with dry lint alone, or dipped in lime-water with a little honey and tincture of myrrh, or brandy: about a fifth part of the latter to one of the former; a pledgit of lint dipped in this mixture ſhould alſo be applied to the bottom of the ſore, which ſhould be filled up with others to the ſurface or edges, but not crammed in too hard, as before obſerved, nor yet applied too looſely.

By this method, the ſore would incarn, or heal up properly, and ſoft ſpongy fleſh would be prevented, or ſuppreſſed in time; whereas when ointments or ſalves are too long continued, a fungus or proud fleſh, is thereby ſo encouraged in its growth, that it requires ſome time to deſtroy and eat it down again: a proper compreſs of cloth, and a linnen rowler is abſolutely neceſſary both for this purpoſe, and to ſecure on the dreſſings, wherever they can conveniently be applied. *Bartlet's Farriery, pag.* 236.

TUPP, a ram.

TUPPING-TIME, ramming time.

TURF, a blackiſh, ſulphureous earth, uſed in ſeveral parts of England, Holland, and Flanders, as fewel.

In Flanders, their turf is dry or pared from off the ſurface of the earth, and cut in form of bricks. The ſedge, or ſpecies of graſs growing very thick on the turf earth, contributes greatly, when dry, to the maintenance of the fire.

The Dutch take their turf from the bottom of the dykes or canals which run acroſs moſt of their lands; by which means they not only ſupply the defect of wood, which is very great in moſt of the United Provinces, but alſo keep their dykes clear and navigable: this turf earth is very black. As they take it up from the bottom of the dykes, they ſpread it about the edges, of ſuch a thickneſs, as that it may be reduced to three inches when moderately dried. In this condition they cut it into pieces of turfs ſeven or eight inches long, and three broad, and, to complete the drying, lay them up in heaps, and at laſt in ſtacks.

In the north of England, Scotland, &c. turf is dug out of ſoft, moiſt, rotten earth, called peatmoſs. They dig horizontally from the ſurface, to the depth of about four feet, with a ſpade, which at once faſhions and takes them out in parallelopipeds nine or ten inches long, and three ſquare; which are ſpread on the ground to drain as faſt as dug; and then ſet up an end three or four againſt each other, for the wind to blow through them; and at laſt they are ſtacked or houſed. The pits or dykes in a few years fill up again, and afford a freſh crop.

TURF-ASHES. *See the article* Ashes.

TURF-BOGS. *See* Bog, Moor, and Moss.

TURFING-SPADE, an inſtrument uſed to undercut the turf, after it is marked out with the plough.

TURKEY, the name of a well known fowl, reared in many parts of England.

“ Moſt of our houſewives, ſays a Swediſh author on huſbandry, have long deſpaired of ſucceſs in rearing turkeys, and complained that the profit rarely indemnifies them for their trouble and loſs of time: whereas, continues he, little more is to be done than to plunge the chick into a veſſel of cold water, the very hour, or if that cannot be, the day it is hatched, forcing it to ſwallow one whole pepper-corn, and then reſtoring it to its mother. From that time it will become hardy, and fear the cold no more than a hen's chick. After which it muſt be remembered that theſe uſeful creatures are ſubject to one particular malady whilſt they are young, which carries them off in a few days. When they begin to droop, examine carefully the feathers on their rump, and you will find two or three, whoſe quill part is filled with blood. Upon drawing theſe the chick recovers, and after that requires no other care than what is commonly beſtowed on poultry that range the court-yard.

“ Theſe articles are too true to be denied; and in proof of the ſucceſs, three pariſhes in Sweden have, for many years, gained ſeveral hundred pounds by rearing and ſelling turkeys.” *Rural Oeconomy, pag.* 739.

TURNEP, or *Turnip*, an eſculent plant, of which there are three ſpecies enumerated by Miller. The firſt is the turnip which is commonly cultivated in the fields, of which there are the following varieties, viz. the round red or purple topped turnip, the green topped turnip, the yellow turnip, the black rooted turnip, and the early Dutch turnip. The laſt ſort is commonly ſown early in the ſpring, to ſupply the markets in May and June, but is never cultivated for a general crop. The red rooted turnip was formerly more cultivated in England than at preſent; for ſince the large green topped turnip has been introduced, all the ſkilful farmers prefer it to the other ſorts; the roots of the green will grow to a large ſize, and continue good much longer than the other ſorts. The next to this is the red or purple topped turnip, which will alſo grow large, and is extremely good for ſome time; but the roots of this will become ſtringy much ſooner than thoſe of the green topped. The long rooted turnip, the yellow turnip, and the blackiſh rooted turnip, are now rarely cultivated in England, neither of them being ſo good for the table or for feed, as the red and green topped turnip, though there are ſome few perſons who ſow them for the ſake of variety.

The French turnip is not much cultivated in England, but in France and Holland they are in great eſteem, eſpecially for ſoups; their roots being ſmall, are boiled whole in the ſoup, and ſo ſerved up to the table; theſe muſt be uſed while they are young, otherwiſe they will become rank and ſtringy.

Theſe are ſuppoſed to be only varieties, which have accidentally been obtained from ſeeds, therefore I have not enumerated them as diſtinct ſpecies; but yet I am certain they are conſtant, where care is taken in the ſaving of their ſeeds not to ſuffer any mixture to ſtand for ſeeds: I have ſown of three or four ſorts ſeveral years, and have always found them retain their differences; however, it is not eaſy to determine if ſome of theſe were not by culture firſt obtained from ſeeds of the common white turnip. The yellow turnip ſeems moſt unlikely to have been an accidental variety, for I have never known this alter, and the roots are yellow within, whereas all the other have white fleſh, notwithſtanding their outſides are of very different colours.

The long rooted turnip is, I think, a diſtinct ſpecies, the form of the root, and its manner of growth being totally different from the other ſorts. I have ſeen theſe roots as long as thoſe of the parſnip, and nearly of the ſame ſhape; theſe run deep into the ground, ſo are unfit for feeding of cattle; and unleſs they are uſed very young, become ſtrong, ſo not proper for the table, which has occaſioned their being rejected of late years.

The green topped turnip grows above ground more than any of the other, which renders it preferable for feeding of cattle; and being the ſofteſt and ſweeteſt root when grown large of any of the kinds, is moſt eſteemed for the table; but in very ſevere winters they are in greater danger of ſuffering by froſt, than thoſe whoſe roots lie more in the ground, eſpecially if they are not covered by ſnow; for when they are frequently hard frozen and thawed, it cauſes them to rot ſooner than thoſe whoſe fleſh is leſs tender and ſweet. I have ſeen the roots of this ſort, which were more than a foot diameter, boiled, and were as ſweet and tender, as any of the ſmalleſt roots.

Turnips delight in a light, ſandy, loamy ſoil, which muſt not be rich; for in a rich ſoil they grow rank and are ſticky, but if it be moiſt they will thrive the better in ſummer, eſpecially in freſh land, where they are always ſweeter than upon an old worn-out or a rich ſoil.

The common ſeaſon for ſowing of turnips, is any time from the beginning of June to the middle of Auguſt, or a little later; though it is not adviſeable to ſow them much after, becauſe, if the autumn ſhould not prove very mild, they will not have time to apple before winter, nor will the roots of thoſe which are ſown after the middle of July, grow very large, unleſs the froſt keeps off long in autumn. But, notwithſtanding this is the general ſeaſon in which the greateſt part of turnips are ſown in the country, yet, about London, they are ſown ſucceſſively from March to Auguſt, by thoſe who propagate them to ſupply the markets with their roots; but there is a great hazard of loſing thoſe which are ſown early in the year, if the ſeaſon ſhould prove dry, by the fly, which will devour whole fields of this plant while young; ſo that where a ſmall quantity for the ſupply of a family is wanted, it will be abſolutely neceſſary to water them in dry weather; and where a perſon ſows thoſe ſeeds in April and May, it ſhould always be upon a moiſt ſoil, otherwiſe they ſeldom come to good, the heat of the weather at that ſeaſon being too great for them upon a dry ſoil; but thoſe which are ſown towards the middle or latter end of June, commonly receive ſome refreſhing ſhowers to bring them forward; without which, it is very common to have them all deſtroyed.

Theſe ſeeds ſhould always be ſown upon an open ſpot of ground; for if they are near hedges, walls, buildings, or trees, they will draw up, and be very long topped, but their roots will not grow to any ſize.

They are ſown in great plenty in the fields near London, not only for the uſe of the kitchen, but for food for cattle in winter, when there is a ſcarcity of other food; and this way is become a great improvement to barren ſandy lands, particularly in Norfolk, where, by the culture of turnips, many perſons have doubled the yearly value of their ground.

The land upon which this ſeed is ſown, ſhould be ploughed in April, and twy-fallowed in May, that is once more ploughed and twice well harrowed, and made very fine; then the ſeed ſhould be ſown pretty thin; for it being ſmall, a little will ſow a large piece of ground; one pound is the common allowance for an acre of land. The ſeed muſt be harrowed in as ſoon as it is ſown, with a ſhort-tined harrow, and the ground rolled with a wooden roll, to break the clods, and make the ſurface even. In ten days or a fortnight after ſowing, the plants will come up; at which time, if the ſeaſon ſhould prove dry, they will be in great danger of being deſtroyed by the fly; but if it ſo happen, the ground muſt be ſowed again, for the ſeed being cheap, the chief expence is the labour; but the ground ſhould be firſt harrowed to looſen it, eſpecially if it is ſtiff land.

When the plants have got four or five leaves, they ſhould be hoed to deſtroy the weeds, and to cut up the plants where they are too thick, leaving the remaining ones about ſix or eight inches aſunder each way, which will be room enough for the plants to ſtand for the firſt hoeing; the ſooner this is performed, when the plants have four leaves, the better they will thrive; but in the ſecond hoeing, which muſt be performed about a month after the firſt, they ſhould be cut up, ſo as that the remaining plants may ſtand fourteen or ſixteen inches diſtance, or more, eſpecially if they are deſigned for feeding of cattle; for where the plants are allowed a good diſtance, the roots will be proportionably large; ſo that what is loſt in number, will be over-gained by their bulk, which is what I have often obſerved. But in ſuch places where they are ſown for the uſe of the kitchen, they need not be left at a greater diſtance than ten inches or a foot, becauſe large roots are not ſo generally eſteemed for the table.

It is not many years ſince the practice of ſowing turnips for feeding of cattle, has been of general uſe; how it happened that this improvement ſhould have been ſo long neglected in every part of Europe, is not eaſy to determine, ſince it is very plain, that this piece of huſbandy was known to the ancients. For Columella, in treating of the ſeveral kinds of vegetables which are proper for the field, recommends the cultivating rapa in plenty; becauſe, ſays he, thoſe roots which are not wanted for the table, will be eaten by the cattle: yet this plant was not much cultivated in the fields till within the laſt ſixty or ſeventy years; nor is the true method of cultivating turnips yet known, or at leaſt not practiſed, in ſome of the diſtant counties of England, at this time. For in many places the ſeed is ſown with barley in the ſpring, and thoſe plants which come up, and live till the barley is cut, produce a little green for the ſheep to pick up, but never have any roots. In other places, where the turnip ſeed is ſown by itſelf, the method of hoeing them is not underſtood; ſo that weeds and turnips are permitted to grow together; and where the turnips come up thick in patches, they are never thinned, ſo that they draw up to have long leaves, but never can have good roots, which is the principal part of the plant, therefore ſhould be chiefly attended to.

The general method now practiſed in England, for cultivating this plant in the fields, is the ſame as is practiſed by the farming gardeners, who ſupply the London markets with theſe roots, and is the ſame as before directed. But it is only within the compaſs of a few years, that the country people have been acquainted with the method of hoeing them; ſo that the farmers formerly employed gardeners, who had been bred up in the kitchen gardens, to perform this work; but it is now performed by many country labourers, by which means that practice is loſt to the kitchen gardeners; the labourers doing it much cheaper.

There has alſo been another method practiſed very lately, by ſome very curious farmers, in cultivating of turnips, which is by ſowing the ſeed in rows, with the drill-plough. In ſome places the rows are ſown three feet aſunder, in others four, in ſome five, and ſome ſix. The latter has been recommended by ſome, as the moſt proper diſtance; and although the intervals are ſo large, yet the crop produced on an acre has been much greater than upon the ſame quantity of land, where the rows have been but half this diſtance; and upon all the fields which have been tilled, the crops have greatly exceeded thoſe which have been hand-hoed. The late lord viſcount Townſhend was at the expence of making the trial of theſe two different methods of huſbandry, with the greateſt care, by equally dividing the ſame fields into different lands, which were alternately ſown in drills, and the intermediate lands in broad-caſt. The latter were hoed by hand, in the common method, and the other cultivated by the hoeing-plough; and when the roots were fully grown, his lordſhip had an equal quantity of land, which had been ſowed in the different methods, meaſured, and the roots drawn up and weighed; thoſe roots which had been cultivated by the plough, were ſo much larger than the other, that the crop of one acre weighed a ton and half more than that of an acre in the other huſbandry.

But when the turnips are ſown in drills, they will require to be hoed by hand, to ſeparate and cut out the plants, where they are too near together in the rows; as alſo to cut up the weeds between the plants, where the plough cannot reach them. If this is carefully performed, the ploughing of the intervals will encourage the growth of the roots, by thus ſtirring of the ground, and make it much better prepared for the crop of barley, or whatever elſe is ſown the following ſpring. This method of culture may be ſuppoſed to be more expenſive than that commonly practiſed, by thoſe unacquainted with it; but thoſe who have made trial of both, find the horſe-hoeing to be much the cheapeſt, and by far the beſt. For the country people, who are employed in hand-hoeing of turnips, are very apt to hurry over their work, ſo that half the weeds are left growing, and the plants are ſeldom ſingled out ſo well as they ſhould be; nor are they curious enough to diſtinguiſh the charlock, which is one of the moſt common weeds in arable land, from the turnips; ſo that about the middle of September, it is very common to ſee the fields of turnips full of the yellow flowers of the charlock. Now, in the horſe-hoeing, all the weeds in the intervals will be entirely deſtroyed; ſo that if a few plants in the rows of turnips ſhould be overlooked, they may be eaſily drawn when they appear viſible, and by this method the land will be ſooner and better cleaned from weeds.

The greateſt evil which attends a crop of turnips, is that of their being deſtroyed by the fly, which uſually happens ſoon after the plants come above-ground, or while they are in the ſeed-leaf; for, after they have put out their rough leaves pretty ſtrong, they will be paſt this danger. This always happens in dry weather; ſo that, if there ſhould be rain when the turnips come up, they will grow ſo faſt, as to be in a few days out of danger from the fly; and it hath been found, that thoſe, which have been ſown in drills, have eſcaped the fly much better than thoſe ſown in broad-caſt; but, if ſoot is ſown along the ſurface of each drill, it will be of great ſervice to keep off the fly, and a ſmall quantity of it will be ſufficient for a large field, where the drills only are to be covered.

Another danger of the crops being deſtroyed is from the caterpillars, which very often attack them, when they are grown ſo large as to have ſix or eight leaves on a plant. The ſureſt method of deſtroying theſe inſects, is to turn a large parcel of poultry into the field, which ſhould be kept hungry, and turned early in the morning into the field; theſe fowls will ſoon devour the inſects, and clear the turnips. To this evil the turnips, which are ſown in drills, are not ſo much expoſed; for as the ground between the rows will be kept ſtirred, the plants will be kept growing, ſo will not be in danger of ſuffering from theſe inſects, for the parent inſects never depoſit their eggs upon any plants which are in health; but as ſoon as they are ſtinted, they are immediately covered with the eggs of theſe inſects; and this holds in general with vegetables as with animals, who are ſeldom attacked by vermin when they are in perfect health; whereas, when they become unhealthy, they are ſoon overſpread with them; ſo that it is the diſeaſe which occaſions the vermin, and not the vermin the diſeaſe, as is commonly imagined.

When the turnips are ſown in drills, it will be the beſt way to plough between every other row at firſt, and ſome time after to plough the alternate intervals, by which method the plants will receive more benefit from the often ſtirring the ground than they would do, if all the intervals were hoed at one time; and plants will be in leſs danger of ſuffering from the earth being thrown up too high on ſome rows, while others may be left too bare of earth; but, when the earth has been thrown up on one ſide of the drill, it may be turned down again ſoon after the next interval is ploughed. This alternate moving of the earth will prepare the ground very well for the ſucceeding crop, and greatly improve the turnips; but, as the plough cannot well be drawn nearer to the drills than two or three inches, the remaining ground ſhould be forked to looſen the parts, and make way for the fibres of the roots to ſtrike out into the intervals; otherwiſe, if the land is ſtrong, it will become ſo hard in thoſe places which are not ſtirred, as to ſtint the growth of the turnips. This may be done at a ſmall expence; a good hand will perform a great deal of this work in a day, and, whoever will make the trial, will find their account in practiſing it, eſpecially on all ſtrong land, where the turnips are much more liable to ſuffer from the binding of the ground, than they will be on a looſe ſoil; but yet, in all ſorts of ground, it will be of great ſervice to practiſe this.

When the ground is thus ſtirred in every part, one ploughing will be ſufficient, after the turnips are eaten, for the ſowing of barley, or any other crop; ſo that there will be an advantage in this, when the turnips are kept late on the ground, as will often be the caſe, eſpecially when they are cultivated for feeding of ewes, becauſe it is often the middle of April before the ground will be cleared; for late feed in the ſpring, before the natural graſs comes up, is the moſt wanted, where numbers of ſheep or ewes are maintained, and one acre of turnips will afford more feed than fifty acres of the beſt paſture at that ſeaſon.

In Norfolk and ſome other counties they cultivate great quantities of turnips for feeding of black cattle, which turn to great advantage to their farms, for hereby they procure a good dreſſing for their land; ſo that they have extraordinary good crops of barley upon thoſe lands, which would not have been worth the ploughing, if it had not been thus huſbanded.

When the turnips are fed off the ground, the cattle ſhould not be ſuffered to run over too much of the ground; for, if they are not confined by hurdles to as much as is ſufficient for them one day, the cattle will ſpoil three times the quantity of turnips as they can eat, ſo that it is very bad huſbandry to give them too much room; therefore the hurdles ſhould be every day removed forward, and if the turnips are drawn out of the ground before the cattle or ſheep are turned into the new incloſure, there will be leſs waſte made, for they will then eat up the whole roots; whereas, if they are turned upon the turnips growing, they will ſcoop the roots, and leave the rinds, which being hollow, the urine of the ſheep will lodge in them; ſo that, when they are forked out of the ground, the ſheep will not eat any of thoſe roots which are thus tainted.

I cannot omit taking notice of a common miſtake, which has generally prevailed with perſons who have not been well informed to the contrary, which is in relation to the mutton which is fatted with turnips, moſt people believing it to be rank and ill taſted; whereas it is a known fact, that the beſt mutton this country affords is all fatted on turnips, and that rank mutton, whoſe fat is yellow, is what the low marſhy lands of Lincolnſhire, and other rank paſtures, produce.

In order to ſave good turnip ſeeds, you ſhould tranſplant ſome of the faireſt roots in February, placing them at leaſt two feet aſunder each way, obſerving to keep the ground clear from weeds, until the turnips have ſpread ſo as to cover the ground, when they will prevent the weeds from growing. When the pods are formed, you ſhould carefully guard them againſt the birds, otherwiſe they will devour it, eſpecially when it is near ripe; at which time you ſhould either ſhoot the birds as they alight upon the ſeed, or lay ſome bird-limed twigs upon it, whereby ſome of them will be caught; and, if they are permitted to remain ſome time, and afterwards turned looſe, they will prevent the birds from coming thither again for ſome time, as I have experienced. When the ſeed is ripe it ſhould be cut up, and ſpread to dry in the ſun; after which it may be threſhed out, and preſerved for uſe.

There have been many receipts for preventing the fly taking turnips, but few of them deſerve notice; therefore I ſhall only mention two or three which I have ſeen tried with ſucceſs. The firſt was ſteeping the ſeeds in water with flour of brimſtone mixed, ſo as to make it ſtrong of the brimſtone: another was ſteeping it in water with a quantity of the juice of horſe-aloes mixed, both which have been found of uſe. The ſowing of ſoot or tobacco duſt over the young plants, as ſoon as they appear above ground, has alſo been found very ſerviceable: in ſhort, whatever will add vigour to the young plants, will prevent their being deſtroyed by the fly, for thoſe never attack them, till they are ſtinted in their growth. *Miller's Gard. Dict.*

Mr. Liſle is inclined to think, that the beſt way to manage turnips, the ſeed of which, ſays he, is impatient of growth, and apt to burſt in too much wet, as alſo to corrupt, if the ground be ſo dry as only to give it a damp, but not wet enough to ſet it on growing, is, firſt to harrow the ground fine, after it has been brought to a perfect tilth by ploughing, then to roll it with a roller big enough to break the little clods, if any ſuch remain, and ſo let it lie till the next rain; then, the ground being mellow, to ſow the ſeed, and harrow it in with ſhort-tined harrows, which may not open the ground too deep, nor bury the ſeed; then roll it again with a one-horſe roller, in order to keep the moiſture in the ground as deep as the ſeed may be: for the ſurface of the earth muſt not be dried before the ſeed can ſtrike root, which may be in twice twenty-four hours; and yet that ſurface muſt be ſo fine, and ſo lightly compreſſed, that the ſeed may ſpear through it. He takes the myſtery, as he calls it, of the ſucceſs or miſcarriage of a crop of turnips to conſiſt in theſe four things, viz. firſt, in the ſeeds not lying too deep; ſecondly, in its not lying too wet, which it cannot eaſily do if harrowed in ſhallow, for the ſurface of the earth is ſoon dry; thirdly, in its not lying too dry; and fourthly, in its lying in a fine bed. In another place, he tells us, that his gardener affirmed to him, that he had found turnip ſeeds, which had been dropped by accident and covered over with earth in digging, freſh and good a year after, when the earth was turned back again, and that it has then grown and produced good turnips. The reaſon is, that every ſeed which is buried ſo deep as not to be affected by the changes in the air, may remain in a ſound ſtate, and in a fit condition to vegetate, for many years, as hath been evinced by numbers of inſtances.

Mr. Duhamel adviſes after the two firſt hoeings a ſlight ploughing all over the field, with a plough that has no fins to the ſhare, as a ſpeedier and cheaper way to thin the plants: the turnips will not require any farther care. They will have attained their full ſize in October, before the froſts come, and ſhould then be taken up, ſtripped of their leaves, which may be given to cattle, and laid upon hurdles in a dry place, with a layer of dry ſand between each layer of turnips, which may be thus piled up, and which will keep very well in this condition, for the food of cattle during the winter. In Norfolk, they ſtow them in their barns, when intended for fattening of bullocks.

A dry ſeaſon is the beſt for hoeing turnips, becauſe neither the weeds nor the turnips hoed up then will be ſo apt to grow again: and Mr. Liſle ſuppoſes that care ſhould be taken to hoe up thoſe that are deepeſt rooted in the earth, and to leave thoſe that grow upon, and almoſt out of it, without much regarding their ſize; becauſe thoſe which lie on the ground, and have room to grow, will ſoon become the largeſt.

Some ſow turnips on their flax and hemp grounds, at the ſame time as they pluck up thoſe plants, and the ſeed is pretty well buried by the ſtirring thereby given to the earth. Others give their corn ſtubble only a ſlight plowing after harveſt, then ſow the turnips very thin, and harrow in the ſeed. Theſe methods do very well when the ground is in good tilth. Others again, ſow late turnips, merely for the ſake of their leaves, which they uſe as green feed, when they are about a foot high; and in this caſe they ſow the ſeed very thick.

An eaſy way to have two growths of turnips in the ſame field, is to ſow ſeed of the laſt gathering, and ſeed that is two years old; for this laſt is longer before it riſes, than the new: and an advantage attending this method, is, that the turnips, by riſing at different times, will have the better chance to eſcape the fly, or grub, which ſometimes deſtroy them entirely: for it has been obſerved, that theſe flies often come ſuddenly in great ſwarms, and eat up the turnips as faſt as they riſe; and that they ſometimes diſappear as ſuddenly; ſo that the turnips which riſe a few days after, in a neighbouring field, are not at all injured by them: conſequently, when the turnips of the ſame field riſe at different times, one or other may eſcape the ravage of theſe inſects; for they deſtroy them only while in their ſeed leaf.

The worm to which turnips are very liable may be guarded againſt, at leaſt in a great meaſure, as Mr. Liſle informs us, by liming the ground. This will alſo render them much ſweeter than they would otherwiſe be: and we are of opinion that freſh ſlaked lime ſtrewed over the ground when the turnip ſeed is ſown, will contribute greatly to preſerve the young plants from the fly. It is to the worm lodged in the root of the turnip, perhaps engendered from the egg of the fly, that Mr. Liſle imputes the diſtemper or diſeaſe in turnips, which the Norfolk farmers call the hanbery; ſo named from a like diſtemper in a horſe's heel. It is a warty excreſcence, formed probably by this inſect, in the ſame manner as galls are formed upon the leaves of the oak. In ſome years it takes off whole crops, and the turnips never thrive after it has begun to grow in them.

A gentleman, remarkable, among many other good qualities, for ſeveral excellent improvements which he has made in agriculture, tried with ſucceſs the following experiment, to preſerve turnips from the fly, and the better to ſecure their growth. He ſowed the ſeed in a nurſery, where there was leaſt danger of ſlugs or the fly, and where they might eaſily be watered in caſe of great drought, to make them grow the quicker. They remained in this nurſery, till they were large enough to be tranſplanted. By this means he gained ſome weeks longer, to perfect his fallow, or give a thorough plowing to ground which had borne a crop that ſeaſon. He tranſplanted his turnips into the field, and by planting them regularly at due diſtances, greatly leſſened the expence of hoeing; their regularity making it very eaſy to deſtroy the weeds from time to time, as they appeared.

In the ſecond part of the memoirs of the Society of Berne for the year 1762, the reverend Mr. Bertrand, not ſatisfied with even a ſcrupulous diſcharge of the duties of his clerical function, has inſtructed his pariſhioners, his country, and mankind, in the important ſubject of agriculture. The improving of light ſoils by the culture of turnips, is one of his objects: upon which he very judiciouſly obſerves, that though it be right to plough ſtiff lands before the winter, in order to their being mellowed by the froſt; yet as the fineſt and beſt parts of the ſoil will be in danger of being waſhed off, or carried down into the looſe earth underneath, when this is done in a light ground, or in mould which has a ſandy or gravelly bottom; it will be moſt adviſeable here, to turn the ſtubble down immediately after the corn has been taken off, and then to ſow turnips; becauſe their ſpreading leaves will ſhelter and ſecure the fine mould upon the ſurface, and keep the land in good heart, whilſt the earth will be looſened and divided by their roots, ſo that it will be rather fitter for a ſpring crop, than if it had lain uncultivated.

The chief uſe of turnips is, to feed cattle in the winter and ſpring, when there is a want of graſs for their paſture. Cows, oxen, and hogs, are very fond of this food, which fattens them, and increaſes the milk of the former. Sheep too eat it readily, and thrive upon it, when they have been uſed to it early; but they do not reliſh it when it has not been offered them till they are grown old: however, if they are kept faſting two or three days, moſt of them take to it, and when they have once taſted it, they become very fond of, and feed kindly upon it. In ſome places, they feed their lambs with turnips till the middle of April, though they then begin to run up to ſeed. Farmers chooſe rather to do this, than to let them hurt their clover, ſainfoin, lucerne, &c. Some parboil them a little, at firſt, till their cattle, and particularly their ſheep, are accuſtomed to them: but a lamb only three weeks old, will, after it has once eaten of this food, ſcoop out a raw turnip with great glee.

Turnips, if not clean eaten, and well cleared off the ground, may take root again, run to ſeed, and do great damage to the enſuing crop. Mr. Liſle inſtances it in a gentleman of Berkſhire, who plowed up a turnip field in the ſpring, and ſowed it with peas: but the little dwarf turnips that were left behind, uneaten, notwithſtanding his plowing them up, took root again, run to ſeed in great quantities, and did much damage to his crop of peas.

The practice of turning a flock of ſheep, at random, into a large field of turnips, is very bad: for they will then ſpoil more in a fortnight, than would keep them a whole winter. The beſt way, therefore, of feeding them with theſe roots, is, as Mr. Tull adviſes, and after him M. Duhamel, one or other of the three following methods, which are equally applicable to the drill, and to the common huſbandry.

The firſt is, to portion out the turnip ground, by incloſing with hurdles ſo much only as the ſheep can clear in one day; and ſo to advance the folds farther into the field every morning, until all be ſpent. But it is to be obſerved, that the ſheep never eat them clean this way, but take only the leaves and the heart of the turnip: ſo that great part of them remains in the earth. It is true that theſe fragments, if left there, rot, and become a manure: but when they are wanted for the food of the flock, and are to that end pulled up with iron crooks or forks made for this purpoſe, the ſheep do not reliſh, and conſequently eat but little of, theſe then dirty withered remains, tainted with their urine, dung, &c. nor can they nouriſh them ſo well as roots which are freſh and cleanly.

The ſecond method differs from the former only in pulling up the turnips ſo far as they are hurdled off, before the ſheep are turned in. They then eat them better, becauſe the food is freſh and in good condition. Beſides, as the whole turnips are pulled up more eaſily than their pieces can be, there is not ſuch waſte as in the other way. The turnips which grow next to the hurdles ſhould be thrown towards the middle of the ſpace hurdled off; becauſe they will be leſs liable to be trampled upon and ſpoiled there, than nearer to the hurdle, where the ſheep run about moſt, in ſearch of means, of eſcaping into the open field.

The third way is to pull up the turnips, and carry them into ſome other ground, and there ſpread them every day on a new place, where the ſheep will eat them up clean. This is done when there is land not far off, which has more need of dung than that where the turnips grow. The expence of carrying the turnips is compenſated by ſaving the price, or at leaſt the carriage and removing of the hurdles: only when the turnips are laid on a ſpot of graſs, as is frequently done in wet weather, the benefit of the dung and urine of the ſheep is loſt.

This method is requiſite when the field on which the turnips grow is wet; becauſe, 1. The ſheep would trample upon, and bury, part of the turnips, which would be loſt. 2. In treading that wet earth, they would poach it, and render it unfit for corn. 3. By this means, a field may be dunged, as we have juſt obſerved, which wants it more than that where the turnips grew. 4. This muſt neceſſarily be done, if wheat has been ſown in the alleys between the rows of turnips, according to the principles of the new huſbandry.

Turnips are always carried off the field, when they are intended to fatten the larger ſorts of cattle: and they ſhould be cut in pieces for them, leſt they choak themſelves with the whole ones. They are given morning and evening to ſtall-fed cattle, which in the intervals, eat likewiſe common fodder; but the turnips increaſe their appetite to ſuch a degree, that a middle ſized bullock, ſtalled for fattening, will conſume near two hundred pounds weight of theſe roots in twenty-four hours, beſides hay: whereas, if nothing but hay were given him, he would hardly eat half the quantity that he will with the turnips. A healthy bullock, in only good plight at the time of his beginning to be fed with turnips, will be very well fattened in three months.

Mr. Tull ſays he found by experience, that the beſt way of ſowing turnips is in ſingle rows, ſix feet aſunder. He ſowed them in double rows alſo at that diſtance, but they did not do well: and he likewiſe ſowed them in ſingle rows, with intervals of only three feet. Theſe laſt yielded a greater crop than a neighbouring field, which was ſown and managed in the common way: but neither the ſingle rows three feet aſunder, nor the double rows with intermediate diſtances of ſix feet, yielded, ſays he, half ſo much, as the ſingle rows ſix feet aſunder: from whence he concludes, that it is beſt to leave a ſpace of ſix feet between the rows; for that, if the alleys are well plowed, theſe turnips will thrive wonderfully, even though no other moiſture falls but the dew, which will ſink into the earth, to their roots.

However, notwithſtanding Mr. Tull's experiment, M. Duhamel is for ſowing turnips in double rows, if the intervals are of ſix feet; or if they are ſown in ſingle rows, he would have theſe rows be but four feet aſunder, which is the ſpace left between the rows of vines in Languedoc, and which is there plowed with oxen.

An ounce of ſeed will ſow as much land when drilled, as a pound will in the common way: and if care be taken to diſtribute only the neceſſary quantity, a great deal of trouble will be ſaved in the hoeing of the plants, afterwards, to thin them. But it is eſſential to obſerve, we muſt again repeat it, that all roots, whether turnips, carrots, parſneps, parſley, or any other, always thrive beſt where there is a great depth of fine, light, well looſened mould. M. Duhamel trenched the whole of his kitchen-garden three feet deep: all his pot-herbs grew very fine, and his roots in particular were of a ſurprizing ſize.

Mr. Tull, by drilling his turnip ſeeds alternately at different depths in the earth, was ſure to ſucceed in one part or other, whether the ſeaſon was wet or dry. If wet, the ſeed ſlightly covered ſprouted firſt; and in dry ſeaſons, that which lay deepeſt was the firſt that roſe. By this means, and by mixing the ſeed, half new and half old, for the new always comes up ſooneſt, he had four comings up, which, as he obſerves, gave the plants ſo many chances to eſcape the fly.

If one was ſure of having rain immediately after the turnips are ſown, it would undoubtedly be right to ſow them very ſhallow: but if no rain happens, they are beſt deeper in the earth, becauſe they there meet with moiſture ſufficient to make them grow.

When the ſeaſon has been ſo kindly that all the ſeeds have grown, and the plants have not ſuffered by the fly or other inſects, they muſt be thinned early, that the ground may not be exhauſted by ſuch as are not intended to remain; for thoſe that are left ſhould be about a foot aſunder.

When the turnips ſown in drills thrive well, only each alternate alley need be hoed at one time, and the others a few days after; it being better to feed the plants gradually, by dividing the hoeings in this manner, than to give them a great deal of food at once, by hoeing all the alleys together, and afterwards leave them double the time without any culture at all. Another advantage attending this method is, that the plants will be the leſs liable to be killed by hot dry weather, and the leſs apt to be damaged by heavy rains. But it will not, indeed, ſo effectually deſtroy weeds, which ought always to be a principal object of the huſbandman's care, and which ever is one of the chief intentions of the New Huſbandry. However, as all weeds are very apparent in the alleys, it is eaſy to extirpate them there; and as to thoſe which may chance to be in the rows, the perſon who thins the turnips may cut them up at the ſame time. He will there moſt eaſily diſtinguiſh the charlock from the turnips, eſpecially when the leaves of theſe laſt are come to be about the breadth of a half crown.

All plants ſown in ſingle rows are greatly benefited by the alternate hoeing of the alleys between them: for, as M. Duhamel obſerves, 1. Four of theſe hoeings, which coſt no more than two entire ones, are almoſt as beneficial to the plants as four complete hoeings. 2. A plant which finds a great deal of nouriſhment on one ſide, is the better able to thrive without receiving ſo much on the other. 3. If, in hoeing very near the plant, ſome of its roots are broke; thoſe on the other ſide, not hoed, ſupply the wants of the plant, till the broken ones have made freſh ſhoots. 4. The horſe-hoe may therefore be brought very near to the turnips, without fear of hurting them; provided it do not force them out of the earth. 5. When a farmer has a great quantity of turnips to hoe, they are ſooner ſupplied by this culture, than they poſſibly could be if all the alleys were to be hoed.

A furrow ſhould not be left open near the turnips, while they are young; becauſe the earth about them would in that caſe become too dry: but there is no danger of this in the autumn, when they are grown ſtrong, and the earth is moiſt. Neither is it adviſeable to leave a furrow open near them during the winter; becauſe they would be in danger of being hurt by the froſt.

When theſe plants are grown large, and their roots are conſequently pretty well extended, the hoe-plough need not come quite ſo near them as at firſt: nor is it neceſſary to hoe them at all, till they are about the bigneſs of one's finger's end.

One alternate hoeing, or which is the ſame thing, two half hoeings, will be ſufficient when the turnips are ſown late. But when they are ſown early, and many weeds grow, one hoeing will not be enough.

By following this culture, M. Duhamel has ſeen turnips which weighed from ſixteen to nineteen pounds; and we may depend on their weighing one with another twelve pounds a-piece in a good ſoil, which is a vaſt produce from an acre of land. Mr. Miller ſays, that one acre of turnips, thus properly cultivated, will afford more feed for ſheep or ewes in the winter, than fifty acres of the beſt paſture at that ſeaſon.

Another vaſt advantage which attends the ſowing of turnips in rows, is, that inſtead of occupying the whole ground when it ſhould be ſowed with wheat, and ſometimes even when it ſhould be ſowed with ſpring-corn, as is frequently the caſe in the old way; they are no hindrance to either in the New Huſbandry: for as the alleys are in good tilth, three rows of corn may be ſown, ſeven inches aſunder, between the rows of turnips; and when theſe roots are pulled up, the ground where they grew is hoed, and becomes the alleys between the beds of corn.

The beſt turnip ſeeds are obtained from the largeſt roots, which may either be tranſplanted for that purpoſe, or marked out in the field where they were ſown. Thoſe which are commonly ſold in the ſhops, ſeldom produce the fineſt plants.

Experiments on turnips cultivated according to the New Huſbandry.

In 1754, M. de Chateauvieux ſowed turnips on beds, in two rows. They ſuffered greatly for want of rain, and none of them grew to the ſize they would have done in a more favourable ſeaſon. Some of them weighed eight pounds; but their general weight was from three to four.

In 1755, M. de Chateauvieux ſowed ſome beds with one row, ſome with two, and others with three rows. They were afterwards thinned, ſo that the plants ſtood a foot aſunder in the rows. Thoſe ſown in one row were the largeſt, and, in general, the moſt equal. Some of them weighed fourteen pounds, and moſt of them from ſeven to eight. In the other rows, they did not weigh ſo much; but they were more numerous.

In conſequence of theſe experiments, M. Duhamel, to whom they were communicated, makes the following ſtriking calculation relative to the quantity of food which turnips will afford for cattle.

"Let a ſquare whoſe ſide is 216 feet be formed into beds four feet wide, which is ſufficient for one row of turnips. Theſe will be 216 feet long, and conſequently will contain that number of turnips, planted a foot aſunder. Theſe 216 multiplied by 54, the number of beds, will give 11664 turnips for the product of the ſquare; and theſe multiplied by ſix, the ſuppoſed weight of each turnip, will give 69,984 pounds for the weight of all the turnips on this ſpot."

This may be looked upon as a very conſiderable crop; for it will be ſufficient to ſtall-feed four bullocks during the three winter months, at the daily allowance of 200 pounds each: and yet there is reaſon to believe that the quantity will be doubled in a good year, as will be pretty evident to thoſe who conſider at how low a rate the medium weight of the turnips is here eſtimated.

In 1755, M. Duhamel ſowed turnips in a field, on beds cultivated with the horſe-hoe. They grew extremely fine; many of them being twenty-nine inches circumference.

The following account of the advantages of the drill huſbandry in the culture of turnips, was ſent by Mr. Willy, of South-Petherton, to the ſociety for the Encouragement of Arts, &c.

The generous method you have taken to promote uſeful knowledge muſt give every lover of his country the greateſt pleaſure, and incline him to do all in his power to increaſe it; 'tis with this view, and by the perſuaſion of many friends, I preſume to lay before you the following lines, hoping they may give you ſome ſatisfaction in reſpect to the difference betwixt the Old and New Huſbandry.

I began huſbandry in the year 1742, had always an inclination to drilling, and was at much trouble and expence in getting one inſtrument after another made for the purpoſe; but was often diſappointed, and for ſome years was forced to lay by the thoughts of it. About eight years ſince a gentleman lent me Mr. Tull's treatiſe; I then got ſome new inſtruments made, which ſowed very regularly, and ſince that time have ſowed all my corn in rows. Several cloſes I ploughed in ſix furrow ridges, and ſowed with three rows of wheat, ploughing the intervals with a ſmall ſull, drawn by one horſe, and made it fit for wheat the next year; it generally took one third of the common quantity of ſeed, and in two years it yielded more than half as much again as the beſt crops in the common way did in one year; which, conſidering the ſmall expence of ſeed and labour, was ſome advantage, though not very great; but then it left the ground in very good order for the next crop of ſpring corn. I kept one cloſe, about two acres, four years to wheat in the ſame method; but the two laſt years did not anſwer to the two firſt, which makes me think Mr. Tull wrong, when he ſays, that plants of different natures are nouriſhed by the ſame ſort of food. I could give an account of the exact quantity produced in each year, but it would be tedious: upon the whole, I believe this method of ſowing wheat will be of no advantage except in poor ſtrong clays, where I apprehend it muſt exceed all others. But there are a few inconveniencies attending it; frequent ploughing the intervals is apt to make the wheat ſhoot freſh ears, which do not ripen with the others; and if any of the full ears when near ripe do but touch the freſh ploughed earth, ever ſo little wet will make them ſprout, and theſe will injure the whole crop; and I find it impoſſible to keep all up, as the rows are at ſo great a diſtance. But my method of drilling in the open fields, and which I intend to follow, is to put five rows about eight inches apart, on a ridge about five feet in breadth. This takes but two-thirds of the ſeed ſowed in the common way, and has always produced a better crop than the lands on each ſide of mine; this my neighbours are now convinced of, and ſeveral of them have drilled their wheat this ſeaſon: our ſoil, for the moſt part, is a deep heavy ſand.

I apprehend the principal advantage in drilling wheat is placing it at a proper depth, which I think is within two inches or thereabouts. I have obſerved, that the firſt motion of the wheat is by ſome roots, which in a little time run very deep; then it ſhoots up its blade; next it begins to form a head, about an inch under ground, from which come (very ſoon in a mild ſeaſon) the ſecond and third blades; and after this it begins to ſhoot freſh roots and branches from this ſame head, till in time it grows very large, eſpecially in a fruitful ſoil and a good ſeaſon; and it keeps on ſhooting freſh roots all the growing ſeaſon: now if the corn is too deep, and a ſevere froſt happens while this head is forming, the plant is quite deſtroyed: but if it lies ſhallow it ſhoots a new blade from the corn, and goes on in its operations as before; this was the caſe in 1763, a ſevere froſt happened in the night of the thirteenth of February, which deſtroyed a good deal of wheat; ſo that ſome which lay deepeſt was ploughed up, and ſown with other ſeed in the ſpring. Laſt year multitudes of plants were killed in the ſame manner, and brought the crop very thin. In ſhort, I am very certain, that whoever will make their obſervations will find that what I have ſaid is the truth; that the ſhalloweſt corn will flouriſh ſooner and better, and from thence will be led to ſee the advantage of drilling wheat.

But although I intend leaving Mr. Tull's method of ſowing wheat, yet I hope always to follow it in beans and turnips.

My beans I have ſown theſe four years in double rows, about ten inches a part, and about two feet intervals. Theſe I plough from and to the beans, when about ſix inches high; this is done with a little ſull drawn by one horſe, and will plough three acres in a day. This method hath ſucceeded ſo well, that many are come into it; although the farmers have always an averſion to new methods of managing; we ſow but one-third of the ſeed, and have a much better crop, as is allowed by all.

As for turnips, all my neighbours will allow the drill to beat every thing. I ſow a double row about eight inches wide, on a ridge about five feet, and though I did not ſow this year till Auguſt, I have turnips two feet round, after wheat. I have given them but one ploughing as yet, beſides hoeing them out at proper diſtances. I believe all will acknowledge I have double the crop in weight with any ſown in the old way. I left four intervals unploughed in one cloſe, to ſee the difference, and it is very ſurpriſing. One of my neighbours was prevailed on to ſow a few rows in a piece he was ſowing, and let my man plough them. The difference is ſo great that he is become an advocate for the drill huſbandry; indeed I do believe that it will ſoon make its way through all the prejudices of the old farmers to the contrary; eſpecially as we have a drill invented by an ingenious carpenter, with which ſeveral farmers have ſown beans, peaſe, turnips and wheat, and it anſwers exceedingly.

For theſe ſeventeen or eighteen years paſt, I have been ſtriving to improve a crop of turnips. Before this, nothing was known or aimed at hereabouts, but ſowing in the common way, one pound of ſeed on an acre; and then come thick, come thin, weeds and all grew together, till the ſheep were turned in to eat the crop as it was, and generally it was very poor.

The firſt improvement I made was by Ellis's direction, to drag them well with heavy harrows till they were got pretty thin, by which method I ſoon got better crops than any about me. But then I ſowed double the quantity of ſeed, that I might have ſufficient ſtock of plants for my after huſbandry. My neighbours were ſoon convinced of the advantage of this, and followed my example, which is now the common practice. After this, finding the thinneſt was beſt, I got ſome hoed: this I found ſtill better, but very expenſive, our people not being uſed to it. I tried Mr. Ellis's receipt to prevent the fly from deſtroying the young plants, but my ploughmen refuſed to ſow the ſeed when mixed with ſulphur. I then invented a long box, made full of holes, for the ſeed to fall through, and faſtened it to two wheels ſo as to keep it above ground; this went ſo light that a boy could draw it, and ſowed the ſeed very regularly. I ſhewed this to a friend of mine, (Mr. Joſeph Pittfield, of Sidland in Dorſet) who had one made immediately; and ſoon made an improvement on it, by having the holes made in rows about a foot aſunder. Finding that the plants could be thinned and cleared at a much leſs expence, I followed this method of ſowing for myſelf, as did ſome of my neighbours, for ſome years, and with a deal of ſatisfaction. A few years ſince, I was willing to try what ſtirring the ground deeper would do; and being reſolved to try the drill huſbandry in corn likewiſe, I had a ſmall ſull made, with which one horſe will plough more than two acres in a day, firſt turning four or five inches deep from the plants, and then back to them again: we generally ſow turnips after wheat, peaſe, and flax, and my method is to plough the ground into ſix furrow ridges, which with the open furrow makes about five feet in breadth. On ſuch a ridge I ſow (out of a ſhort box) two rows of ſeed, though ſometimes but one, and harrow it in with a very light harrow. When they have four or five leaves I get them thinned, and give them a ploughing; and ſome time after, when they begin to kern, I have them thinned and cleaned again: and this is all the huſbandry I have hitherto beſtowed, and all I think is neceſſary, as we do not ſow till late; the coſt of which is about three ſhillings *per* acre.

I have ſown ſome betwixt rows of beans, and they anſwered very well: when the beans were pulled, I had the plants thinned and cleaned, and the earth ploughed betwixt the rows.

The firſt I ſowed laſt year was a ſmall piece about half an acre, where hemp failed: I had the ground ridged up, and ſowed with two rows of ſeed, and managed, as I ſaid before: indeed the ground was dunged for the hemp. This was ſown the latter end of July, but did not come up till the middle of Auguſt, for the want of rain. I pulled them before Chriſtmas, and had fifteen putt loads, which every one will acknowledge to be a good crop; I believe double a common one: and though the rows were four feet apart, the leaves touched each other. The next I ſowed was after wheat, about the middle of Auguſt: when the wheat was carried off, I had the ground ploughed into ridges where the old furrows were, and ſowed one row of ſeed on each ridge: theſe coſt but little in thinning and cleaning, and once ploughing, and were a very good crop: the largeſt of them was more than two feet round, and weighed above ſix pounds; indeed towards the hedges they were much ſmaller; I had fifteen putt loads per acre, though the ground had borne three crops ſince it was dunged. Another piece of two acres I ſowed after peaſe, in double rows; but not till the latter end of Auguſt: I had the ground ridged up, and when the plants were fit, I had them thinned and cleaned as uſual, but left four ridges for ploughing to ſee the difference; and truly it was ſurprizing: thoſe that were ploughed were more than three times as large, though they had all the ſame huſbandry, except ploughing. They are as good a crop as the wheat ſtubble, though ſown later, which makes me think double rows are beſt: our ſoil is moſtly heavy good ſand.

We have reſerved for this article the following account of ſeveral very important experiments made by Mr. John-Wynn Baker, under the direction of the Dublin Society, and publiſhed at their requeſt, on the culture of cabbages, the turnip-cabbage, boorcole, and turnips, by various methods; with an accurate ſtate of the produce; and of the abſolute and comparative advantages of each in feeding ſheep and horned cattle. *See the articles* BOORCOLE, CABBAGE, POTATOES, and TURNIP-CABBAGE.

In the month of March, 1763, two acres of ground, very highly manured with dung, were planted with potatoes, in the manner uſually practiſed in this kingdom, with ſpade and ſhovel; in the beginning of November following the potatoes were dug. The land being low, and the winter very wet, it could not be plowed until the beginning of March, 1764; when, it ſhould be obſerved, the under ſtratum, upon which the dung and potatoes lay, roſe at the plowing as ſtubborn and ſtrong, as if no part of the ground had been tilled before: which proves the potatoe tillage, in the manner in which it is uſually practiſed, not to be ſo beneficial to land as is generally imagined: the fact being, that only about thirty inches in every nine feet of the ground is tilled at all.

In the night of the 10th, and on the 11th and 12th, of May following, there was very fine rain; this rain enabled me, on the 12th, to reduce this ſtubborn ground pretty fine by the harrow.

In the month of March, 1763, the other part of this field was broke for fallow (an improper time to break fallows; but, my entrance upon the farm in that month was the cauſe); in June following it was croſs-ploughed, which brought it into very large lumps; from the poſition this ploughing threw them into, they were expoſed, in a greater number of points, to the influence of the weather, than the ground would have been, had the ſecond ploughing been in the ſame direction as the firſt.

In this ſituation I left this fallow till the March following; when, it was ploughed for the third time, with the potatoe ground, in the ſame direction as at firſt; by this third ploughing this land was brought into an exceeding fine tilth.

This benefit aroſe from the ground not having been harrowed at all. This is ſomething contrary to the common mode of culture; but was adapted to the ſpecies of ground I had to work upon; which I ſhall deſcribe hereafter.

What the harrow would have done in part towards reducing it after the ſecond ploughing, was completely effected by the influence of the ſummer and winter; the firſt deſtroyed all the weeds and couch-graſs (with the latter of which the ground abounded); and the lumps exfoliating by the operation of the winter, by degrees fell into fine mold; whereas, had it been harrowed before the winter, the rains would have run the ſmaller particles together, ſo as to have given a great adheſion to the ground before the ſpring; abſtracted from the like miſchief, which the cattle would have done by drawing the harrow. In the beginning of June, I ploughed this part of the field a fourth time, and the potatoe ground a ſecond; by which ploughing I laid the whole field into ridges of five feet width, except about half an acre, which I reſerved for other purpoſes, as will appear hereafter.

In this field I had two parcels of manure ready prepared for it. One conſiſted of earth raiſed from the head-land, mixed with lime, which lay about twelve months, having been in that time twice turned.

The other parcel conſiſted of the like earth, and lime, mixed in the ſame manner, after which I mixed dung with it, *ſtratum ſuper ſtratum*, which lay about two months, when I turned it: after which it lay about two months longer: by this ſtirring the ingredients, of which this parcel was compoſed, were perfectly incorporated with each other; and a new putrefactive fermentation was excited in it; which perfectly prepared it for the land: and all the earth was ſo fully impregnated with the juices of the dung, that it was very little, if any thing, inferior to the dung: whereas, when dung lies by itſelf, great part of the volatile ſaline particles are loſt, as ſoon as the fermentation begins; ſome fly off in vapours, and others run off with the juices of the dung and rain, which fall upon it.

When I have mixed dung and earth, in the manner already deſcribed, I always once, or twice when the ſeaſon affords it, cover the compoſt with a large quantity of ſnow, or ice; which, upon diſſolving in its paſſage through the whole, cauſeth the earth to be finely impregnated by the dung. Snow, by being gathered with ſhovels or rolled together in balls, is longer diſſolving than ice, and therefore I prefer it, unleſs it be ice of water which happens to be the ſoakage of a dung-yard, ſuch ice being always replete with food for vegetables.

The land being now, in June, in five feet ridges, in the manner already deſcribed, I began to draw out my compoſt; which I diſpoſed in the following manner: I drove the cars up every alternate ridge, and upon each of them dropped the compoſt, till I had manured about three acres of the fallow ground; then, with ſhovels, I divided this manure, as equally as could be, in every furrow; which was readily done, from the convenient manner in which it was depoſited.

In the ſame manner I put out the other parcel of manure (which, it may be remembered, I before ſaid conſiſted of lime, and earth) upon an acre and a half of the potatoe ground; and on a part of the fallow ground, where no compoſt, or other manure, had been put; and ſpread it in the ſame manner as the former.

The whole field being thus manured, I ploughed it again, which was the fifth ploughing of the fallow, and third of the potatoe ground: by this ploughing I altered the poſition of every ridge, by laying the middle of each exactly over the manure; conſequently the furrows were made, where the middle of the ridges was before.

The half acre before-mentioned I manured with at leaſt double the proportion of compoſt, which was allowed to the other part of the fallow; as it was flat, and it was neceſſary to manure every part of it, being intended for turnips, to be ſown in the promiſcuous way.

To this piece of ground I gave a ſixth ploughing; as it could not have the benefit of the horſe-hoe, when cropped, and therefore I thought it neceſſary to reduce it as fine as poſſible, in order to give the broad-caſt crop of turnips every advantage I could.

The field being prepared in the manner already deſcribed, I proceeded to crop the land in the following order.

July the ſixth and ſeventh, I planted one row of cabbage plants, upon the middle of every ridge, of about an acre of the fallow ground, the plants in the rows two feet from each other. In like manner I planted about half an acre with turnip-cabbage plants.

Hence it may be obſerved, that the plants were in rows five feet aſunder, and two feet aſunder in the rows.

This buſineſs ought to have been done, at leaſt, a month ſooner; but I could not get the ground ready in due time; however, the ſucceſs of theſe crops may encourage others not to give up their expectations, although they may happen to be as late as I was, which muſt frequently happen in a courſe of buſineſs; though this is always to be avoided as much as poſſible.

I never begin to put my plants out till about ſix o'clock in an evening, unleſs I can be ready for planting in a rainy day, which is always to be preferred; in the other caſe, I always keep the men at this work as long as they can ſee. If it can be done in, or immediately after, rain, that will ſave the expence of watering the plants; which is an object worthy of attention in a large work of this kind; beſides the circumſtance of the plants ſucceeding much better.

On Friday the ſixth of July we had fine rain, and on the ſeventh I finiſhed. On the eleventh we had ſome light ſhowers, and on the twelfth fine rain, which ſecured life to my plants; but they began to look ſickly before the twelfth; three of the intervening days having been hot and dry.

On the ſeventh I alſo planted three of the five-feet ridges, with one row of boorcole plants on each ridge, the plants in the rows two feet aſunder.

Be it obſerved, that, for the obtaining large cabbages of the ſpring ſowing, the ſeed ought to be ſown early in

March; and, if once planted out before the final planting them, it will be an advantage to the crop: the caſe is the ſame with reſpect to turnip-cabbage; but it is more eſſentially neceſſary in the common way of raiſing cabbages; for, otherwiſe, they will run into long ſhanks, and will not cabbage well; moſt gardeners allowing their plants too little room: that is not the caſe here; my cabbage and turnip-cabbage ſeeds were not ſown till the twenty-ſixth of March, and I was ſo much hurried, that I never had time to get them planted out before the final planting, ſave about three thouſand plants; and yet they are all very ſhort in their ſhanks. This may juſtly be attributed to the manner of diſpoſing them, and the culture they receive in this huſbandry.

Here I cannot omit to remark one circumſtance, for the obſervation of gentlemen and farmers who may adopt this huſbandry, viz. That I have not one cabbage this year of the ſort I intended to have; what I have being chiefly ſugar-loaf, the ſeedſman having deceived me; and, if I had not happened to have about an ounce of turnip-cabbage ſeed by me four years old, I ſhould not have had one plant of that kind this year; the ſeed, which I bought in Dublin for it, turning out a poor, ſmall, wretched cabbage.

I ſhall now proceed to make my report of the farther treatment, and ſucceſs, of theſe crops, before I proceed to the turnips, &c.

Upon the 17th of Auguſt, I horſe-hoed my cabbage, turnip-cabbage, and boorcole, for the firſt time, by taking off, at one furrow of the plough, only one ſide of each ridge, cloſe to the plants: thus they remained till the 25th, when, I ran the plough in the ſame furrow; by which, with the firſt furrow, I plowed about twenty-one inches deep. This being finiſhed, I immediately returned the earth back to the plants; this afforded them freſh nouriſhment; and in order to give their roots time to penetrate this freſh earth, which, by the horſe-hoeing, was become very fine mould, I let them remain in this ſtate till the twelfth of September; when, I horſe-hoed them again, by taking off the other ſide of every ridge; and, on the twentieth, deepened the furrow in the ſame manner as the former, and immediately returned the mold back to the plants; and, on the eighteenth of October, threw up a ſmall furrow to each ſide of every ridge, which finiſhed the culture of theſe crops, and reſtored the ridges to the form in which they were when the plants were put out upon them.

The plants all grew very luxuriantly; and, in the hotteſt weather, were infinitely more brittle in their leaves, than any I could ſee in the gardens of my acquaintances: which is a certain indication of health in this kind of plants.

The horſe-hoeing was ſo effectually deſtructive to weeds, that it coſt me but four-pence to weed theſe crops, which occupied about an acre and three quarters of ground.

The repeated horſe-hoeings coſt me two ſhillings and four-pence an acre, for workmen's wages, excluſive of horſes, of which I uſed two, and ſometimes three.

December the 8th, I cut one row of the cabbages, they beginning to decay, which is indicated by their burſting. The number was two hundred and fifty-eight, and they weighed ſixteen hundred-weight, three-quarters, and twenty-one pounds, *i. e.* one thouſand eight hundred and ninety-ſeven pounds: which, at an average, is ſeven pounds and near ſix ounces for each cabbage.

The produce upon an acre, on weighing this row, which was five hundred and ſixteen feet long, amounted to twenty-three tons, four hundred, two quarters and fourteen pounds, *i. e.* fifty-two thouſand and thirty-eight pounds: which is, at leaſt, from ten to ſeventeen tons leſs, as I compute, than the produce would have been upon an acre, had I obtained the ſort I intended to have, which was the large, late, Dutch cabbage. However, ſuch a produce as was here obtained, will be an ample reward for the labour any one may beſtow in this huſbandry, as will appear when I ſhall come preſently to ſhew how many cattle twenty-three tons will maintain.

December the 17th, I took up one row of the turnip-cabbages, which were in number two hundred and forty-nine, they weighed eighteen hundred weight, and fifteen pounds, *i. e.* two thouſand and thirty-one pounds, after chopping off the roots and ſtalks below the turnip, which ought not to be weighed, as being no part of the food for ſheep, or cattle: the weight of theſe plants, one with another, was ſomething more than eight pounds and two ounces; ſome few weighed fourteen and fifteen pounds. The produce upon an acre, on weighing this row, which was four hundred and ninety-eight feet long, amounted, at the ſame proportion, to twenty-five tons, fifteen hundred, three quarters and ſeven pounds, *i. e.* fifty ſeven thouſand ſeven hundred and ſixty-one pounds.

This crop was much greater than ever I had before; and, from ſome obſervations I have made this year, I am inclined to believe, their culture may be improved to a produce of ten tons more upon an acre: but, abſtracted from that, the produce already obtained is more valuable than any crop I know of, for they are invincible by the winter, either in or out of the ground. The great diſtreſs of even the careful farmer is in the months of March and April, for his ewes and lambs, when turnips are gone, or are but very indifferent food, and all other green winter-food is exhauſted.

Feeding ewes upon dry hay affords but little milk to their lambs; add to that, hay is not made without great expence and anxiety, over and above the rent of the land; for really, where the farmer is ſo unfortunate as to have his hay upon hand in wet weather, it is a buſineſs which will exerciſe his patience, no leſs than it will conſume his money.

One ſuperior excellence in theſe plants is, that ſheep will prefer them to turnips; another is, that they are a firmer and more ſubſtantial food: and, to aſcertain their firmneſs in texture, and quality in keeping after being drawn, I have kept them near twelve months expoſed to the open air, to the extremes of heat and cold, and, after that, they were ſound, ſave ſome few.

If any perſon who may cultivate this plant for ſheep, ſhould keep a large ſtock, he may let the plants remain in the ground till he wants them; in that caſe, he may turn the ſheep into the field, where they will eat them quite down to the ſtems; and, as the plants ſtand naturally above the ground, and by my manner of cultivating them, they are ſtill higher, by being placed on the tops of the ridges, the ſheep cannot dirty them, as they do turnips when turned into the crops; add to this, that when the ſheep have eaten all the leaves, and begin to eat the butts or turneps of this plant, they will not rot as turnips do, when wounded; but will certainly keep ſound, even after that, for ſix weeks or two months: nay, yeſterday, the fifteenth of February, upon dreſſing ſome of them for ſeed, I found ſome, which had been accidentally wounded by cows, upwards of three months ago, perfectly ſound, notwithſtanding the great quantity of rain which had fallen upon them.

When the leaves are wanted early in the winter for ſheep, or black cattle, or, the land is wanting for any other crop; in either caſe the plants may be taken up, the leaves taken off, and the turnips thrown any where upon a piece of ſound dry graſs ground, where they will keep, and be ready for ſheep in the ſpring: but this work is attended with ſome trouble and expence, the roots being very firm in the ground.

The latter end of December, and in January, the plants begin to throw out freſh ſhoots, which are to produce the ſeed; and, when they begin to do ſo, all the leaves of the preceding year fall off, being firſt greatly decayed; and as the leaves, in October and November, are really very numerous, and afford a large quantity of food for cattle, it is well worth the trouble to take them off before they begin to decay; and, when this is judiciouſly done, the trouble is very little.

The method which I would recommend is, that two men be ſent into the field, each taking one row before him, and, as he pulls off the leaves, laying them upon the ridge between the turnips; when theſe two ridges are finiſhed, or as many as may be thought neceſſary, let one horſe, or more, be brought with a pair of cleeves upon his back; let him be placed in the furrow, between the two rows; and, as he paſſes along, the two men fill the cleeves, which may be moſt conveniently done, from ſuch a diſpoſition of the buſineſs, without any injury to the turnips in the rows.

Where extenſive crops of theſe plants are raiſed, it will be very uſeful to collect all the roots, whether left in the field by ſheep, or otherwiſe ſeparated, and mix them with heaps of earth, where a putrefactive fermentation will ſhortly commence, by which the earth will be ſtrongly impregnated with volatile and fixed ſalts, and will then be an excellent manure; and, indeed, all ſucculent vegetables will contribute to the ſame end, under the like treatment.

I muſt beg leave in this place juſt to mention, for the conſideration of the ſociety, and which I earneſtly recommend to be tried by mariners, another uſe, to which, I think, this plant, may be converted, which is ſtill of more importance, than any which I have yet named.

We loſe more men in the beginning of a war in the navy, as I have been informed by the navy-ſurgeons, by the ſcurvy, than by the enemy, which is attributed to their ſudden change of food. From freſh proviſions and vegetables on ſhore, the men are at once brought to ſalt proviſions.

The turnip of this plant, I am inclined to believe, would keep three or four months on ſhip-board, perhaps longer; but the navy-ſurgeons have told me, that if it would keep ſix weeks, it would ſave the lives of many men. Something has been ſaid on this ſubject before, in a pamphlet intitled, Hints on Huſbandry, in a letter to the Dublin ſociety, printed by Flinn, in Caſtle-ſtreet.

I cannot diſmiſs this ſubject, without earneſtly recommending the culture of this plant to the attention of the farmer, particularly to ſuch as keep any ſtock; and, although the plant is very little known, except in the gardens of the curious, yet, whoever will cultivate it in the way I have here ſet forth, will find himſelf amply repaid for his labour; for how comfortable is it, for a man's mind to be at eaſe about his flock, in the months of ſcarcity? Whereas I have every year obſerved, that the farmer's ſtock, particularly ewes and lambs, are turned into his meadows to live upon the ſpringing graſs, to the irrecoverable injury of the hay-harveſt; as frequently have I ſeen them upon young clover, to the manifeſt injury of that crop.

I could enlarge greatly upon theſe injudicious practices; but in brief I ſhall only ſay, that if I ſhall live to ſee the culture of this plant generally eſtabliſhed, I ſhall have the comfortable reward of knowing that I have been uſeful to mankind; a circumſtance which will be more grateful to me, than if I had conquered a nabob, or extirpated an Indian nation.

December the eighteenth, I cut two perches in length of one of the rows of boorcole, which contained twenty-one plants; they weighed one hundred and eighteen pounds, which is very near five pounds ten ounces for each plant: but I am inclined to believe, that theſe plants will ſucceed as well, if they are planted only eighteen inches aſunder in the rows. However, at the above proportion, there would be ſeventeen tons and fourteen hundred upon an acre. But, if the produce would be the ſame, were the plants only eighteen inches aſunder, in that caſe an acre would produce, by this culture, above twenty-three tons and twelve hundred.

This plant is well worthy the farmers or graziers attention, for, as faſt as it is cut, it will again, in about a month or ſix weeks, afford another crop: I have been cutting theſe plants for my family-uſe ever ſince the middle of Auguſt laſt; I believe ſome of them have been cut three times; and they are excellent for the table. For feeding cattle and ſheep they are highly valuable, as no froſt will injure them; and, although the firſt crop amounts not to as many pounds upon any given quantity of ground as the others, yet the ſucceeding crops will, I believe, make their produce nearly, or quite, of equal weight with any other of the cabbage kind. But I muſt not omit to obſerve, that, as theſe plants afford only open leaves, and many of them very ſmall, there will be a little more trouble in collecting and carrying them to the ſheep and cattle, than there will be with the other kinds.

It may not be improper to obſerve, likewiſe, that, upon the approach of the ſpring, when they begin to throw out their ſpring-ſhoots for ſeed, if the large leaves have not been taken off for winter uſe, they will decay and fall off in the ſame manner as the turnip-cabbage leaves have already been deſcribed to do.

I have not yet tried it, but I believe that the beſt way of uſing this plant, would be to allot one whole field to the culture of it, proportioned in ſize to the ſtock intended to conſume the produce; and in September or October, to turn the ewes into the field for a few hours, morning and evening, and then lodge them on any piece of graſs or fallow, which may want improvement, to which they will greatly contribute by emptying themſelves upon it; and thus continue turning them into the boorcole field, till they have eat all the luxuriant leaves; then let the plants reſt a month, and there will be another crop. By having two ſmall fields under this crop, a flock of ſtore-ſheep might be maintained a whole winter at a very ſmall expence; for whilſt the produce of one field would be conſuming, the other would be coming on.

This method occurred to me from an accident, which attended my boorcole this year. My cows got into the field, and preſently devoured ſome of the leaves of the plants; theſe plants have engaged my attention ever ſince, and I have the pleaſure to ſee them again in a very luxuriant ſtate.

If any perſon ſhould be able to put this ſcheme in practice before I can accompliſh it, I recommend it to them, not to let the ſheep paſture ſo long upon the crop, as to wound the ſtalks for want of leaves; as too great an injury to the ſtalks may check the ſucceeding growth; which injury, I am inclined to believe, will not happen to the plants, at leaſt not in ſo great a degree, whilſt they have a ſufficient quantity of leaves.

It doubtleſs will be obſerved, that I confine this ſcheme to ewes or ſtore-ſheep: my reaſon for that is, that fat ſheep ſhould always have as much food before them, as they may chooſe to eat; add to this, that ſheep, when they are fat, are more ſubject to be lame, than ſtore-ſheep, to which ploughed ground will greatly contribute.

We ſhall now return to the ſtate of the field, in which it was after being manured, and ploughed into ſmall ridges of five feet breadth, with the compoſt under them in the fallow part, and part of the fallow with the lime and earth, and the potatoe ground aided with the lime.

Upon the fourteenth of July, I ſowed with my drill plough what remained of the ridges of the fallow manured with the compoſt. That part of the fallow which was manured with the lime and earth, and that part of the potatoe ground which was before deſcribed to be in ridges, with turnips: and that part of the fallow before deſcribed to be flat, and manured with a double proportion of the compoſt, I ſowed in the promiſcuous way with turnips alſo.

The drilled turnips filled only one row along the middle of each ridge.

When the drilled turnips were about three inches high, I thinned them by hand, as being much preferable, and more expeditious than any inſtrument, intending to have them ſingled out to about one foot aſunder in the rows: but, it being ſo new a work, the women could not be brought to do it effectually at once, they apprehending, that the whole crop would be loſt, and urging, that they were ſure there was already too much ground allowed to one row: under theſe circumſtances, I could not get this work done quite to my mind this year, as I had, beſides this field, two others ſown in the ſame way, amounting in all to about twelve acres.

My turnips ſhould have been ſown at leaſt three weeks earlier; but the immoderate, and continual rains of the preceding winter, involved me ſo much with my ſpring-ſowing, that I could not accompliſh my turnip-ſowing earlier.

The turnips, after being thinned, received the horſe-hoeings much about the ſame time, and diſtances, as the cabbages; with this difference only, that I deepened the furrows of but a few ridges in another field by a ſecond ploughing in the ſame furrow, which I did not find to benefit the turnips much: for, if the ground be well prepared before the ſowing, the depth of one furrow will be enough for turnips, provided that be deep and bold.

Thinning the turnips in drills by hand coſt me eight-pence an acre; weeding of them coſt me four-pence; and the repeated horſe-hoeings about fourteen-pence an acre for workmen's wages, excluſive of the horſes, of which I generally uſed two, except in very hot days, and then I found three were neceſſary.

The broad-caſt turnips were carefully thinned by hand, when they were about two inches high; which the women did with more courage than they did the drills; and ſometime afterwards, I hand-hoed them once, and wed them twice.

Thinning them by hand coſt me four ſhillings. Hoeing them afterwards coſt eight ſhillings, and weeding them coſt me two ſhillings and four-pence. They were ſcarcely half an acre; this expence being therefore doubled, they coſt me at the rate of twenty-eight ſhillings and eight-pence an acre, over and above the extraordinary ploughing, and double proportion of manure.

In truth, this crop greatly exceeded my expectations, being by far the beſt I ever had in the broad-caſt way; but I attribute their ſucceſs wholly to the thinning them by hand; for two, three, four, and often more, turnips will be ſo united and interwoven, that it would be impoſſible for the moſt dextrous hoer to ſeparate them; whereas the fingers and thumb will preſerve the maſter plant, whilſt the others are moſt conveniently drawn from it by the other hand of the perſon employed: add to this, that there is no labour in which we are more liable to be deceived, than turnip-hoeing.

In one of my other turnip fields I manured about an acre of ground with ſhell marle, which I ſowed in drills with turnips in the ſame manner as the former, on the ſixteenth of July.

In the ſame field, I manured about half an acre with the native earth, which had been expoſed to the weather for upwards of two years, which I ſowed likewiſe in drills with turnips on the ſixteenth of July.

Both theſe crops were thinned by hand, and horſe-hoed, in the ſame manner as the former.

Thus we have five experiments in the drill way upon turnips, with different manure. One with the compoſt already deſcribed, one with lime, one on potatoe ground, aided with lime, one with ſhell-marle, and one with native earth; and alſo one in the broad-caſt way, with a double proportion of the compoſt, and an extraordinary ploughing.

The principal point to be determined by theſe experiments is, whether ſowing turnips in drills, or the broad-caſt way, will afford the heavieſt crop: but the trials with the different manures will, I hope, be alſo uſeful.

The produce of drilled and broad-caſt turnips compared.

December the ſeventeenth, I meaſured out three ſquare perches of the beſt of the broad-caſt turnips, and alſo three ſquare perches of the drilled; and the produce was as follows:

The three perches of the broad-caſt turnips weighed ſixteen hundred weight and one quarter, i. e. one thouſand eight hundred and twenty pounds; which, at the ſame proportion, amounts upon an acre to forty-three tons, five hundred weight, three quarters and ſix pounds, i. e. ninety-ſix thouſand nine hundred and ſeventy pounds.

The three perches of drilled turnips weighed ſeventeen hundred weight, two quarters, and twenty-one pounds, i. e. one thouſand nine hundred and eighty-one pounds; which, at the ſame proportion, amounts upon an acre to forty-ſeven tons, two hundred, three quarters, and two pounds, i. e. one hundred and five thouſand five hundred and ninety pounds.

	T.	C.	Q.	lb.		Pounds
An acre of drilled turnips	47	2	3	2	or	105590
An acre of broad-caſt ditto	43	5	3	6	or	96970
In favour of the drilled	3	16	3	14		8620

Thus we ſee, that, notwithſtanding the extraordinary proportion of manure, and the extraordinary ploughing, which was afforded to the broad-caſt turnips, the drilled crop, with intervals of five feet, produced the greateſt quantity upon an acre, by three tons, ſixteen hundred, three quarters, and fourteen pounds weight.

The drilled turnips in my other fields were very large, regular, and even crops, as many gentlemen ſaw during their growth.

Thoſe ſown on the acre manured with the ſhell-marle were very near as good as the reſt—thoſe ſown on the potatoe ground were not near ſo large, but were regular—thoſe ſown on that part of the fallow-ground which was limed, were very poor crops—and thoſe ſown on the ground manured with the native earth were miſerable.

The crops in my other fields were all treated in the ſame manner as that already deſcribed; except, that the fallows were broke in September, 1763, inſtead of March, 1763.

It now remains to deſcribe the nature and quality of the land, and then to draw concluſions from the various experiments.

The land lies upon a lime-ſtone quarry, which is very near the ſurface; and is, naturally, a very ſtrong and ſtubborn ſoil, with an infinite number of looſe lime-ſtones in it. With dry winds, or a parching ſun, the ground unites, and is as hard as bricks; moderately wet, it is reducible by inſtruments; but, when thorough wet, it runs together, and is like brick-clay when tempered. This, I repeat it, is the natural quality of the land, and is what the writers would call a barren, grey, ſtiff earth, but is not quite a clay.

I have found repeated tillage, when the land is in a proper ſtate of moiſture, will reduce it, and diveſt it of its natural adheſion. Tillage and manure together render it capable of producing any thing; as, I believe, ſuch agents will do upon any land, provided it can be kept moderately dry. The fields, which I had under turnips and cabbages, have been in appearance all the ſummer a fine loam, and really bore the complexion of very fine land, abſtracted from the rich appearance of the crops.

I recommend to the practice of all perſons, who may have ſuch land as this to work upon, never to harrow the fallows before winter, but as early as may be in the ſpring, and during the working the fallow in the ſummer, but not to leave more than one day's ploughing unharrowed, but rather harrow in the evening what has been ploughed in the morning, and then the harrow will reduce it; but if the ploughing is continued for two days, without any harrowing, the harrow will have no more effect upon the land, than it would have upon bricks, unleſs it be moiſtened with rain; in which caſe it will be reducible, as, it may be remembered, I deſcribed the potatoe ground to have been reduced, after rain which fell on the twelfth of May.

Concluſions to be drawn from the preceding experiments.

Theſe experiments prove gardens to be no more than farms in miniature, under an extravagant expence of culture; ſince we can with the plow raiſe more tons of the larger kinds of garden vegetables for twenty ſhillings, than by the ſpade for as many pounds: and indeed, I do not ſee, why moſt of the ſmall ones may not be raiſed in the ſame way.

They alſo prove, that it is profitable for the farmer to raiſe different ſpecies of cabbage for his cattle in winter; and I have it in contemplation to try them for ſummer uſe alſo. However, for the winter, it is an object of great importance, not only to the well-feeding of cattle, but to the ſaving an infinite conſumption of hay, which by this huſbandry may, at leaſt, be paſtured in ſummer.

The experiments on the turnips prove, firſt, that it is more profitable to raiſe them in drills, than in broaſt-caſt: ſecondly, that the culture is a great deal cheaper: thirdly, that leſs manure will produce a larger crop, than in broad-caſt, provided it be diſpoſed in the ſame way as mine was: fourthly, practice ſhews the expence of drawing the drilled turnips for ſheep or black cattle, to be at leaſt two-thirds leſs, than drawing the broad-caſt: fifthly, in the drill way not a turnip need be left upon the ground; whereas, in the broad-caſt way, the leaving many is unavoidable, to the great annoyance of the ſucceeding crop, particularly if that ſhall be barley: and ſixthly, that the land is left, after drilled turnips, in a much higher ſtate of preparation for a ſucceeding crop, than it can poſſibly be in the broad-caſt way. To theſe advantages another may be added, which I find very material, viz. that of ſlicing them for black cattle, which is highly neceſſary, even when they are ſmall, nay more ſo, for cattle are ſometimes choaked with a ſmall turnip. A man will be near as long ſlicing a ſmall turnip as a large one, and will make no diſpatch; whereas, my men and boys now ſlice for me every evening about nine hundred weight in an hour; which is a taſk upon them after night-fall, except on Saturday nights; then they ſlice double the quantity.

As it ſeems to be a paradox to ſay a man will ſlice a large turnip as ſoon as a ſmall one, it may be proper to explain it to the reader. The man is in danger of cutting his hands when he is ſlicing a ſmall turnip; but in no ſuch danger with a large one: and, beſides that, one ſlice of a large one contains more food, than two or three whole ſmall ones.

Theſe experiments prove, that the potatoe tillage, in the manner it is now generally practiſed, is not ſo beneficial an improvement of land, at leaſt not of ſtrong ground, as is generally imagined; although there is a greater conſumption of dung than in any other huſbandry.

The experiment with the lime, upon the fallow ground, proves lime to be an inſufficient manure, for the high improvement of lime-ſtone ground. There are ſo many advocates for lime as a manure, that it is adventurous to ſay any thing againſt it; but, I hope, the reader will obſerve, that I pronounce upon it, as being inſufficient, "for the high improvement of lime-ſtone ground." I have tried lime in another field of my farm, in which I ſowed wheat, and my ſucceſs was no better in that than in my turnips: and I earneſtly recommend it to every improver, who may have favourable opportunities of getting lime, that he try it upon a ſmall patch, before he launches into a large expence for it; ſuch caution may perhaps ſave him money. This advice ariſes from practice; for, I imprudently burnt a large quantity of lime, at an expence of near an hundred pounds, and, I can truly ſay, I have not received in benefit as many ſhillings.

The experiment with the ſhell marle, proves that to be a very high and excellent manure; for, as it will produce turnips upon poor ground, it may be ſafely relied upon for any other crop.

The native earth proves to be perfectly inſufficient for turnips; though it certainly mends the ground a little, beſides that it adds to a ſhallow ſoil.

Accidents and diſtempers.

Turnips are ſubject to be deſtroyed by the fly. In an orchard I ſowed two acres with turnip ſeed in drills in July laſt. They were invaded by the fly; I had a conteſt with them for a fortnight, and at laſt conquered them, with a loſs of only four or five perches of my turnips, which happened where there were moſt trees. Every morning before the dew was off, I had the rows daſhed with lime, which was ſlacked every day on purpoſe. This lime adhered ſo cloſely to the leaves, when they were wet with the dew, that it defended the upper ſides from injury: then I found the flies began upon the under ſide of the leaves, which I had never ſeen them do before; however, upon this, I was obliged to have the duſt thrown very low; and, whilſt the plants were wet, a great deal adhered to them, even on the under ſides:—thus I ſaved my turnips, which were as fine a crop as any I had, ſave the four or five perches before-mentioned.

The upper ſide of the turnip leaf, in its infant ſtate, is very ſmooth, and on that part the flies always lodge, unleſs they are interrupted; in that caſe they will deſtroy the plants by wounding the under ſide, which is not ſo inviting to the inſect as the upper, it being a little rough, though not enough to protect it from them.

The greateſt inconvenience I found in this work was, that every little ſhower of rain waſhed off all the lime, and then the work was to begin again; ſometimes I repeated it three times a day: however, it will be found to anſwer well, but it requires to be done with care.

I have, by the ſame method, ſaved lucerne, which is alſo ſubject to be deſtroyed by the fly, upon its firſt coming up.

I diſcovered laſt ſeaſon three diſtinct ſpecies of the turnip fly (if I may ſo call it) one of them is black; it ſeems to hop like a flea, and reſembles it exactly. The ſecond is a ſmall degree larger, and very diſtinguiſhably has wings, upon which are two ſmall white ſpecks; and the inſect is of an oval form. The third is like a domeſtic fly, but not by a fourth part ſo large.

The turnip-cabbage is ſubject to the ruſt, or mildew. In my orchard I had ſome plants put out, at different diſtances, for experiments; they grew very well for a time, but they were all infected with the ruſt, and thoſe neareſt the trees ſuffered moſt. In my field I could find but three, which were injured by this diſtemper. This ſeems to prove, that they require an open expoſure; and therefore they better ſuit the purpoſe, for which I have recommended them.

Turnips, cabbages, turnip-cabbages, and boorcole, are food for black cattle and ſheep.

A ſheep, I find, will conſume about twenty pounds of turnips in twenty-four hours, provided they are allowed as many as they can eat, which ſhould always be allowed to fat ſheep: but as ſheep vary in ſize, ſo I preſume will they conſume more or leſs food.

An acre of turnips, of forty-ſeven tons to an acre, will maintain one hundred ſheep fifty-two days, allowing each ſheep twenty pounds a day. My ſheep weigh about twenty pounds a quarter.

In the month of November laſt, I gave my ſheep acceſs to ſome pea-ricks, which I had erected on purpoſe for them, of which they eat with great eagerneſs; but I find they affect them in the ſame manner as they do horſes, when given to them new; for the ſheep, I apprehend, from violent cholicks, which, I conceive, the peas gave them, were ſeized with ſtrong convulſions; and in this way I loſt ſix of them, in a few days, before I conſidered what could be the cauſe: but having examined the inteſtines of every one of them, and finding no ſymptoms of any other diſeaſe, I was led to draw the above concluſion; and what ſeems to confirm my opinion is, that I have not loſt one ſince I took them from the peas. If other perſons have not met with the like accident, who have fed their ſheep with new peas, it ſhould ſeem that turnips and peas together do not agree with ſheep. However, that is a fact which I ſhall ſoon be able to determine, for I ſhall admit the ſheep to the peas again to-morrow, which will be the twentieth of February; a ſeaſon in which it is imagined we may ſafely give peas of the preceding year to horſes, and therefore, I conceive, there can be no danger in giving them to the ſheep: but, if they ſhould be affected as they were before, I think there cannot remain a doubt, that the peas and turnips diſagree in their ſtomachs. And here I ſhall leave a ſpace to add to my report hereafter.

Now, the fifteenth of March, the ſheep have been ever ſince at the peas, and I have not loſt one.

Of cabbage, and turnip-cabbage, a ſheep, of about twenty pounds a quarter, will conſume about fifteen pounds a day. An acre, at that rate, will maintain one hundred ſheep about thirty-four days. The cabbage, and turnip-cabbage, are a firmer and more ſubſtantial food than turnips.

I have fed a cow this winter upon turnips, and I have now two bullocks which are ſtall-feeding upon turnips alſo. It is computed that they weigh between four and five hundred weight each; and I find by experiment, that they each of them eat about two hundred and ſixteen pounds in twenty-four hours; which is, therefore, about half their own beef-weight; from hence we may, with reaſon, imagine a beaſt will eat every day of turnips, at ſtall-feeding, about fifty-ſix pounds for every hundred weight of beef he may contain.

One of the bullocks was put up miſerably poor from the plough, for an experiment, on the fourteenth of December: he took kindly to the turnips; and on the ſixteenth I began to give him, with his turnips, pea-flower, to the amount of eight pounds every day; and I find he is greatly improved, but he will not be beef; though I am very inclinable to think, that if he had been put up ſix weeks ſooner, in April, he would have been good beef. This experiment I ſhall repeat next year. What induced me to mention it here is, that ſome other perſons may perhaps try it next winter, and, if they ſhould, I ſhall be much obliged by their report of the effect. I am led to believe, that bullocks may be profitably fed with peas, becauſe horſes, and pigs, thrive very faſt upon them.

When the cattle are firſt put to turnips they dung but little, the turnips going off chiefly by urine, the quantity of which is really incredible; but, after ſome time, they dung more; and, from a whitiſh colour, the dung reſumes the natural colour, and is of the common firmneſs. I allow each of the cattle ſeven pounds of hay every day, and I do not find that they eat fewer turnips on that account; the reaſon, I believe, is, that the hay makes them more eager for the turnips. They refuſe water.

To each of my cows, and ſtore-cattle, I allow ſeventy-two pounds of turnips a day, and a little ſtraw, thirty-ſix pounds being what I find a moderate-ſized beaſt will eat at a meal. To my plough bullocks I allow the ſame quantity of turnips, with as much ſtraw as they can eat; but I forbid their having the turnips till they have been unyoked about an hour, and after they have eat ſome ſtraw; as I conceive the turnips are too cold for them immediately after their labour.

I have lately confined a milch cow four days, and fed her with turnips, and I could find no diſagreeable flavour in her milk from that food, though I have often heard turnips complained of as giving a bad taſte to the milk, when cows are fed with them. Query, whether it might not ariſe from the leaves of trees falling upon the turnips? Leaves of trees always ſpoil the milk when cows eat them.—Here follow,

Calculations upon the feeding black cattle with turnips and cabbages.

Suppoſe four cows or bullocks, of four hundred weight each to be ſtall-fed upon turnips, allowing each beaſt two hundred and ſixteen pounds a day, an acre of forty-ſeven tons would maintain them one hundred and twenty-one days. Indeed a larger ſtock ſhould be put up, or heavier cattle, as the turnips will not keep ſo long.

Suppoſe ten dairy cows to be maintained upon turnips, allowing each cow ſeventy-two pounds of turnips a day; at this rate, an acre of forty-ſeven tons will keep them one hundred and forty-ſeven days. All cattle, fed in this manner, ſhould have about ſeven pounds of hay a day allowed to each.

The fat cattle eat about one hundred and a half of cabbages a day; therefore an acre of twenty three tons will, at that rate, maintain four bullocks, of four hundred weight each, ſeventy-ſix days.

When fed with cabbages, they dung more, and make leſs urine, than when they are fed with turnips, and will drink a little water.

Hence I am induced to believe, that cabbages are a better food for cattle than turnips. I am fully perſuaded near as many tons may be raiſed upon an acre, with proper ſeed and good management; but they will coſt five or ſix ſhillings an acre more.

There remains one general obſervation to be made, and which I imagine contributed greatly to the ſucceſs of the abovementioned crops, viz. that we had for theſe ſpecies of crops, very ſeaſonable and fine rains. From the ſixth of July, on which day I began to put down my cabbage-plants, to the firſt of December, both incluſive, we had ſeventy days, in which there was, more or leſs, rain; and the latter end of Auguſt, and beginning of September, the heavieſt dews that I have ſeen. From the ſixth of July to December the firſt, both incluſive, were one hundred and ſeventy-ſeven days; ſo that we had but one hundred and ſeven dry days, many of which, I ſee by my kalendar, were cloudy and inclinable to rain.

“ Land, ſays an Eſſex farmer, cannot be brought into too good tilth for ſowing turnips: they require a deep, looſe, well-wrought mould; and to effect this, diſcreet plowing and harrowing is the beſt way. I ſay diſcreet, becauſe one plowing, properly timed, is worth three that are out of time. It is a maxim in huſbandry, that ſome land cannot be plowed too much; but we ſhould add, at proper ſeaſons and intervals, or an ignorant farmer might ruin himſelf, and yet think he had followed the directions that were given him.

“ A light land requires leſs plowing, as well as leſs nicety in the times of plowing, than a ſtiff heavy ſoil; and it is alſo ſooner brought into good tilth: two well-timed plowings will often do it; whereas a clayey ſoil will require three or four, before it is brought into order.

“ An early plowing will greatly forward the getting a ſtiff ſoil into order: the month of April ſhould be the lateſt that ſuch, when intended for turnips, ſhould be turned up. It may then lie till the beginning of June, when it ſhould be harrowed down with loaded harrows to break the clods, and immediately croſs-plowed: about a fortnight after this it ſhould be plowed for the laſt time, and immediately croſs-harrowed and ſowed out of hand with the turnip-ſeed pretty thick, and ſcratched with a light harrow to cover the ſeed.

“ Light lands, as I ſaid before, may do very well with two plowings, one in the ſpring, and the other juſt before ſowing at Midſummer.

“ I look upon it that turnip-ſeed cannot well be ſown too thick, for it ſeldom all comes up, and of what does get above ground, much is often deſtroyed by the fly, and ſlug; ſo that the plants ſometimes, though the ſeed was ſowed thick, require but little thinning by the hoe. In fact, I think it better at firſt to beſtow an additional quantity of ſeed, than to have to ſow three or four times over, as I have been often obliged to do, till I practiſed this method of ſowing thick, which generally ſucceeds very well with me.

“ The beginning of July is the time in which I, for the moſt part, ſow my turnip-ſeed: in this matter the grand affair is to hit it off, ſo that the turnips do not grow ſticky or ſpongy before the winter, and yet are forward enough in their growth to reſiſt the froſts, &c. and be fit food for the cattle in the winter, or in the ſpring.

“ To have a good and profitable crop of turnips, it is abſolutely neceſſary they ſhould, at proper times, be hoed, not only to kill the weeds, but alſo to thin the plants, and ſet them out at a proper diſtance.

“ The proper time for the firſt hoeing, is when they have put forth their fourth leaf, and the ſecond hoeing ſhould be in about three weeks afterwards: twice is, in general, enough, unleſs a very following rainy ſeaſon ſhould come on, when it will be proper to take the advantage of the firſt ſun-ſhine weather, to give them a third hoeing: this, indeed, is often neglected, but I always found it pay well, by the thriving condition it put my crop in.

“ As to the diſtance at which the plants ſhould ſtand one from the other, that muſt be regulated by the ſize of the turnip; but it ſhould be never leſs than one foot, nor is there occaſion for its being more than two: about ſixteen or eighteen inches is a proper diſtance for the common turnip we generally ſow about me.

“ If the ſoil, on which the turnips grow, is light and dry, the moſt profitable way is to feed your ſheep on them in the ſpot where they grew; but if the ſoil is heavy and ſtiff, it is beſt to have them pulled, and carried in tumbrils on to ſome dry paſture, or on any dry field you want to mend; for was you to feed them on the land, one half of them, at leaſt, would be rolled in the dirt, trodden under foot, and ſpoiled.

“ Land cannot be too rich, or too well dunged, for bearing turnips; and this will bring them forward, and make them eſcape the fly better; for when once the leaves become rough, the fly does not chuſe to touch them: it is therefore certainly beſt to encourage them in their growth, and bring them as ſoon as poſſible out of danger.

“ When my young crop of turnips have come up, and I have been fearful of the fly, I have frequently ſown over them wood aſhes, and ſometimes ſoot: theſe have been of great ſervice, eſpecially if gentle rains followed, as neither the flies nor ſlugs choſe afterwards to touch them. But I muſt obſerve, that this is no ſafe remedy, if the weather is dry and hot, for aſhes being of a hot nature, will then be apt to burn up the crop.

“ As to the ſlugs, the beſt way of deſtroying them in dry weather is with a light roller: this cruſhes and kills them, and does the crop ſervice, eſpecially if it is light land; for it preſſes the particles cloſer, ſo that the moiſture in the earth is not ſo ſoon exhaled by the heat of the ſun; conſequently, the young turnips do not ſo ſoon ſuffer by a continued drought.

“ It is ſcarcely neceſſary to obſerve, that dry weather is beſt for hoeing turnips in, as then neither the weeds nor the turnips that are cut up are apt to grow again.

“ In light gravelly or ſandy ſoils, the ſeed of turnips may be deeper covered than in ſtiff clayey land: in the firſt it may be pretty well harrowed in; in the latter, it ſhould only be ſlightly ſcratched with a very light ſhort-tined harrow, or even only buſh-harrowed; as by that means they will ſooner appear above ground, be ſooner out of danger, and thrive better afterwards, the apple of the root growing almoſt entirely out of the ground, the whole nouriſhment being collected by the tap-root, and by the horizontal roots, which iſſue from it on all ſides.

“ The quantity of ſeed to be ſown on an acre, ſhould be from two to three pounds, according to its goodneſs; and many uſe equal qnantities of old and new ſeed, thinking this method beſt; for the new ſeed comes up firſt, and if the fly takes it, the old ſeed in a day or two ſucceeds, and generally fares better.

“ If a crop of turnips fails, either through any defect in the ſeed, or by the ravages of the fly or ſlug, it is uſual for the farmer to ſow the ſame land again; and this, if there is occaſion, he repeats two or three times, till at laſt he ſecures himſelf a crop. For the reaſon above-mentioned, it is eſteemed beſt to ſow early, as by that means there will be time, if the firſt crop fails, to ſow another.

“ Turnip-ſeed is very apt to take damage from wet, if it is not covered as ſoon as ſown: without this precaution it will ſprout prematurely, malt, or mould: by too early a germination the ſeed is apt to burſt.

“ When peas are ſown on a rich mellow earth, they are apt to grow rank: in this manner they cover the ground, keep the moiſture in it, raiſe a kind of fermentation in the ſoil, and make it hollow and porous; inſomuch that when the crop has been off, turnips have been harrowed in without plowing, and have thriven amain: but there is danger in purſuing this practice without great caution.” *Muſeum Ruſticum, vol.* I. *pag.* 205.

“ I have, in my time, ſays a Norfolk farmer, ſown a great deal of land in turnips, and have applied them with great advantage to various uſes; but our chief reaſon for cultivating them in this county is for feeding and fattening ſheep.

“ It is almoſt needleſs to ſay, that they anſwer this purpoſe extremely well: their uſe is too well known to all the eaſtern farmers, to be in theſe days controverted.

“ We have various methods of ſpending them: ſome fold their ſheep on the land where the turnips grew; I have done this, but it is not a method I approve of: however, for the benefit of ſuch farmers as chuſe to practiſe it, I ſhall give one caution; which is, that they uſe wicker hurdles for folding their ſheep, which will otherwiſe be apt to thruſt their heads through the bars, and, tangling themſelves, are by that means often killed in the night, to the great loſs of the owner.

“ If, however, it ſhould not be convenient to the farmer to get theſe wicker hurdles, but he ſhould be obliged to take up with thoſe made of reft ſtuff in form of a gate, let him then be careful, when he has ſet his hurdles, and ſtaked and bound them tight, to pull up all the turnips that grow within two or three feet of the outſide of the fold, and throw them over the hurdles for the ſheep to eat within-ſide.

“ This will take away any temptation the ſheep may have to put their heads through the bars, and they will, by that means, eſcape the danger of being ſtrangled.

“ Every animal is fond of liberty; and though the ſheep will bear confinement, perhaps, better than any other creature, yet whoever has ſeen them when firſt driven into the fold, muſt have obſerved that they naturally go round the hurdles to try to find an opening to get out at: by this means the turnips which grow near the hurdles are trampled on, dirtied, and ſpoiled. For this there is a very eaſy remedy; let the ſhepherd only pull up all the turnips that grow near the inſide of the hurdles, and all will be well.

“ I obſerved before, that I am not fond of giving my ſheep turnips as they grow: I think it much the better way to have them pulled; by this means they have an opportunity of eating the whole root, and my ſtock of winter-fodder goes much farther; whereas, when they feed on the turnips as they grow, they generally ſcoop them out, and leave a hollow ſhell in the ground, which, though it may afterwards be forked up, the ſheep will ſcarcely even by hunger be induced to touch, as it cannot but be ſoked by the dung, urine, and dirt, from the feet of the ſheep.

“ *I find it then the beſt way,* to have my turnips pulled before they are given to my ſheep; they go much farther, and do them more good.

“ But in this method there is one ſeeming inconvenience, which is, that in froſty weather, when the ground is hard, I cannot have them pulled; yet this difficulty is very eaſily removed, by laying up, at the beginning of the winter, a ſufficient ſtore of turnips, ſecured from wet, and not much expoſed to froſt.

“ I think it worth while to have a building particularly dedicated to this uſe, and find it anſwer well: it is built in form of a ſmall barn, and boarded round.

“ In the beginning of the winter, before the froſt ſets in, I have a large quantity of turnips pulled, and the dirt is carefully ſcraped off them; and, after cutting off the heads and tap-roots, I cauſe them to be regularly laid in my ſtore, with this caution, however, that all round the ſides next the boarding, my men lay ſtraw, to keep out the froſt. The heads, or tops, I give to all my cattle in general, as they are cut off; by which means I, in fact, ſuffer no loſs.

“ I find theſe ſtored turnips a happy reſource when hard weather comes on; then I open my repoſitory, and deal them out to my ſheep in ſuch a manner that there may be no waſte; and as ſoon as the weather breaks, and the earth becomes leſs hard, I reſort again to the fields, and have them pulled as uſual.

“ For ſome years I had another manner of ſtoring my turnips, which was by digging a deep pit in a ſandy, dry field, which being filled with turnips, they kept there very well; yet, as this method was ſubject to many inconveniencies, I left it off.

“ I have diſcovered another uſe for the turnip, beſides feeding my ſheep, oxen, and cows with it, which I muſt mention before I conclude this letter. I find it agrees remarkably well with hogs, which will eat of it greedily, and thrive on it apace.

“ I have ſeveral times tried this, and have often killed fine young porkers that had for many weeks eat nothing but turnips boiled in ſwill, or waſh, till they were tender.

“ I have at other times given turnips to large hogs, that have been put up to fatten, in order to their being killed and ſalted for family uſe; and here I was not diſappointed in my hopes; they always came on well: but I made it a cuſtom to give them, for a week or two before they were killed, a few buſhels of boiled peas, in order to harden their fat, that it might not boil away in the pot.

“ I gave them boiled peas rather than raw, becauſe, having been long uſed to eating the ſoft turnip, I found they did not afterwards take kindly to the hard, raw pea.

“ Hogs may eaſily be brought to eat raw, unboiled turnips; but it is much better to boil them when the hogs are to be fattened; for, though they will eat enough of them raw to keep them in tolerable good plight, yet they will not eat enough to fatten them apace.” *Muſeum Ruſticum, vol.* I. *pag.* 335.

“ I had laſt winter, ſays an ingenious clergyman of Northampton, a piece of turnips intended for feeding ſheep; but my method of conſuming them at firſt aſtoniſhed my neighbours.

“ I fed them off by the fold; but I firſt turned in ſome ewes, which greedily devoured all the tops and leaves: when they had finiſhed them, I immediately folded my ewes on a freſh ſpot.

“ After the leaves were eat off the firſt ſpot encloſed by the hurdles, by the ewes, I turned in ſome wethers, which eat with a very good appetite the apples of the roots, leaving, however, the lower part ſcooped out in the ground: theſe I had forked up, and they were eat by my ſtore-ſheep.

“ My neighbours were convinced my method was right, becauſe I evidently kept and fattened more ſheep on the ſame quantity of land, than they did; yet they begged I would give them my reaſons for this my practice.

“ I told them I would readily comply with their requeſt, and the more ſo as it might be a means of tempting them to imitate what they ſaw practiſed with ſucceſs.

“ Continuing my diſcourſe, I informed them that many years experience, and conſtant obſervation, had convinced me, that if you turn a parcel of ſheep promiſcuouſly into a field of turnips, the ewes and lambs would immediately attack the leaves; the fattening wethers would, for the moſt part, prefer the apple of the root; and the ſtore-ſheep, not being nice, would indiſcriminately devour both leaf and apple, and even eat the leavings of either of the others.

“ I farther informed them, that I had frequently obſerved, that when a parcel of wethers have been turned into a piece of turnips, the farmer, thinking to have no waſte, generally kept them in till they have eat the roots clean up. But this is very bad huſbandry; for after the wethers have eat the moſt delicious and ſweet part of the root, they loathe the reſt, which is generally gritty, dirty, and ſodden, inſomuch that nothing, but abſolute hunger, will tempt them to taſte it. In this period they pine, and loſe fleſh; and by the time they are turned into a freſh bite of turnips, they are but little better than they were at firſt.

“ The appetite of a beaſt that is fattening ſhould be tempted, not palled; and undoubtedly, ſuch of the ſheep as are moſt forward will be moſt delicate; and this delicacy, if the farmer is wiſe, he will indulge, as it will eventually turn out to his advantage.

“ Thus, in my manner of feeding turnips, the ewes come firſt, becauſe they prefer the leaves; the wethers that are to be fattened follow, and make the moſt pure and ſweet repaſt; and the ſtore-ſheep, which are the leaſt nice of any, come laſt, and clear off the remains; at leaſt, as much of them as they ought to be permitted to eat; for I do not hold it good to oblige them to eat what are in a half putrefied condition, and ſodden with dung and ſtale.

“ My neighbours were ſo well pleaſed with my reaſons, and ſo well convinced by what they ſaw, that they are determined to adopt my practice; and if any of your readers ſhould be of the ſame mind, it would give me great pleaſure, as I cannot feel a truer joy than what reſults from my endeavours to be of ſervice to my fellow creatures.” *Muſeum Ruſticum, vol.* II. *pag.* 231.

“ I laſt year ſowed ſome turnips, ſays a farmer near Chelmsford, on near ten acres of good light land. Some other buſineſs interfering, prevented my getting them hoed in due time, inſomuch that, by the latter end of Auguſt, they ſeemed to be almoſt covered with weeds.

“ Being willing to endeavour at recovering my crop, I cauſed the field to be harrowed and croſs-harrowed, which ſet them out pretty well, and cleared away a great number of the weeds, inſomuch that the turnips got ahead, and grew to be a tolerable crop.

“ I ſend you this for the information of ſome farmers, who, when they have delayed hoeing their turnips for a few weeks, if the weeds get forward, think they have loſt their crop; whereas, would they adopt this method, which has been more than once recommended, they would find it anſwer any reaſonable expectation they could form. I have ſeveral times tried it, and it always ſucceeded with me more or leſs. The work coſts but little, and the benefit reſulting from it is conſiderable. I have known farmers plough up a crop of turnips which, by harrowing, would have yielded them a good return.” *Muſeum Ruſticum, vol.* V. *pag.* 239.

“ I have known many, ſays farmer White of Suffolk, who intend feeding off their turnips with ſheep, keep the turnips till they are too old to be applied with advantage to that uſe. Your readers may give me credit, for I ſpeak from experience; and I can aſſure them, that one acre of young turnips is of more value for fattening ſheep than two acres of old ones, as the wethers you turn in will get fleſh and fat at leaſt as faſt again on the firſt as the laſt.

“ Let this maxim be treaſured up in the farmer's memory; and let him not at any rate be tempted, for the ſake of ſpending a few weeds and graſs on his fallows, to keep his turnips till they are of little worth.

“ If any of your readers ſhould be incredulous, let them try the experiment; it will be but little expence, and ſtill leſs trouble. I did ſo myſelf before I adopted the practice, and was in a very ſhort time convinced: this happened ſome years ago, and I have continued this method ever ſince.” *Muſeum Ruſticum, vol.* II. *page* 279.

We ſhall conclude this article with the following letter we were favoured with from Mr. Matthew Cox, of Wallhampton, near Limington, in Hampſhire.

“ I have, ſays he, incloſed you a draught of a hoe-plough, which I have found to anſwer very well for hoeing carrots and turnips, which may probably be improved by ſome of your ſociety: the following is the particulars of its ſucceſs this year, 1766. I took poſſeſſion of the farm I live on in April, and going ſoon after to London, ordered my ſervant to ſow two acres of carrots with four pounds of ſeed; on my return, I found he had ſown all the ſeed I had left him, being twenty-eight pounds. In May the carrots came up as thick as ſand on the ſhore. The people here being intirely unacquainted with the method of hoeing, made my work very tedious, as I was obliged conſtantly to attend them, it coſt me ſixteen and ſix-pence *per* acre, and the work not half done; I then harrowed them, &c. according to Mr. Billing's directions, and in June found ten times too many to come to any ſize; but could not get the ſecond hoeing performed under one guinea *per* acre: I then gave directions for this hoe, which I fixed to the common horſe-hoe plough, and hoed my two acres in five hours with eaſe; next day I harrowed them with common harrows. About ten days after I harrowed them again, and have kept nine horſes on them ever ſince Auguſt, except a quarter of oats in ſeed time.

Whoever uſes this plough will find it anſwer the firſt hoeing extremely well, as it will leave whatever it hoes in two inches and a half diſtant; conſequently the ſecond hoeing, which muſt be by hand, will be very trifling; and often there will be no occaſion for it. I firſt hoe the long way of the land, and then croſs it. The hoe I have is bare two inches; but I find it is too narrow.

a a, Plate XXVI. Fig. 5. are the two out-ſides of the hoe, which are flat, and ſo go on the out-ſide of the block on the common horſe-hoe at A A, Fig. 4.

b, Goes on a mortice at the bottom of the block, at *b*.

c, The pin goes through the holes on the flat ſides of the hoe at *a a* and the block A A.

d, *d*, *d*, The cutting parts two inches and a half wide; and leaves a ſpace of two inches and a half.

E, A chain that hooks to a ſtaple on the beam, and keeps all ſteady. I have ploughed ten inches deep with this hoe.

F, F, Two bars of iron worked in to the three uprights.

I always uſe the harrow belonging to the common horſe-hoe with the above. I ſometimes fix M. De Villier's cultivator to the above carriage. I have a field of twenty-two acres of wheat, in which is ſixteen different ways of ſowing, preparing the ſeed, and manuring the land.

TURNIP-CABBAGE, the name of a ſpecies of cabbage, ſo called becauſe the ſtalk, at ſome diſtance from the ground, after riſing of the uſual thickneſs, and in the manner of thoſe of other cabbages, enlarges ſuddenly to ſuch a degree, that it forms a knob of a very large turnip; of which likewiſe it has ſometimes the figure, though it is, in general, more oblong.

By this peculiar formation of the ſtalk, or production of the turnip-like knob, together with its being perennial, this ſpecies of cabbage is diſtinguiſhed from all others. From the top of this turnip riſe a number of leaves, of a greeniſh-red, or ſometimes greeniſh-purple colour; which anſwer to the radical leaves in other plants. They do not, though this plant is truly of the cabbage kind, ever cloſe together, and form a compact globular or oblong maſs, as in the common ſpecies; but keep their erect growth, or turn outwards.

From among theſe leaves ſpring a number of other ſtalks, of which, thoſe that are nearer the extremity, branch, and ſend out flower ſtalks, ſpreading horizontally; and thoſe that are more in the center, grow erect, and without branches. On theſe ſtalks are leaves, ſpringing out alternately, and of the ſame colour with the others. The flowers are ſmall and yellow, and ſucceeded by long cods, full of ſeed, of the ſize of that of muſtard, and a light-brown colour. We have given a figure of this plant on Plate XXVI. Fig. 6.

It may be juſtly doubted, whether or no this plant be originally a native of our country; though it is at preſent found growing wild in ſome places near Dover. But, from its general character, which does not agree with the indigenous plants of the ſame kind; from its being unknown to the earlier botanic writers, or, at moſt, known only in the view of an exotic; and from its being now to be met with wild, only in the one place mentioned, it is moſt probable, that what is there found was the produce of ſeed conveyed originally thither by ſome accident; and which has ſince propagated itſelf, and ſpread ſpontaneouſly, as it eaſily might, from its perennial nature and extreme hardineſs. It is frequently cultivated in gardens, where there are collections of vegetables: but, for the moſt part, rather as a curious than an eſculent plant. Though certainly, the turnip, or knob, is at leaſt as wholeſome as either any turnip or cabbage, and is much liked by ſome; and the leaves are alſo thought good by others; but, in general, both are ſaid to be ſtrong, and ſeldom admitted to the table with us. This plant, however, affords ſprouts, which, after they have undergone the action of a ſtrong froſt, are exceeding good; and may conſequently be had at the time when all others fail. The lying in very ſmall room, proportionably to the quantity of ſolid ſubſtance, and the keeping good much longer than any other ſort of vegetable of a ſimilar nature, are qualities, moreover, which fit this plant in a moſt peculiar manner for the uſe of ſeamen, as is ingeniouſly remarked by Mr. Baker, in his report to the Dublin ſociety. *See the article* TURNIP.

It appears from Gerard, that there were, in his time, two kinds of this plant; one of which he calls *caulorapum rotundum*, or round rape-cole; and the other, *caulorapum longum*, or long rape-cole. The difference of theſe two kinds conſiſted only in the form of the knob or turnip, as is expreſſed by the names themſelves; and in the long kind's ſhooting forth ſmooth indented leaves from the turnip part, which leaves the round kind wanted. I have here ſent you a ſketch of theſe two kinds, according to the prints Gerard has exhibited of them; and they may ſerve alſo to give ſome idea of the general figure of the plant, to thoſe who have never met with it.

I have not however ſeen in any garden, nor find any traces in the late writers, of more than one kind of this plant; ſo that if the round and long kinds, mentioned in this manner by Gerard, were really different ſpecies, the long is now loſt. But it ſeems more probable, that this was only a degeneracy of the plant, by means of the farina of the common kinds of cabbage; as the deviation from the round knob towards the plain ſtalk, and the breaking out of the leaves from it ſeem to indicate.

If there really were two original kinds, or this difference aroſe from a permanent ſeminal variation, it would merit attention under the preſent circumſtances to recover them; ſince it frequently happens in correſpondent caſes, that where there are two allied ſpecies, the one has qualities which fits it to a particular purpoſe in a very ſuperior degree to the other. This plant was rare in Gerard's time in our country; as he mentions his having the ſeed from Spain: and indeed it was ſo little known, that he ſays it is to be ſown and ſet as cucumbers and melons; and that it was then accounted a dainty meat. It did not however make its way to the table in common, or even as a curioſity in gardens, much more at that time than ſince. For Parkinſon, who wrote after Gerard, and enumerates many more ſpecies of cabbage than his predeceſſor, does not take the leaſt notice of it. Tournefort, and moſt of the later writers, mention this plant under various names; but they do little more with regard to it, than give the name and deſcription. Miller, in his Gardener's Dictionary, ſays, this kind of cabbage "never varies, for I have cultivated it many years, and have not found it to alter. It grows naturally on the ſea-ſide, near Dover. It hath a perennial branching ſtalk, in which it differs from all other ſpecies. I have cultivated it theſe three or four years, and have eaten the young ſhoots, after they have been much frozen, when they were very ſweet and good; but at other times they are very ſtrong and ſtringy. In very ſevere winters, where the other ſorts are deſtroyed, this is a very neceſſary plant, for the moſt ſevere froſts do not injure it."

Till lately we ſee, therefore, this plant was only conſidered, either as a kind of curioſity in botanic, or other gardens, where there were collections of different kinds of plants, or as an eſculent herb: but, in this latter view, it ſeems not to have acquired any great reputation, as it is ſo ſeldom, even notwithſtanding Miller's recommendation, met with on the table here; though I am well informed, that in ſome of the factories in the Eaſt-Indies, it has been cultivated from European ſeed, and is much liked.

The firſt public notice I find taken of this plant, in the preſent view of cultivating it for feeding cattle, is in a pamphlet publiſhed by the late Mr. North, gardener, near Lambeth, who ſpeaks of it, under the article of cabbage; of which he ſays, "There are four ſpecies that may be cultivated to great advantage for cattle; to wit, the white cabbage, the hardy curled Savoy cabbage, the turnip-cabbage, and the green curled cabbage." When he comes to treat particularly of the turnip-cabbage, he thus expreſſes himſelf: "The turnip-cabbage is one of the hardieſt roots that grow; and I dare affirm, might be propagated to great advantage for feeding ſheep, &c. For in the moſt ſevere winter that I can remember, when cabbages, ſavoys, turnips, &c. have all been demoliſhed by the extremity of the weather, the turnip-cabbages have not been hurt. The turnip part grows all above ground, which is crowned with many large ſmooth leaves, like thoſe of the red cabbage, but which grow open like the tops of turnips. They are a very ſolid juicy root, and do not grow ſpongy when they are old, as turnips do. The tops may be cut off, and given to ſheep, &c. in the ſpring, and the roots laid by in an out-houſe to feed them in April and May, when no other roots can be had. Sheep are ſo fond of theſe roots, that they will leave the beſt turnips for them. When they are given to ſheep, they ſhould be cut to pieces; but they will eat them faſt enough, tops and bottoms, as they are growing in the fields. After Michaelmas, when turnip-cabbages have their full growth, they will weigh from four to eight pounds a root."

It may be proper here to caution againſt a miſconception, from the inaccuracy of an expreſſion of Mr. North's, in calling the turnip-like part of this plant, a root: for it is no more than an enlargement of the ſtalk in that part; being, when the plants are large, ſeveral inches above the ground. It is proper to obſerve likewiſe, that Mr. North has under-rated the weight of theſe plants; it appearing, by Mr. Baker's account, that ſome weigh fourteen or fifteen pounds. This is the firſt notice I find in any publiſhed work, of this plant's being conſidered as proper for feeding cattle: but it appears in the minutes of the ſociety's books, that ſome little time before the publication of this pamphlet, on the enquiry ſet on foot by the late Mr. Wych, concerning a proper food for cattle in hard winters, this plant, together with the Chineſe or white vetch, and the Syberian medicago, were propoſed to the Committee of Agriculture for their conſideration, by a gentleman well known to that ſociety; and this plant was particularly recommended for its hardineſs in the ground, its quality of not rotting, though long kept, its nutritive property, and the fondneſs which cattle ſhew for it, when offered to them as food.

Mr. Baker, neverthleſs, whoſe report on this ſubject to the Dublin ſociety, the reader will find under the article TURNIP, muſt have the honour of being the firſt who really introduced this plant into uſe, as an article of huſbandry. For it was on the authority of his judicious experiments, related in that report, the ſame gentleman, who formerly recommended the turnip-cabbage, as above-mentioned, to the London Society, induced them laſt year to offer a premium for its culture: and there is no one object of a ſimilar nature, hitherto taken into conſideration, either by this ſociety, or that of Dublin, which bids fairer for being of great public utility: as this plant ſeems to anſwer all the ends of what was ſought for, with ſo much pains and attention, in the reſearch ſet on foot by Mr. Wych, after a proper winter pabulum (as it was called by him) for cattle in ſcarce winters.

The turnip-cabbage may be cultivated in the manner of other cabbages; of which the particulars may be ſeen under the article CABBAGE. But the ſucceſs Mr. Baker had with his method, particularly in relation to the magnitude of the turnip, which ſeems to go far beyond Mr. North's notion, recommends ſtrongly the trial of that manner; except that, as he properly remarks, where the plants are raiſed in the ſpring, the ſeed ſhould be ſown in the very beginning of March; the plantlings, tranſplanted to a proper cloſe bed, as ſoon as they are ſufficiently ſtrong to bear it; and the final tranſplantation of them out into the field at the diſtances in which they are to grow, ſhould not be deferred later than the beginning of June. This would both give more time for the plants to become large before winter, and a better chance to avoid a total want of rain, after tranſplanting; the only accident, except the deſtruction by caterpillars, or other inſects, to which this kind of crop is ſubject; as the plants bid defiance, after they have firmly taken root, to all inclemencies of weather, either with reſpect to cold, wet, or drought.

It may be inferred from the above particulars, which, as we ſee, ſtand on unqueſtionable authority, that, conſidered as an article of huſbandry, this plant muſt be a very valuable acquiſition; as it is of eaſy culture, and as little ſubject to fail by accidents, as any crop whatever: as the produce, with reſpect to quantity, is likely to prove, under favourable circumſtances, thirty-five or thirty-ſix tons per acre, as appears from Mr. Baker's account: as its produce is greatly preferable either to turnips or other cabbages; being much more nutritious, and leſs watery and cold; a fault in the common turnips: as it may be depended on in the moſt rigorous and ſevere ſeaſon, when every thing elſe but dry fodder fails, and may be taken from the place of growth, in caſe of exigence, whenever the ground is not covered with a very deep ſnow: and as it is much liked by neat cattle, ſheep, deer, and hogs; agrees perfectly well with all of them; and fattens them in the moſt profitable manner. This is certainly very ſufficient ground of recommendation, as an object of premium, to the London Society; and it is hoped, will be ſo, as a ſubject of experiment and trial to thoſe gentlemen, or more liberal kind of farmers, who attempt improvements in huſbandry.

I have thus endeavoured to give all the light I can into the nature of this plant, conſidered as an article of huſbandry: but before I conclude, I muſt beg leave to ſubjoin a few words reſpecting it in another view, of ſuch importance to a particular ſet of men, whoſe health and ſafety manifold reaſons recommend to the care of the public, as makes it merit a very ſerious conſideration. What I allude to is, the intimation given by Mr. Baker, of the probability that this plant might be rendered extremely ſerviceable to ſeamen in long voyages. As there can be no doubt of the juſt foundation of this opinion, it ought to be kept in ſight as much as poſſible, till the matter be realized in practice. The putrid ſcurvy, ariſing from the eating ſalt proviſions, is the great bane of a ſea-faring life. The numbers diſabled or carried off by it, particularly in time of war, are almoſt incredible; and, if we conſider the public value of lives ſo loſt, both with reſpect to the national power and expence, policy, as well as humanity, bids us liſten to every feaſible propoſal for mitigating this evil. The uſe of vegetables in the diet along with the ſalt-beef or pork, is well known to be one of the moſt effectual means of prevention of this diſeaſe: and indeed, it has been ſo well underſtood, that great quantities of cabbages, &c. have been ſent off to the fleets cruiſing in the bay, or elſewhere within reach, to the great relief and refreſhment of the men. But this ſpecies of cabbage, abounding more in the ſaccharine juice than the other kinds, would be a more efficacious preventative or palliative of the ſcurvy; and the ſolid compact texture of theſe turnips, which makes a conſiderable weight, lye in a ſmall compaſs, together with their repugnance to that putrefaction, to which other turnips, cabbages, &c. are quickly diſpoſed, renders it practicable to keep them on ſhipboard, in any climate, for many months; provided they be preſerved from the acceſs of any extraordinary degree of moiſture.

If this plant ſhould be, therefore, generally cultivated in the field-way, and conſequently produced at a very cheap rate, as Mr. Baker has ſhewn, that betwixt thirty and forty tons may be obtained by an eaſy method of culture, in one year, from one acre of ground, they might be purchaſed at a much cheaper rate than any other article of proviſion at preſent in uſe for the victualling ſhips.

This ſeems to be an object very well worth the conſideration of the India company; as it might be a means of preventing that delay and ill ſucceſs of ſome voyages, which ariſe from the ſickneſs of the men; and it is attended with no difficulty, but what regards the ſtowage. For the plant being already cultivated in ſome of the factories in the Eaſt-Indies, where it ſucceeds as well as here, and conſequently might in all the others, as no climate or ſeaſon appears injurious to its growth, it might be procured at a proportionably cheap rate, as well for the ſupply of the homeward as outward bound ſhips: and indeed, conſidering the nature and ſtate of the proviſions on board ſhips returning from India, it would undoubtedly be peculiarly beneficial in that caſe. *Muſeum Ruſticum, vol.* VI. *pag.* 46.

TURPETH, a ſpecies of the convolvulus or bineweed. *See the article* BINEWEED.

TWIFALLOWING, or TWYFALLOWING, ploughing the ground a ſecond time, which is generally done in June.

V.

VALE, low ground; a valley.

VAN, an inſtrument to winnow corn. *See the article* THRESHING.

VASCULIFEROUS PLANTS, ſuch whoſe ſeeds are contained in veſſels divided into cells.

VAT, *or* FAT, a veſſel for holding wine, ale, beer, cider, &c. in the time of their preparation.

UDDER, that part of a cow, mare, ewe, &c. where the milk is prepared, anſwering to the breaſts in women.

VEGETABLE, a term applied to all plants, conſidered as capable of growth, *i. e.* all natural bodies which have parts organically formed for generation and accretion, but not ſenſation.

Vegetables, according to the analyſes made of them by chemiſtry, are diſtinguiſhable into two grand tribes, the acid and the alkaline; the firſt affording a volatile acid, and the ſecond a volatile alkali, upon a dry diſtillation: thus guaiacum, cedar, box, cinnamon, cloves, ſorrel, mint, balm, &c. afford an acid; but garlic, onions, horſe-radiſh, ſcurvy-graſs, muſtard, &c. afford an alkali, which, rectified, is hardly diſtinguiſhable from that of animal ſubſtances, ſo as nearly to reſemble the ſpirit and ſalt of hartſhorn.

VEGETATION, the act whereby plants receive their nouriſhment and growths; of which, three principal functions are underſtood, viz. nutrition, increaſe, and generation.

From Scripture we learn, that the earth has been endued, from the beginning, with a certain ſeminal virtue to produce plants; which virtue, proceeding from God, was not confined to the firſt production of things, but extends likewiſe to all future conſequences of times; and this faculty which the earth has of producing plants, is from this commandment of the Almighty: "Let the earth bring forth graſs, the herb yielding ſeed, and the fruit-tree yielding fruit after his kind, whoſe ſeed is in itſelf upon the earth; and it was ſo." Gen. i. 11.

Philoſophers aſk, what can be that virtue the earth is ſaid to be endued with, if it be only an inherent quality whereby it produces, naturally, all ſorts of plants, without the concurrence of ſeed? or if a ſeminal virtue (or ſeed) muſt be adminiſtered to it? Some follow the firſt opinion, for this reaſon, that earth dug up from a great depth and put into pots, after a ſet time or ſeaſon, produces ſeveral ſorts of plants of itſelf without ſeed; but though this opinion be approved of by many, it has not, however, the leaſt appearance of probability on its ſide; for who (conſidering with attention the progreſs of nature, ſees the marvellous mechaniſm of the organs of plants, the whole texture of their internal as well as external parts) could be perſuaded to attribute it to a heavy and indigeſted maſs of clay or earth: therefore, it is more rational to ſay, that plants have their origin from ſeeds, which being taken from the firſt plants, have propagated their ſpecies by the Creator's will, as far as our times, and will continue to do ſo (particularly where they are natives) to the end of the world.

The ſun, rain, the exhalations of the earth, and the reſt of the exterior cauſes, are capable to excite a certain motion or fermentation in the boſom of the earth; but unleſs there be a ſeed which contains already the conformation of the plant, whoſe parts are unfolded by that fermentation, never ſuch fermentation or motion can give origin to the plant; therefore, we have great reaſon to think, that all plants have their origin from ſeeds, actually or potentially, ſince the firſt rudiments of a plant can be diſcovered no where elſe, nor by the naked eye, nor even by the help of a microſcope; ſo that the ſeed contains not only the coarſer matter of the plant, with its organical parts, which have the ratio of a body, but likewiſe a certain ſpirit, that is, an active and vegetative ſubſtance, which may be called the ſoul of the plant. Although, in ſome manner, it may be ſaid to ſleep in the grain or ſeed, yet when excited to motion by the heat of the ſun, the warmth of the earth, and with rain impregnated with particles of volatile ſalts, it then unfolds its parts and puſhes the embryo plant forward.

A ſprig or cutting muſt contain in it this ſeminal property, for being ſet at a proper ſeaſon, it produces a tree with all its generative parts; which it would not do were it not endued with ſome ſeminal virtues.

This generative or ſeminal faculty, is a power of the vegetative ſoul of a plant, by which it lives and produces its likeneſs for the preſervation of the ſpecies: but this faculty is not diſcernable from the ſeed itſelf, nor from the ſpirit contained therein, for as the ſeed is ſaid to be a part of ſome ſubſtance, deſigned for the production of another ſubſtance of the ſame ſpecies, it is not abſolutely neceſſary to diſtinguiſh that prolific virtue from the ſeed itſelf, nor from the ſpirit contained in it; for after the ſeed is ſown and ſoftened by the warmth and humidity of the earth, its germ (wherein the plant is contained, as in an epitome) is unfolded by a gentle fermentation, and ariſes into a plant.

That the heat of the ſun and the temperate warmth and humidity of the earth, are the firſt principles of vegetation, appears from the ſterility or fertility of the ſoil in thoſe climates where theſe two principal agents act, or do not act, in concert; ſince, in the moſt northern countries, where the humidity of the ſoil is exceſſive, and its natural warmth is too much concentered, the fermentation of the ſeed being made with too much precipitation, and without that gradation neceſſary for the eaſy and moſt perfect expanſion of the different parts of the plant, thereby they are fruſtrated of that ſtrength they ſhould have before they come out of the matrix it has been formed in to reſiſt the injuries of the air and the inconſtancies of the ſeaſons, it periſhes almoſt as ſoon as it appears on the ſurface of the earth; for although the earth has in ſome meaſure, though very imperfectly, acted its part (as it cannot alone, and without the aſſiſtance of the ſun, carry the plant to its laſt perfection) that tender parent of nature, by the obliquity of its ſituation, being reduced to the incapacity of darting its rays as favourably and abundantly in thoſe climates as he does in others more happily ſituated, cannot either help the mother earth in her pregnancy, nor rectify what ſhe has left imperfect in her productions, which therefore die almoſt as ſoon as nature itſelf is appriſed of their exiſtence.

Likewiſe in thoſe other climates ſituated quite different from theſe where the ſun, by being too profuſe of its influences, penetrates the inmoſt parts of the womb of the earth, and by its too violent and too often repeated acts, and exalting its ſalts, and evaporating its radical humidity, cauſes an exceſſive dilation of its pores, a diſunion, and but too often an intire laceration of its generative parts, ſo as to render them quite ſteril or barren, and therefore incapable to contribute to that fermentation abſolutely neceſſary for the production of plants.

On the contrary, in thoſe happy climates where the parts of the earth are ſo ſituated in reſpect to the ſun as to be under his moſt favourable aſpect, and expoſed to none but his moſt benign influences, it almoſt always continues in its natural flouriſhing ſtate, being ſeldom viſited by the moſt powerful and penetrating beams of the ſun but at thoſe regular and periodical times appointed by nature for its pregnancy, when they are neceſſary to excite her fœcundity, or to nouriſh and cheriſh her productions when once brought forth.

Suppoſe our ſeed to have been ſown in this laſt ſoil, and ſituation, the firſt things which preſent themſelves to the imagination are the ſun and earth concerting together, the one by its heat, and the other by her moiſture, how to rid the embryo of that hard tough ſubſtance it is enwrapped in, and which is the greateſt obſtacle to the burſting forth of its parts; therefore the earth, which is the firſt agent in this caſe, and which is to do the office of incubation, makes uſe firſt of its natural moiſture to ſoften the outer rind or huſk, by having it percolated through the pores or pipes of the ſaid huſk, whereby they are ſo opened and dilated as to facilitate the introduction of the different ſalts appointed to operate on the whole ſubſtance of the ſeed, by unfolding the different parts it contains, and diſpoſing them ſeverally towards aſſuming their reſpective forms.

It cannot be imagined that the earth acts alone in this firſt operation, that it could direct itſelf to action without the concurrence of the ſun, which on this occaſion excites, by a gentle warmth, the different ſalts the moiſture of the earth is impregnated with, that they may be capable to conquer the ſtubbornneſs of the huſk, by forcing themſelves into its almoſt imperceptible pores, conquering all the obſtacles, and raiſing all the obſtructions which the ſeveral ſubſtances may meet with; by this means a free paſſage being opened for ſuch a quantity of the moiſture as is neceſſary to make a due ſeparation of the huſk from the more eſſential part of the ſeed, the ſalts employed in that operation being volatilized or already fixed on that eſſential part, leave the huſk filled with nothing elſe but the lympha, which groweth turgid, and being deprived of the nouriſhment it received when united to the ſubſtance of the ſeed, begins to tend towards its deſtruction.

The following procedure in the vegetation of plants is exemplified by Malpighi in a grain of wheat; the firſt day the grain is ſown it grows a little turgid, and the ſecundine, or huſk, gapes a little in ſeveral places, and the body of the plant being continued by the umbilical veſſel to a conglobated leaf (which is called the pulp or fleſh of the ſeed, and is what conſtitutes the flour) ſwells, by which means not only the gem or ſprout (which is to be the future ſtem) opens and increaſes, but the roots begin to bunch out, whence the placenta, or ſeed-leaf, becoming looſe, gapes. The ſecond day the ſecundine or huſk being broken thro', the ſtem or top of the future ſtraw appears on the outſide thereof, and grows upwards by degrees; in the mean time, the ſeed-leaf guarding the roots becomes turgid with its veſiculæ, and puts forth a white down, and the leaf being pulled away, you may ſee the roots of the plant bare, the future bud, leaves, and the reſt of the ſtalk lying ſtill hid. Between the roots and aſcending ſtem, the trunk of the plant is knit by the navel knot to the flower-leaf, which is very moiſt, though it ſtill retains its white colour and its natural taſte. The third day the pulp of the conglobated or round leaf becomes turgid with the juice it has received from the earth fermenting with its own; thus the plant increaſes in bigneſs, and in its bud or ſtem becomes taller, and from whitiſh becomes greeniſh, the lateral roots alſo break forth greeniſh and pyramidal from the gaping ſheaf which adheres cloſely to the plant, and the lower roots grow longer and hairy, with many fibres growing out of the ſame; indeed there are hairy fibres hanging on all the roots, except on the tops, and theſe fibres are ſeen to wind about the ſaline particles of the ſoil, little lumps of earth, &c. like ivy, whence they grow curled about the latent roots, and then break out into two other little ones. The fourth day the ſtem mounting upwards, makes a right angle with the ſeminal leaf, the laſt roots put forth more, and the other three growing larger are cloathed with more hairs, which ſtraitly embrace the lumps of earth, and where they meet with any vacuity, unite into a kind of net-work; the conglobate or flower-leaf is now ſofter, and when bruiſed yields a white ſweetiſh juice, like barley cream; by ſtripping it off, the root and ſtem of the plant are plainly ſeen, with the intermediate navel-knot, whoſe outer part is ſolid like a bark, and in the inner more ſoft and medullary. The fifth day the ſtalk ſtill riſing puts forth a permanent or ſtable leaf, which is green and folded, the roots grow longer, and there appears a new tumour of a future root, the outer ſheath is looſened, and the ſeed-leaf begins to fade. The ſixth day the ſtable leaf being looſened, the plant mounts upwards, the ſheaf ſtill cleaving round it like a bark; the ſeed-leaf is now ſeen ſinuous or wrinkled and faded, and this being freed or cut from the ſecundine, the fleſh, or pericarpium is found of a different texture, the outer part, whereby the outſide of the ſeed or grain is heaped up, being more ſolid, but the inſide viſcular and full of humour, eſpecially that part next the navel-knot. All the leaves being pulled off, the roots torn, and the flower-leaf removed, the trunk appears, wherein, not far from the roots, the navel-knot bunches out, which is ſolid and hard to cut; above there is a mark of the ſheath-leaf, which was pulled, and underneath, as in an armpit, the gem is often hid; the hind part of the plant ſhews the breaking forth of the roots likewiſe, with the faded placenta, &c. After the eleventh day, the ſeed-leaf as yet ſticking to the plant, is crumpled and almoſt corrupted; within it is hollow, and about the ſecundine the mucus and white ſubſtance of the ſeed being continued to the navel-knot, forms a cavity, all the roots becoming longer, put forth new branches out of their ſides, the ſecond leaf withers, and its viſicles are emptied; the internodes, or ſpaces between the knots, grow longer; new gems appear, and the middle root grows ſeveral inches longer. After a month, the roots and ſtalk being grown much longer, new buds break out at the firſt knot, and little tumours bunch out, which at length break out into roots.

Thus, according to Malpighi, in this ſhort ſpace of time, the plant paſſes through all theſe various changes and mutations, which, though his obſervations may be real as here repreſented, yet it does not happen with ſuch celerity in all ſorts of plants, though in ſome kinds all theſe variations may come to paſs in a ſhorter time.

The plant carried thus far, it ſtill wants food for the future preſervation of its vegetative life, which being deprived of ſuch nutriment, it cannot exiſt; of which naturaliſts are ſo ſenſible, that their common opinion is, that water is the great vegetable food, which they endeavour to confirm by repeated experiments, eſpecially by that made on a ſprig of baum, mint, &c. which being ſet in a phial of pure water, without any mixture of earth, grow and put forth roots, leaves, and branches; without conſidering, that thoſe ſorts of plants being of a ſhort duration, the juices which they have received from their mother earth in their firſt formation circulating through their veſſels, being continually recruited by the ſalts the water they are ſet in is impregnated with, together with thoſe they receive continually from the ambient atmoſphere, are more than ſufficient for the ſupport of their ſhort life in the water, which ſubſiſts no longer than that the water continues to ſupply them with ſalts, of which when once exhauſted, it grows viſcous, obſtructs the pores of the veſſels, and hinders thereby the admiſſion of ſalts even from the atmoſphere, imbecillitate by degrees the functions of the vegetative ſoul, which being forced for ſome time to feed on its own ſubſtance, becomes at laſt enervated and impotent, whereby the plant withers and dies for want of food, unleſs the water is changed before it comes to the laſt period, which appears at its growing offenſive to the ſmell; even that precaution becomes uſeleſs, at leaſt for the greateſt part.

Thoſe ſalts the water is impregnated with, being heterogeneous to thoſe which enter into the compoſition of the juices, which circulate through the veſſels of the plant, have ſoon, by diſordering the whole frame of that mechaniſm, procured the extinction of the plant.

The great quantity of oleaginous particles thoſe ſorts of plants are compoſed of, which keep their pores extremely dilated for the admiſſion of ſalts and other nutritive particles, contribute much towards the production of this phænomenon; but in plants of a cloſer texture, whoſe pores are ſo exiguous as not to be forced, but by the impetuoſity of ſalts exalted and volatilized, beſt by the warmth of the earth and the heat of the ſun, this experiment is of no effect; therefore, water cannot be ſimply conſidered as the great vegetable food, although it has a very conſiderable ſhare in the nutriment of plants: but were it water alone, to which vegetables owe their increaſe, there would be no need of manures nor changing the kinds. The rain falls in all places upon the moſt barren land, as well as on the moſt fertile; nor could there be any reaſon why the ſame field ſhould yield a large crop of wheat one year, and not the next, ſince rain ſhowers down nearly alike on the earth.

VELLING, ploughing, or cutting up the turf, or upper ſurface of the ground in order to its being burnt. *See the article* BURNBAKING.

VENTILATOR, a machine by which the noxious air of any cloſe place (as an hoſpital, jail, ſhip, chamber, granary, &c.) may be changed for freſh air.

The noxious qualities of bad air have been long known, though not ſufficiently attended to, in practice; but it is to be hoped, that the indefatigable pains taken by Dr. Hales, to ſet the miſchiefs ariſing from foul air in a juſt light, and the remedy he has propoſed by the uſe of his ventilators, will at length prevail over that unaccountable ſloth or obſtinacy, which, where particular intereſts are not concerned, ſeems to poſſeſs the generality of mankind, and which rarely allows them to give due attention to any new diſcovery.

The ventilators invented by that ingenious gentleman conſiſt of a ſquare box, ABCD (plate XXVI. fig. 7. about ten feet long, five wide, and two deep; in the middle of which is placed a broad partition, or midriff, made to move up and down, from A to C, on hinges at the end E, by means of an iron rod Z R, fixed to the midriff at Z.

Another box, of the ſame ſize with the former, having a like midriff, bar, &c. is placed near the former (fig. 8.) with its rod, R Z. Both theſe rods are fixed to a lever F G, moveable on the center O; ſo that by the alternate riſing and depreſſing of the lever F G, the midriffs are alſo raiſed and depreſſed alternately, by which means theſe double bellows are at the ſame time both drawing and pouring out the air.

That the midriffs may be rendered lighter, they may be made of four bars, lengthwiſe, and as many placed acroſs them, each about three inches broad, and an inch thick, the vacant ſpaces being filled up with thin pannels of fir board.

In order to make the midriffs move with greater eaſe, and without touching the ſides of the boxes, there is an iron regulator N L (fig. 7.) fixed upright to the end A C of the box. As very little air will eſcape if the edges of the midriff be within one twentieth part of an inch from the ſides of the box, there is no neceſſity for leathern ſides, as in common bellows. The end A C of the box muſt be ſomewhat circular, that it may be the better adapted to the riſing and falling of the midriff; and at the other end of the midriff a ſlip of leather may be nailed over the hinges.

To the ventilators above deſcribed, eight valves are adapted for the air to paſs through; theſe valves are placed at the hinge-end I Q, fig. 8. numbered 1, 2, 3, 4, &c. The valve 1 opens inward, to admit the air to enter, when the midriff is depreſſed at the other end, by means of the lever F G; and at the ſame time the valve 3, in the lower ventilator, is ſhut by the compreſſed air, which paſſes out at the valve 4: but when that midriff is raiſed, the valve 1 ſhuts, and the air paſſes out at the valve 2. The ſame is to be obſerved of the valves 5, 6; 7, 8, of the other box; ſo that when, by the motion of the lever F G, the midriffs are alternately riſing and falling, then two of the ventilators are conſtantly drawing in the air, and two of them at the ſame time are blowing it out at their proper valves, the air entering at the valves 1, 3, 6, 8, and paſſing out at the valves, 2, 4, 5, 7. To the ventilators, before the valves, is fixed a hook Q Q M M (fig. 9.) as a common receptacle for all the air that comes out of theſe valves, which air is conveyed away through the trunk P, paſſing through the wall of a building, &c.

It would be foreign to the intention of this work to point out the various uſes of theſe machines in extracting foul air out of ſhips, hoſpitals, &c. but we muſt not omit the following:

Experiments on the preſervation of corn by ventilation.

M. Duhamel cauſed a caſe, or little granary of preſervation, to be made of oak plank two inches thick, forming a cube of five feet every way. At ſix inches from the bottom was a flooring, or ſecond bottom, of lattice work, placed upon joiſts five inches thick, and covered with a ſtrong canvas. This ſmall granary was filled quite full of good wheat, of which it contained 94 cubic feet, weighing 5040 pounds. It was covered with good oak planks, ſo cloſely joined, that neither rats, mice, or even the ſmalleſt inſects could get in; leaving only ſome vent-holes, with trap doors, or covers, fitted very exactly to them, as mentioned before.

This corn, laid up without having been dried at all by fire, was not ventilated more than ſix days in a year, which was ſufficient to keep it ſo well that the beſt judges allowed it to be as good as could be. Even when the bellows had not been worked for ſeveral months, the corn was ſtill allowed, by good judges, to look and ſmell perfectly well: but they objected, that it did not handle well, that is, that there was ſome little dampneſs in it. The bellows were worked for half a day, and this objection was entirely removed,

This wheat was old, and had been as well dried as any corn generally is in a common granary: therefore it being ſtill damp, at the end of a conſiderable time, ſhews the neceſſity of taking away the ſuperfluous moiſture, and of reducing our corn to the ſame degree of dryneſs, as that of the hotteſt countries, in order to preſerve it in great bodies.

Experiment on ninety-four cubic feet of wheat.

In May, 1743, ninety-four cubic feet of wheat were put into one of the little granaries before-mentioned. It was of the harveſt of 1742, of an excellent quality, perfectly clean, and ſo dry, that a ſmall parcel of it which was put, for a trial, into a ſtove heated to fifty degrees of M. de Réaumur's thermometer (123 of Farenheit's) loſt but one ſixteenth of its weight. This wheat was well cleanſed from duſt, and depoſited in the granary without being dried by fire.

During the firſt three months, it was ventilated for eight hours once a fortnight: during the reſt of the year 1743, and all 1744, it was ventilated once a month: all the year 1745, and part of 1746, it was ventilated half a day once a month; and after that, but once in two or three months.

In June 1750, the granary was emptied, and the wheat looked and ſmelt very well, but felt a little rough in the hand, becauſe, not having been ſtirred for ſix years, the little hairs that are at the extremity of the grain, and the particles of the bran, were roughed up: but after paſſing twice through the wind ſcreen, that objection was entirely removed. *See the article* THRASHING.

This corn was eight years old, during ſeven of which it was preſerved in one of M. Duhamel's ſmall granaries, without any ſenſible diminution, and without any damage from vermin or inſects: we cannot ſay abſolutely, without any expence, becauſe a man was employed from time to time to ventilate it. But this was a very trifling charge, and may be reduced almoſt to nothing, by working the bellows with ſwifts like thoſe of a mill.

Experiment on ſeventy-five cubic feet of new wheat, extremely moiſt, grown, and which had already contracted a bad ſmell.

The harveſt of 1745 was very rainy: almoſt all the wheat of that year was grown in the ear; the ſheaves were extremely wet when they were houſed; the grains adhered ſo cloſely to their huſks, that they were greatly bruiſed by the flail; and if they were left but a very little while upon the barn-floor, before they were cleanſed, they heated, and contracted a ſmell like that of pigeon's dung: in ſhort, they were ſo very moiſt, that they loſt an eighth part of their weight when dried in a ſtove heated to fifty degrees of M. de Réaumur's (one hundred and twenty-three of Farenheit's) thermometer; and when laid up in the common granaries, in the uſual way, they were always in a ſtate of fermentation, though but a foot thick, and turned every fourth or fifth day.

Seventy-five cubic feet of this grown wheat, which ſmelt very ill, and was ſo moiſt as to wet the floor of the granary where it laid but a few days, were put, in this condition, and without being dried by fire, into one of M. Duhamel's little granaries, with ſmall hopes of ſucceſs.

As this corn was very hot when put into the granary, it was ventilated three or four times the firſt week, and once a week during December and January: and as it had then loſt great part of its bad ſmell, it was ventilated but once a fortnight from that time till June. Then perceiving, by thruſting his hand into the top of the heap, that it heated, and concluding that it was going to be entirely corrupted, M. Duhamel ordered the granary to be emptied: but after the depth of about a foot had been taken from the top, he was greatly ſurpriſed to find the reſt cool, with very little bad ſmell, and drier than that which was preſerved in the common granaries.

The reaſon why the top of this corn was the worſt, was, undoubtedly, that the moiſt vapours were always forced upwards in ventilation. It therefore might, perhaps, have been kept very well, if, inſtead of emptying the granary, it had been ventilated oftener: for this would, probably, have dried away the remaining moiſture, even at the top, as the following experiment will ſhew. But however that might have been, this teaches us one important thing, which is, that the top of the heap is moſt ſubject to heat in this ſort of granary: ſo that if the grain taken out of the vent-holes is in good condition, it may be concluded that the reſt is ſtill better.

Experiment on five hundred and fifty-five cubic feet of wheat, very damp, mixed with ſmut, and which had contracted a bad ſmell.

The wheat of the year 1750 grew in almoſt continual wet; the harveſt was very rainy; and the ſame weather continuing all the year 1751, no pains that could be taken to turn the corn laid up in the common way, could dry it, or prevent its heating and contracting a bad ſmell. The wheat of this crop was likewiſe mixed with a conſiderable quantity of blighted and ſmutty grains, which always contain a great deal of moiſture, doubly difficult to be exhaled from them, and which ſoon makes them contract a bad ſmell, which they ſpeedily communicate to the ſound corn.

Five hundred and fifty-five cubic feet of this wheat were depoſited in one of M. Duhamel's granaries of preſervation, after being cleanſed with ſuch perfect care, that ſcarce any mark remained either of blight or ſmut among it; though theſe faulty grains amounted to near a ſixth part of the crop. But there ſtill remained a fine duſt, or powder, occaſioned by the moiſture, ſo cloſely adherent to the corn, that it could not be taken off by any means.

This wheat was laid four and a half or five feet thick in one of theſe granaries, the bellows of which were worked by a wind-mill; and as there was no want of wind during all the year 1751, and till the ſpring of 1752, the corn was often ventilated, without trouble or expence; by which means it was not only well dried, but alſo cleared of great part of its bad ſmell. It was indeed, when taken out of the granary, very full of duſt, which had fallen off the grains as their moiſture was exhaled: but this was then eaſily ſeparated by proper ſcreening, and the wheat proved ſo good, that the bakers bought it at the higheſt market price.

This experiment proves, that even very moiſt corn, which has a great diſpoſition to ferment, may be preſerved by ventilation only: and as to the ſmutty grains with which this was mixed, the reverend Dr. Hales, after rightly obſerving that kiln-drying is apt to make wheat grind unkindly, propoſes the following method of drying ſmutty corn, after it has been waſhed; cold air not hurting it, as kiln-drying is found to do. "That I might be well aſſured, ſays that friend to all mankind, of the good effect of thus drying ſmutty corn; having procured a quantity of very ſmutty wheat, which weighed ſeven pounds and fifteen ounces, on the twenty-ſixth of May, at five in the morning, it was waſhed clean in four ſeveral waters, which was done in a few minutes, and was then laid to drain in an oat-ſieve, till half an hour after five, when it had increaſed in weight, by wetting, ten ounces, beſides the moiſture that was equal to the weight of the ſmut-balls and ſmut that was waſhed from the wheat. It waſted but two ounces and an half, by the firſt two hours ventilation; two ounces and five drachms in the ſecond two hours, viz. from eight to ten; in the next ſix hours, viz. from ten to four in the afternoon, it waſted at the rate of four ounces every two hours; from four to ſix, two ounces and an half, and from ſix to eight, one ounce and an half: in all, about twenty ounces; ſome allowance being made for what corn was waſted by handling and biting ſome of it from time to time. It was ventilated in theſe fourteen hours with about forty thouſand gallons of air, which paſſed upwards through it, and made it ſufficiently hard and dry, ſo as to be fit for grinding: it was well coloured, and handled well; and, from ſtinking, as ſmutty wheat does, it became much ſweeter. The viſible dewy moiſture was blown off in three hours; but it continued damp and cold to the feeling till two o'clock, when ſome little duſt began to fly off it.

"And whereas it waſted off much leſs moiſture during the firſt four hours ventilation, when it ought to have waſted the moſt, on account of its being then wetteſt, this was owing to the foggy hazineſs of the morning: which as it went off, and broke out into fine warm ſunſhine, towards ten o'clock, ſo the air being thereby become dry, it imbibed moiſture more ſtrongly from the corn: and that this was the true caſe of the difference, is farther confirmed by a like experiment which I had before made on a gallon of wheat, April the firſt, there being then a very dry north-eaſt wind.

"It will be adviſable to begin to ventilate corn as ſoon as poſſible after waſhing, that the moiſture may have the leſs time to ſoak in: for the leſs moiſture ſoaks in, ſo much the ſooner the corn will dry.

"If the moiſture is ſo eaſily carried off from wet wheat, by ventilation, this method will doubtleſs much improve what is called cold wheat, viz. ſuch as is grown, and has been houſed in a cold wet ſeaſon; and will therefore ſoon carry off the moiſt vapours which ariſe from corn, and which cauſe it to heat and grow muſty."

Other experiments on the preſervation of corn by ventilation.

The prior of the royal abbey of St. Stephen in Caen, filled a granary of preſervation twelve feet wide, thirteen feet long, and ſix feet deep, which forms a parallelipipede of nine hundred and thirty-ſix cubic feet, conſtructed according to M. Duhamel's directions, with wheat that had been kept all the winter in a common granary. It was cooled from time to time by two bellows, which two men worked by means of a leaver; and though the place where this granary of preſervation ſtood, was neither ſo dry nor ſo airy as might have been wiſhed, the corn kept perfectly well in it.

In the beginning of September 1754, M. Vanduſfel filled one of M. Duhamel's granaries of preſervation, ſeven feet ſquare and ſix feet deep, with good wheat, undried. It heated a little at the end of eight days; but two men, with a ſmall double ventilator, cooled it in two hours time. It began to heat again about a week after, when he repeated the ſame operation, which cooled it preſently. By the twentieth of October it was quite cool, though it had not then been ventilated for fifteen days; and according to a letter of his writing to M. Duhamel, dated the fourteenth of October, 1756, it ſtill continued in the ſame good condition. Corn of the years 1754 and 1755, not dried, but only ventilated, had likewiſe kept with him as well as could be wiſhed.

VERJUICE, a liquor obtained from grapes or apples too acid for wine or cider. It is generally made in England from the juice of the crab, or wild apple.

VERMIN, a collective name including all kinds of ſmall animals, that are troubleſome to men, beaſts, corn, fruits, &c.

VERNAL, ſomething belonging to the ſpring ſeaſon.

VERTICULATE *Plants*, ſuch as produce their flowers round the joints of the ſtalks in whorles; as hyſſop, mint, thyme, &c.

VETCH, the name of a well known plant, much cultivated in many parts of England, and of which there are ſeveral ſpecies.

Some ſorts of this plant, the ſeeds of which ripen in autumn, grow naturally in moſt parts of England, in ſhady places among buſhes, and by the ſides of woods. The roots of theſe are perennial; but their ſtalks are annual, weak, and grow to ſo great a length (for they will climb up to the height of ſix or eight feet wherever the tendrils which proceed from the end of their leaves can lay hold of boughs, branches, or the ſide of a hedge, to ſupport them,) that they are hardly fit to be cultivated in the field, though ſome writers have recommended them for this purpoſe: for as they cannot be ſupported there, they will trail ſo much upon the ground, that they will be apt to rot: nor do their ſhoots, which are leſs ſucculent than thoſe of the vetch commonly raiſed, grow to a ſufficient height to be cut for uſe till late in the ſpring, when there is little want of green food for cattle.

Mr. Miller, after ſowing for many years the common vetch or tare, which is much cultivated in the fields for fodder, ſeems to think that which has black ſeeds, a diſtinct ſpecies from the white: for he has never found either of them vary. Both theſe are annual, and periſh ſoon after they have perfected their ſeed. Their ſtalks are angular, ſtreaked, and hairy: they are weak, and want ſupport, and generally trail upon the ground when they do not find any thing to faſten themſelves to. Their leaves are compoſed of ſeveral pair of blunt lobes, and are terminated by tendrils. The flowers, which are pretty large, proceed from the wings of the ſtalk, and ſit very cloſe to the baſe of the foot ſtalks of the leaves. Two of theſe flowers generally ſpring from the ſame joint: thoſe of the black ſeeded ſort are purple, and thoſe, of the white ſeeded are white. They appear in June and July, and are ſucceeded by erect pods containing three or four round ſeeds in each, which ripen in Auguſt and September.

The white vetch is rather the more ſucculent plant of the two, and therefore it is beſt for fodder: but many are unwilling to cultivate this ſort, becauſe their ſeeds, being white, are much ſooner diſcovered by rooks and other birds, than thoſe of the black, which bear a nearer reſemblance to the colour of the ground. This objection may, however, be eaſily removed, by ſowing them in drills, and then covering them carefully, inſtead of the uſual method of ſcattering them with a broad-caſt, and plowing them in lightly.

The ſmall black-ſeeded vetch, which ſome call rath-ripe, and others pebble, goar, or ſummer vetch, is much tenderer than either of the former, and therefore leſs cultivated. This muſt always be ſown in the ſpring: whereas the others may be ſown in ſpring or autumn.

But another ſpecies of vetch, viz. the Siberian, hardly known, to the generality of farmers in this country, bids fair to become, perhaps, the moſt uſeful of all for fodder; for its ſtalks grow to a great length, and are well furniſhed with leaves, which do not decay in autumn, like thoſe of the other ſorts, but continue green all the winter, in defiance of the hardeſt froſt: ſo that in February and March, when there often is a ſcarcity of green fodder for ewes and lambs, this may be of ſingular ſervice, eſpecially if theſe plants are ſupported from trailing upon the ground. Their flowers, which appear in July, are of a light blue colour.

This, like our common vetch, may be ſown in the ſpring, or in autumn; and when the plants are come up, they will not require any other culture than keeping them clear from weeds; a work which, if the ſeeds are ſown thin in rows four feet aſunder, as Mr. Miller rightly adviſes, may be eaſily done with the Dutch hoe, while they are young, and afterwards with the hoeing plough. By this thin ſowing, the ſtalks of theſe vetches, which ſend out many branches, and extend very far, will be kept from matting ſo cloſely together as to rot each other by excluding the air; and by earthing up their ſtems in the ſame manner as ſhould be done for peas and beans, they will be greatly ſtrengthened, their leaves will grow the larger and more ſucculent, and they will conſequently yield an increaſed quantity of fodder. The repeating of this as often as it may be found neceſſary to deſtroy the weeds in ſummer, which may be done at a very ſmall expence, and is particularly proper when the growth is intended for the green food of cattle, will be attended with the farther important advantage of preparing the ground thoroughly for whatever other crop may afterward be put upon it.

As the plants of this kind of vetch will not be in danger of being hurt by froſt, they ſhould not be cut till the ſpring, when the beſt way will be to take them as they may be wanted, green, for the feeding of ewes: but ſome of them ſhould be left untouched, for ſeeds; for if thoſe which are cut do ſhoot out again, they will flower ſo late in ſummer, that their ſeeds will not ripen, unleſs the autumn proves very warm. A better way will therefore be to ſow a proper quantity of ſeeds for this purpoſe in a ſeparate ſpot of ground: becauſe, when the other is cut, the ground may be plowed for other crops; and if the ſeaſons ſhould be ſo mild as to produce a ſufficiency of green food independent of this, the vetches may be plowed into the ground, to which they will be an excellent dreſſing for other crops.

Mr. Miller, who has a high opinion of this ſort of vetch, and whoſe recommendation of it ought to have very great weight, is now beginning to try it in the field, where he has not yet had experience of its culture: but the experiments which he has made with it for ſix years paſt, on ſmall patches of it ſown in gardens, in different ſituations, have fully anſwered his expectation: for he has found theſe plants continue in great verdure in all thoſe places, when moſt of the perennial plants in the ſame ſituation have ſuffered greatly by the froſt, and could have cut from only eight of them as much fodder as would have been equivalent to half a truſs of clover.

Vetches are generally ſown either in autumn, or early in the ſpring: but the beſt time, in this country, is toward the beginning of Auguſt; becauſe the rains which uſually fall about that ſeaſon will bring them up in a ſhort time, and the plants will get ſtrength before winter, and be fit to cut for the food of cattle early in the ſpring, when green fodder is moſt wanted: and if they are deſigned for ſeed only, theſe early ſown vetches will come early into flower, and their ſeeds will ripen early, ſo that they may be cut and ſtacked in good weather, which is a great advantage; for thoſe which ripen late, are often ſtacked or houſed wet, and then their ſeeds frequently ſprout in the mow, and are ſpoiled.

Vetches will do well in almoſt any ground; not excepting even ſuch as can ſcarcely produce any other plant. The common method of ſowing them is in broad-caſt, ploughing them lightly in, as was obſerved before; and the uſual allowance is two buſhels of ſeed for an acre of land; though ſome ſow two buſhels and an half. Either of theſe practices may do well enough for thoſe vetches which are intended to be cut for fodder in the ſpring; but when they are ſown with a deſign to let them ſtand for ſeed, it will certainly be much better to ſow them in drills, in the ſame manner as is practiſed for peas; and in this caſe leſs than half of the abovementioned quantity of ſeed will be ſufficient: for the rows ſhould be at leaſt three feet aſunder, that the hoe-plough may have room to go between them, to deſtroy the weeds, and earth up the plants, which, when thus managed, will produce a much greater crop, and ripen better and earlier, than in the common way. Theſe drills ſhould be of about the ſame depth as for peas, and the ſeeds ſhould be ſcattered at about the ſame diſtance in the drills, in which they ſhould be carefully covered over as ſoon as they are ſown; for otherwiſe the rooks will diſcover them; and when thoſe voracious creatures once find the rows, they will ſpeedily deſtroy them intirely, if they are not carefully watched. The preventing of this is another advantage which attends the ſowing of vetches early in autumn, rather than in the ſpring: becauſe there is more food for rooks and pigeons in the open field in the former of theſe ſeaſons, and the plants will then appear much ſooner above ground. Toward the end of October, by which time the plants will have acquired conſiderable ſtrength, the horſe-hoe ſhould begin to work between the rows, provided the weather be dry: and in doing this, particular care ſhould be taken to lay the earth up as high to the ſtems of the plants as can poſſibly be, without covering their tops. This will help to ſecure them againſt froſt, and clear the ground of weeds at leaſt till March, when the plants ſhould be earthed up a ſecond time, and the intermediate ſpaces between their rows be cleaned again, in the ſame manner as before. This will make them grow ſo vigorouſly, that they will meet and cover thoſe ſpaces in a little time: whereas thoſe ſown in the ſpring will not grow to half this ſize, and will be very late in flowering.

When vetches are intended only for fodder, of which they generally afford two good crops in the year, in hot countries, or when the farmer deſigns them for plowing in, by way of manure, they need not be ſown in drills, or huſbanded in the manner directed: the common broad-caſt way will then do well enough: but ſtill it is moſt adviſable, in either caſe, to ſow them early in autumn; becauſe, in the firſt place, they will produce the deſired green fodder much earlier in the ſpring; and in the ſecond, they will be fit to plow in much ſooner the following year, and thereby have time properly to meliorate the land, and prepare it to receive the enſuing crop, which they are generally allowed to do even more effectually than peas. Stiff clays are peculiarly benefited by this dreſſing: but it ſurely is bad huſbandry to ſow vetches for green fodder, where lucerne will thrive; becauſe this laſt will yield greater plenty of ſtill more nouriſhing food.

In ſome countries, eſpecially abroad, they mix oats with their tares or vetches, an equal quantity of each, and ſow them in February. The vetch, ſupported in ſome meaſure by the oat, grows the higher for it: and, about the middle of May, this mixture is mowed, and given to horſes and other cattle, which it fattens greatly. Mr. Mortimer likewiſe thinks it a good way to ſow horſe-beans and tares together: their ſeeds are eaſily parted with a riddle: and another obſervation in which he agrees with the Maiſons Ruſtiques, is, that more vetches ſhould not be ſown at any one time, than can be covered the ſame day, becauſe the dew is apt to ſpoil them: conſequently they ſhould not be ſown till two or three hours after the riſing of the ſun; by which time the moiſture will be exhaled from off the ſurface of the earth. But though their ſeeds cannot bear dampneſs, which would ſoon rot them, their plants, eſpecially in ſandy land, often periſh in dry years, for want of water. To make them flouriſh well, they require a ſhower of rain every ten or twelve days. One plowing to turn in the ſtubble of the preceding crop, and another at the time of ſowing, are ſufficient for this plant: but thoſe who give only one plowing, which is when they ſow, and afterwards harrow in the ſeed, neither have, nor can expect, an equally good return.

When vetches are cultivated for their ſeeds, they ſhould be cut ſoon after the pods turn brown, and ſtacked as ſoon as they are dry: for if they are ſuffered to lie out in the field, till they receive wet, and there then comes a hot day, moſt of the pods will burſt, unleſs they happen to have been blighted; in which caſe they will not open ſo eaſily. Their haulm, when dry, and threſhed, is eſteemed good food for cattle, and ſome ſay that their ſeeds are as good for horſes, as beans; which, if true, ſhould render them the more valuable, becauſe theſe will grow on the lighteſt ſandy land, where beans will not thrive; and may therefore, as Mr. Miller obſerves, be a good improvement to ſome counties in England where they do not even attempt to cultivate the bean. About three loads from an acre are reckoned a good crop.

Vetches, when threſhed out, will be as good for ſowing at the end of five or ſix years, as at firſt, if care be taken to turn them in the heap from time to time. Mr. Mortimer cautions the huſbandman to lay them by themſelves in ſome convenient place, ſeparate from his other corn, becauſe they will otherwiſe be apt to foul it.

It is commonly ſaid, that the farmer cannot ſow any thing more profitable than vetches; for that, beſides inriching the land, a load of them will go farther than two loads of hay: but Mr. Liſle has a calculation tending to prove, that an acre of broad clover is worth twenty ſhillings a year more than an acre of any vetches, and that the clover ſhould therefore be preferred, wherever the ground will bear it well.

“It would certainly, ſays Mr. J. Smith, an ingenious farmer of Eſſex, be of great national advantage, could our ſtock of cattle and ſheep be encreaſed without diminiſhing the quantity of our lands that are in tillage.

“This can no otherways be done, but by encouraging the growth of artificial paſtures, which the farmers have of late years fallen into.

“The turnip huſbandry is not of very old ſtanding in this iſland, yet has it made a very rapid progreſs. The immenſe utility of it, when properly practiſed, cannot but be evident, even to an ignorant common farmer, on the ſlighteſt inſpection. This evident utility of it has occaſioned its being almoſt univerſally practiſed in the counties of Norfolk, Suffolk, and Eſſex, whence it has ſpread to other parts of England, and is of late even adopted in Ireland, where, I am informed, the gentry are very intent on improving their eſtates.

“The coleſeed plant has alſo its utility, and in many places is as univerſally ſown as the turnip. I have, myſelf, very often raiſed this crop, as well for feeding ſheep, &c. as for the ſake of its ſeed, and have had no little ſucceſs in this huſbandry, being very fond of it, as coleſeed is an excellent crop to overpower, choak, and deſtroy weeds.

“I wiſh the burnet graſs, ſo ſtrongly recommended, may anſwer every purpoſe that is expected from it: it ſeems to promiſe very fair from the accounts given of it by Mr. Rocque; and if it has not too much prejudice to encounter withal, it may probably ſucceed, and the culture of it become as univerſally adopted, as is that of the turnip, or coleſeed plant, already mentioned.

“So much in general; but the particular reaſon of my now writing to you, was to recommend to the induſtrious farmer the cultivation of vetches as food for cattle.

“I have often ſown this crop with great ſucceſs, to prepare my land for wheat, and have always found that by growing to a large cover they deſtroy and choak up a great number of weeds, which would otherwiſe do me immenſe damage: indeed, I think them, for this purpoſe, next in rank to a hoeing crop.

“When I ſow vetches before wheat, I always, in the ſpending my crop, have regard to the condition of my land. If my land is not in good heart, but wants mending, I not unfrequently fold my ſheep on it, and feed off my crop in the field; but if it is inclined to be rank, or the wheat which is ſowed on it, is apt to run much to ſtraw, I often cut my vetches green, and feed my horſes in the ſtable with them. I find no food agree better with them; they thrive well, grow fat, and are always in good health and ſpirits when thus fed.

“I ſometimes alſo mow my vetches when they are in bloom, and make them into hay, in the ſame manner I manage my clover and meadow graſs; all which I leave in graſs cocks in the field, whilſt it is haying, very ſeldom ſpreading it, for fear of rain; and after two or three turns it is generally fit to carry.

“The great art, in making hay of vetches, is to contrive in ſuch ſort, that the leaves do not drop off the plants, which, if left too long, or dried too ſuddenly, they are apt to do; and the farmer is to underſtand, that great part of the peculiarly nouriſhing quality of the hay reſides in the leaf.

“I ſay peculiarly nouriſhing, becauſe almoſt every kind of cattle, as horſes, oxen, cows, and ſheep, is fond of it, and they all thrive on this food amazingly: this I have often experienced, and moreover obſerved, that they make no waſte even of the ſtalks, which they eat with an appetite.

“In this manner I manage for my hay, when I am inclined to have it very fine and fit for my cows and ſheep; and in this manner it is no difficult matter to get it in in good order, ſweet, and wholeſome: but when I intend it only for my horſes, I generally let my crop ſtand ſomething longer; that is, till the kid, or pod, is formed, and the ſeed about half grown within it.

“When the hay is made in this laſt way, the buſineſs is much more tickliſh, and conſtant obſervation muſt be made to ſee when the crop is in proper order to cut, becauſe if it is left too long, the ſtalks grow hard and ſticky, and the leaves are apt to drop off.

“This hay is more nouriſhing, when cut in this laſt method, than I can well deſcribe: it anſwers both for hay and corn; and with this food my horſes will be in good fleſh, health, and ſpirit, and be able to do a great deal of work. I have often proved this to be true, and can therefore the better venture to aſſert it.

" I have ſtill another method of making theſe vetches into hay, which is to leave the crop, till the ſeed is grown to its full ſize in the pod, though not ripe: I then mow them, and, when dry, threſh them on a cloth in the field; by which means I procure a conſiderable quantity of pigeons meat, which fetches me a tolerable good price; and this pigeons meat ſells better at market, than if the vetches had ſtood till the ſeed was thoroughly ripe; for by cutting the crop when the ſeeds are barely full grown before they begin to harden, they ſhrink in the drying, and thereby become of a ſmaller ſize than they are by nature, and conſequently more proper food for pigeons than if they were larger.

" I own, the hay in this laſt method is not quite ſo good, as many of the leaves will, in ſpite of all the care that can be taken, drop off, and the ſtalks will be a little ſticky: yet, after all, it ſerves very well for my ordinary cattle, and even for my plow and cart horſes, with the aſſiſtance of a few oats.

" Vetches are a very good plant to ſow thick on land, and when they have formed a perfect cover, to plow them in, in order to the land's being ſown afterwards with wheat on one plowing. In this intention they anſwer to the full as well as buck-wheat, or clover.

" When a farmer intends to plow in his vetches, I would by all means adviſe him to do it ſome weeks before he ſows his wheat, that they may have time to ferment and rot, or the conſequences may be fatal to his crop: I once, myſelf, loſt the chief part of a fine field of wheat by this overſight." *Muſeum Ruſticum, vol.* II. *pag.* 169.

" Vetches, ſays a gentleman farmer of Surry, are a grain often overlooked by the farmer; yet are they, when properly cultivated and applied to proper uſes, highly valuable and very beneficial.

" They are a very hardy grain, and reſiſt the ſeverity of a ſevere winter better than moſt other crops; beſides which, they have the additional advantage of growing in almoſt any ſoil; but then the farmer is to expect a produce in proportion to the goodneſs of his land.

" I would by all means adviſe, where it is intended for early feed, or to ſtand for ſeed, that the ſmall winter vetch be cultivated in preference to every other ſort, becauſe it is not only hardier, but alſo, being ſown about Michaelmas, it is forwarder, to ſerve as fodder, or will be earlier ready to mow for ſeed, which is no inconſiderable advantage; for the vetch being a ſucculent plant, and forming a very thick cover on the land where it is a full crop, it will be in danger of rotting inſtead of drying, if it ſhould be cut late, or the harveſt weather ſhould be very rainy; but if the winter vetch is ſown early, it will, in general, be fit to mow in July, or the very beginning of Auguſt, when there is leſs danger.

" Few farmers allow more than one ploughing for vetches: I always allow two, notwithſtanding what the neighbouring farmers tell me of turning the freſh ſoil again down to the bottom of the furrow: I find my advantage in this practice, and ſhall therefore continue it.

" I have generally experienced the firſt week in October, if the weather is fine, to be the very beſt time for ſowing vetches; and I allow only two buſhels of good ſeed to every acre, which I find full ſufficient.

"I ſow them broad-caſt on the rough land, as the plough leaves it after the ſecond ploughing, taking care to harrow the field length-ways and croſs-ways, in order to cover the ſeed the better; after which I paſs over it a roller, heavier or lighter, according to the nature of ſoil and the dryneſs of the weather, obſerving, that if the weather is dry, and the ſoil light, I uſe a heavy roller, in order to cloſe the pores of the light earth; but if the ſoil is ſtiff, and the weather damp, I uſe a lighter roller, leſt I ſhould knead and cruſt the field over, ſo as to ſtop the young ſhoot of the vetch.

" This crop will, in general, choak all the weeds that come up with it; but this muſt, however, be underſtood of the ſmaller ſorts, for if there are many large rampant weeds, it will be neceſſary to have them extirpated with the hook.

" Vetches afford excellent food for ſheep in the ſpring, make cows give a great deal of good milk, and horſes are fonder of them, cut green, than almoſt any other food.

" The beſt way is to cut them freſh and freſh every morning as they are wanted; and if the farmer has occaſion for them for this uſe only, he may ſow in the ſpring, to great advantage, the large vetch, at different times; by which means he will have a ſucceſſion of crops, which, to give green to his cattle, he ſhould always cut juſt before the plant flowers, for it is then in its tendereſt and moſt ſucculent ſtate, and will afford moſt nouriſhment; whereas, if he leaves it till the ſeeds are nearly ripe, the ſtalks harden, grow ſticky, and are of far leſs value; beſides that many of the lower leaves will, by this time, be withered, or dropped off, and entirely loſt.

" I muſt not conclude without mentioning an important uſe to which vetches are often applied; I mean, a full crop of them is frequently ploughed into the land as manure, to prepare it for a ſucceeding crop of wheat.

" When vetches are ſown with this intention, I would recommend the large ſort, and that four buſhels of good ſeed ſhould be uſed, to be ſown broad-caſt twice in a place: but my way of ſowing it is ſomewhat peculiar when I mean to plough it in; therefore I think it may not be amiſs to relate it.

" Moſt farmers ſow it by caſting it twice in a place, immediately after the land is ploughed, and then harrow and roll the field; but I proceed as follows.

" As ſoon as the field is plowed, I ſow two buſhels, broad-caſt, on every acre; after which I harrow it lengthways and croſs-ways. When this is done, I ſow the remaining two buſhels, and then harrow it twice again with a pair of heavier harrows, and finally ſcratch it twice over with light harrows to raiſe a mould, concluding my work by paſſing a roller over the whole field. By this management I ſcarcely ever miſs of a full crop, which covers the whole land, choaks the weeds, and ſerves as excellent manure for the wheat that is to follow.

" I have always found that this huſbandry ſucceeded beſt in light, hungry, ſandy, or gravelly loams; and a brother of mine, who lives in Bedfordſhire, tells me it does very well on a chalky ſoil, provided there is any heart in it.

" The time I chooſe to plough in the vetches is juſt after the bloſſom fades, and the kid begins to form; and it is really ſurpriſing to ſee what a ſtrong fermentation they raiſe in the ſoil.

" I have ſometimes had my crops ſo heavy that I have been obliged to mow, or hook up, the vetches before I could plough the land: but this is not often the caſe; when it is, the farmer has reaſon to rejoice.

" There are, as I hinted in the beginning of this account, ſcarcely any ſoils but the vetch will thrive in, though ever ſo various in their nature. I am an old man, and in the courſe of many years experience have ſown vetches often on a ſandy and gravelly loam, a chalk, though not for ploughing-in, a gravel, a low damp clay, and a perfect brown loam. On all theſe varieties of ſoil have they ſucceeded with me; but I muſt note, that the farmer may expect a larger crop from a gravel (I do not mean a pure gravel) that has ſome heart and ſtrength in it, than from the fineſt loam, which has been, by a long-continued courſe of bad culture, ſtarved and impoveriſhed.

" The large vetch may be ſown in January, February, March, April, or even the beginning of May, when deſigned for green fodder; but I would, by all means, have the induſtrious farmer avoid ſowing it before Chriſtmas, for it is a tender plant, and if hard froſt enſue, he may chance to loſe his crop." *Muſeum Ruſticum, vol.* III. *pag.* 185.

VINDIMATION, the gathering the grapes, or vintage.

VINE, the name of a well known ſhrub, which is, with good reaſon, preferred to all other, not only for the ſweetneſs of its fruit, but alſo for the eaſe with which it anſwers the labour beſtowed upon it, almoſt in every country and every latitude in the world, except in the frozen or the torrid zones.

It grows as happily in plains as upon hills, and thrives as well in a ſtrong ſoil, as in that which is looſe and open; alſo in land that is poor, as in that which is rich; and in a dry ſoil, as well as in that which is naturally moiſt. It alone beſt endures the intemperature of heat, cold, or ſtormy weather.

Nevertheleſs, it is of great importance that the quality of the vine be adapted to the condition of the country: for neither is the culture the ſame in every ſoil and climate, nor are all vines of the ſame kind. It is not eaſy to ſay which is the beſt; experience teaching us, that every country has its own, which is more or leſs proper for it. A judicious huſbandman will however eaſily find, that that vine is proper for the plain, which bears fogs and hoar-froſt without being hurt; and for a hill, that which can bear drought and wind. He will plant in a rich and fertile ſoil, a ſlender vine, which does not bear plenty of fruit; in a ſtiff ſoil, one that makes ſtrong ſhoots and is covered with plenty of leaves; and in a looſe ſoil, one that makes but few ſhoots. He will find, that it is not proper to commit to a moiſt place a vine which bears tender and large grapes; nor to a dry place, a vine of a contrary quality.

The good huſbandman will alſo know, that the nature of the climate is of great conſequence; whether it be hot or cold, wet or dry, ſubject to hail and wind, or calm, clear, or cloudy. Two ſorts of vines are fit for a cold and cloudy ſituation, viz. either one which is early, and ripens its fruit before the winter; or one of firm and hard grapes, which bloom in the midſt of fogs, and afterwards mellow with the cold and hoar-froſt, as other grapes do with warmth. Where wind and ſtorms are frequent, the vines muſt take deep root and have hard grapes: where the ſituation is warm, they may be of more tender and more fruitful kinds. Vines whoſe grapes rot with rain and conſtant dews ſhould be planted in dry places; and thoſe in moiſt, which are hurt by drought. If any vines are planted in places ſubject to hail, it ſhould be thoſe which have large and ſtrong leaves; becauſe they will ſhelter the fruit. Where the ſky is uſually ſerene and fair, all ſorts of vines will grow: and thoſe may be planted to advantage, whoſe grapes fall quickly off.

Could we have the quality of the ſoil, the ſituation of the place, and the ſtate of the weather to our wiſhes; that ſoil ſhould be preferred, which is neither too ſtrong nor too looſe, but rather inclining to looſe; neither poor, nor exceeding rich, but rather fertile. The ſituation ſhould neither be a plain, nor ſteep, but yet on a riſing ground; it ſhould neither be wet nor dry, yet moderately moiſtened with dews: it ſhould neither have ſprings on the ſurface, nor at ſome depth in the earth; and yet it ſhould communicate to the vines a moiſture which is neither bitter nor ſalt; for either of theſe will vitiate the taſte of the wine, and give a ſcurvy rough coat to every plant that grows on ſuch land. The ſtate of the moiſture may be known, by diſſolving ſome of the earth in water. The vine does not proſper either in a frozen, or in a ſcorching hot climate; but it thrives beſt in a country that is rather warm than cold. It is hurt more by rain, than by dry weather, and proſpers better in a dry climate, than where rains are frequent. It delights in gentle and moderate gales, but is greatly damaged by ſtorms.

It is an obſervation of long ſtanding, that ground which has never been plowed, or had trees growing on it, is the beſt for a vineyard. All authors agree, that an old vineyard is the worſt of any for making a new plantation; becauſe the earth is entangled with the old roots of the vines matted together, poiſoned by their decay, and quite exhauſted by their long ſtanding. Wood-lands may be uſed, becauſe the roots of common trees and ſhrubs are eaſily extirpated. Where there is no unplowed land, the next beſt is a corn field, free from trees, or where trees have not been planted thick.

The fitneſs of new ground for the vine may be judged of by the ſhoots of ſuch ſhrubs as grow naturally in it: for if they make thriving ſhoots, which have not a ragged or ſtinted appearance, the vine will flouriſh there. Of all ſoils, a black rich mould is the beſt for vines. Stones which crumble, or rot as it were, with the weather, being broken, and laid to the roots of the vines, retain a moiſture, cool them, and, by that means, are exceeding fit for nouriſhing them. For the ſame reaſon gravel, pebbles, and looſe ſtones are approved of, provided they be mixed with rich mould: but if they are mixed with poor earth, they are bad. Flints are likewiſe very friendly to vines, if covered with a moderate depth of earth; becauſe, being cold, they retain the moiſture, and prevent the roots being parched up in the dog-days. The foot of mountains, which receive the earth waſhed down from their tops; or vallies, to which additions are made by the ſettling of rivers, which overflow them, are very proper for vineyards. A chalky bottom is fit for the vine; but clay, not excepting even that which approaches to marle or potter's clay, is very unfit; as is alſo coarſe hungry ſand. On mountains and riſing grounds, and on the ſides of hills, vines do not eaſily take firm root; but they yield wine of a laſting and excellent flavour. In moiſt and level places, vineyards are exceeding ſtrong; but they produce wine of a weak flat taſte, which does not keep long.

It may be eſtabliſhed as a general rule, to plant vineyards in cold countries ſo as to face the ſouth, and in warm countries facing the eaſt, unleſs they are ſubject to ſtorms from that quarter, in which caſe it is better that they face the north. In exceeding hot countries, ſuch for example as Egypt, it will be beſt to expoſe them to the north.

Mr. Miller ſays, that the beſt ſoil for a vineyard, in England, is that whoſe ſurface is a rich ſandy loam, and not above a foot and an half. or two feet deep, lying upon gravel or chalk; either of which bottoms is equally good for vines. If the ſoil is deep, or the bottom either a clay or ſtrong loam, it is by no means proper for this purpoſe: for though the vines may ſhoot vigorouſly, and produce a great quantity of grapes; yet we have not ſun to ripen them ſufficiently. If the ſoil is too deep, the roots of the vine will run to too great a depth to receive the influences of the ſun and air; whence the juices of their fruit will be crude.

According to him, our vineyards ſhould be planted on the north ſide of a river, upon an elevation inclined to the ſouth, with a very gradual deſcent, that the ſuperfluous moiſture may be the better drained off. Yet if the ground ſlopes too much, it is by no means proper for this purpoſe. Hills to the north, as they ſhelter the vineyard from cold, and reflect the heat, will be of great advantage. The country round about ſhould be open and hilly, to preſerve the air dry. The vineyard ſhould be open to the eaſt, that it may enjoy the morning ſun, to dry up the ſuperfluous moiſture.

Dr. Beal, in N°. 116 of the Philoſophical Tranſactions, after having mentioned ſome inſtances of the warmth ariſing from ſtones under ground, eſpecially lime-ſtone, and ſome kinds of pebbles, is of opinion, that, as I obſerved before (quoting this very paſſage more at large), many of our hills and rocks might be greatly improved: for it would be no hard taſk, ſays he, to ſhovel down the ſhallow and moſſy turf from the ſteepeſt declivities, into places, where it may have ſome receptable or ſtay; and there to impregnate it, with the ſpade and compoſt, for garden or vineyard.

The ground muſt firſt of all be cleared of the roots of trees or ſhrubs, or whatever elſe can be a hindrance to the diggers, or might afterward preſs down the trenched earth, by its weight, or by the treading of thoſe employed in carrying it off. It is of great importance that the earth be kept extremely looſe, even, if poſſible, without a foot touching it, in order that the mould, being all equally ſtirred, may eaſily give way to the young tender roots, wherever they extend themſelves, and inſtead of obſtructing them by its hardneſs, receive them into its tender nouriſhing boſom, which, in that ſtate, readily admits the ſhowers and other influences from above, and diſpenſes them equally to all parts, for the nouriſhment of the young plants.

A plain or valley muſt be trenched two feet and an half deep, and a riſing ground three. A ſteeper hill muſt be trenched four feet deep: for when the mould is turned down from a higher place, it can hardly be thrown up again to a ſufficient depth, unleſs the trenches are made deeper. Beſides, I never approve, ſays Columella, of planting a vine leſs than two feet deep, even in a valley; for it is better not to plant it all, than to leave its roots too near the ſurface ſuſpended from the nouriſhing moiſture, which lies low, except where ſprings riſe near the ſurface: there indeed the ground muſt not be trenched above a foot and an half deep.

The trenches muſt be made equally deep all the way to the bottom, the ſides being perpendicular, and the ground marked out by a line, which muſt be carried forward as the work proceeds, always at equal diſtances, till the whole ground is equally trenched. Where the bottom is of a binding nature, it is of great advantage to lay in the bottom of the trenches, ſmall ſtones, or other rubbiſh, to carry off the water, which otherwiſe, ſtagnating there, would chill the tender roots. In order to do this the more effectually, the bottom of the trenches are made ſomewhat convex towards the middle, the better to convey the water to drains cut at the extremities of the vineyard.

If neceſſity forces to replant an old vineyard, all remains of the old vines muſt be extirpated. The ground ought then to be dunged with old dung, if it can be had, if not with new, and trenched moſt carefully, picking out every remaining root, which ſhould be collected and burnt. The trenched earth ſhould then be covered with old dung, which does not breed weeds, or with freſh earth brought from among thickets. Columella adviſes particularly, to have a careful overſeer to inſpect the workmen, and to be watchful that they do not make baulks.

Mr. Miller, inſtead of trenching the ground as the ancients did, propoſes giving it a ſummer fallow, plowing it as deep as the ſoil will admit of, and clearing it of roots, weeds, or whatever elſe can obſtruct the growth of the plants.

Columella adviſes great care to be taken in the choice of the vine from which the cuttings are taken, and is therefore againſt purchaſing ſtrange plants at a venture, which may come from a ſoil and climate different from that they are intended for, and may not be of the ſort of vine which is deſired. A vine cannot be ſaid to be fruitful, becauſe it bears many grapes; for this may ariſe from the largeneſs of the trunk, and the great number of bearing ſhoots, which may have but a ſingle bunch on each. If ſeveral bunches of grapes are ſeen to hang from each ſhoot: if from each bud left the former year, ſhoots with fruit ſpring forth; if the ſhoots which ſpring out of the trunk of the vine have ſome bunches; and if even the ſecondary ſhoots, or thoſe which grow out of the preſent year's ſhoots, bear grapes; that vine may undoubtedly be eſteemed fruitful, and fit to afford cuttings. Whoever has this much at heart, will mark the vines which have been the moſt fruitful, and have yielded the ripeſt and ſoundeſt grapes, with ochre and vinegar, that it may not be waſhed off by the rain. Nor is this to be done for one year only; but the vines ought to be examined for three or more vintages, to know whether they preſerve the ſame degree of fruitfulneſs: for then it will be certain, that the fruitfulneſs muſt be owing to the good quality of the vine, and not to a favourable ſeaſon. Whatever grapes come to their full maturity without being rotted or damaged, for ſeveral ſeaſons running, will yield more, and higher flavoured wine, than any others.

It is not enough that the ſtock from which the cuttings are taken be fruitful, but they muſt alſo be taken from thoſe parts of it which promiſe the greateſt fruitfulneſs. Thoſe which grow from the ſtem or old wood of the vine, ſeldom bear fruit, or produce fruitful vines. Thoſe which grow from the ſummit of the vine are reckoned too luxuriant to plant; and though the number of cluſters on them may promiſe fruitfulneſs, yet they ſhould not be relied on; but rather thoſe which grow out of the middle of the vine, of which the wood is firmer than that of the former. This Columella calls the genital part of the vine; and ſays, that, having followed reaſon as his guide, and alſo a long experience, he chooſes from that fruitful part of the vine, ſhoots which, bearing plenty of fruit already, promiſe fecundity for the time to come. He is not contented with ſingle cluſters, but chiefly approves of thoſe which have the moſt numerous offspring; and adds, that the neglect of theſe rules has rendered many vineyards leſs fruitful, indeed ſome quite barren, when the cuttings have been very improperly choſen.

Some are of opinion, that the whole ſhoot, as it is taken from the ſtem, is fit for planting; and for that end, they cut it into pieces of five or ſix eyes, each of which they plant. Others, with more reaſon, think that no part of the ſhoot is fit for being formed into a cutting, but only that part of it which is next to the wood of the former year: for every bearing ſhoot abounds in fruit below the fifth or ſixth eye. The reſt either bears no fruit, or produces only ſlender twigs. The ancients, ſays Columella, always preſerved ſome of the old wood to the cuttings: but experience has ſhewn that this is wrong; for whatever is left of the old wood ſoon roots, when it is moiſtened and covered with earth, and kills the tender roots next to it; and when this happens, the whole vine ſhrivels, or is burnt up. Whatever remains of the old wood ſhould therefore be cut off, where the ſhoot grows to it, that the ſhoot may be planted with its own ſmall head. Mr. Miller differs here in opinion from Columella; for he directs, that the ſhoots ſhould be cut from the old vine, juſt below the place where they were produced, taking a knot, or piece of the two years old wood to each, which, ſays he, ſhould be pruned ſmooth.

Were cuttings, thus choſen, taken from the vines every time they are pruned, for ſeveral vintages, and carefully planted, vineyards might be raiſed, which would yield plenty of the moſt generous wines: nor need we grudge this delay; for when once we are aſſured of the fruitfulneſs of a vine, it may be multiplied by engrafting. This, ſays Columella, you, Publius Silvinus, can witneſs: for, from one early vine on your eſtate, I engrafted the ſtocks of two jugera of vineyard in two years. How much therefore, may the vine be multiplied from theſe two jugera, ſeeing that theſe are the offspring of only one?

There are two ways of planting vineyards; viz. either with cuttings, or with vines which have already taken root. Theſe laſt are called quickſets. In the provinces, ſays Columella, they plant cuttings, for they will not be at the trouble of having nurſeries. The expert huſbandmen in Italy approve of this practice, becauſe the quickſets are attended with ſeveral advantages. They are leſs apt to die; and by reaſon of the greater firmneſs of their wood, they ſuſtain better the extremities of heat and cold, and other intemperatures of the weather: and the tranſplanting of them quickens their producing grapes. Cuttings may do in a looſe yielding mould; but a ſtrong heavy ſoil muſt have rooted vines, or quickſets.

Mr. Miller prefers good cuttings to rooted vines, for planting a vineyard; becauſe the roots of vines do not grow ſtrong and woody, as moſt ſorts of trees do, but are long, ſlender and pliable; and therefore, after they have been taken up, they ſeldom ſtrike out any fibres from the weak roots: but theſe generally ſhrivel and die, and thereby rather retard, than help, the plants in their growth, by preventing the new fibres from puſhing out.

This difference of opinion between Columella and Mr. Miller may be accounted for, from the different depths at which they direct the vines to be planted: for were cuttings to be planted two feet and an half deep, no roots would ſhoot out from their loweſt part; and if the rooted vines were planted ſo ſuperficially in Italy as Mr. Miller adviſes, they would be dried up by the ſun.

Columella directs that the nurſery be made, neither in a poor hungry ſoil, nor in an ouſy wet one; yet where there is moiſture enough; and in a middling rather than a rich ſoil; becauſe, though cuttings take root ſoon, and make ſtrong ſhoots in a rich ſoil; yet, when tranſplanted, they ſhrivel, and ſeldom recover. It is therefore the huſbandman's intereſt, rather to tranſplant from a middling ſoil to a rich one, than from a rich to a poorer. From a rich ſoil to a rich ſoil, they will thrive apace. It is not adviſable to make the nurſery in very poor land, becauſe many of the cuttings will then die, and the others will arrive but ſlowly at a ſtate to bear being tranſplanted.

The nurſery ſhould be trenched to the depth of two feet and an half, and being formed into beds three feet wide, the cuttings are planted in them at about a foot diſtance from one another, every way. This may be done either in the ſpring or in autumn. The ſpring is beſt if the climate be cold, or ſubject to much rain; and the autumn if the climate be warm, and the ſoil dry, or ſituated on the ſide of a hill.

The length of the cuttings ſhould be regulated by the diſtance between their eyes: for when theſe are near one another, the cutting may be ſhorter, and when they are more diſtant, it ſhould be longer. This length ſhould not exceed a foot, nor ſhould it be leſs than three fourths of a foot, leſt, being planted on the ſurface of the earth, the cutting ſhould periſh with drought in the ſummer; and, on the other hand, becauſe when a cutting planted too deep has taken root, it cannot be taken up without ſome difficulty. If the cuttings are planted on the ſide of a hill, their length may be about fifteen inches on ouſy ground, they need not have above three eyes, which may reduce them to nine inches, but certainly to more than ſix. In theſe three eyes are not included the numerous eyes which uſually are on the cutting, near the part where it is taken from the ſtem: beſides thoſe numerous eyes, there ſhould be three others, with joints. The cuttings ſhould be planted ſo deep, as that the uppermoſt eye may be level with the ſurface of the ground; becauſe all the ſap will then be employed in one ſingle ſhoot, which will conſequently be ſo much the ſtronger. They ſhould be planted as ſoon as poſſible after they are cut off the vine; and in doing this care ſhould be taken to avoid a ſtrong drying wind, or a ſcorching ſun. It is therefore beſt to chooſe a calm day, or at leaſt a day in which there is but little wind. The ſun may be kept off by ſhades, or any covering. The nurſery ſhould afterwards be kept clear of weeds, and be frequently dug. Only one ſhoot ſhould be reared, and that ſhould be faſtened to a ſtick or ſlender pole, to bear it off the earth. The reſt ſhould be carefully rubbed off; and this ſhoot ſhould be pruned down to two eyes in the autumn. The ſtrongeſt ſhoot from theſe eyes ſhould be reared the next ſummer; and with this management the cuttings will be fit to tranſplant at the end of thirty or thirty-ſix months.

Vines are likewiſe propagated by layers. For this purpoſe, a trench is dug four feet every way, that the layer may not be hurt by other roots. A ſhoot of the laſt year is then laid down in it, in ſuch manner as to make its end riſe at the farther part of the trench. Four eyes are left on that part of the layer which goes to the bottom of the trench, and they are to put out roots. All the eyes between them and the ſtem ſhould be rubbed off, to prevent the growth of uſeleſs ſhoots. Two, or at moſt three, eyes are left on the farther end, which riſes out of the earth, and all the reſt, between them and thoſe at the bottom of the trench, are rubbed off. The layer thus prepared ſoon takes deep root, and in the third year, it may be cut off from the mother vine. When the ſhoot is not long enough to riſe again out of the earth, Columella thought of the following method. The end of the ſhoot is brought to the bottom of the trench, and the four lower eyes, left for the roots to ſhoot from, are covered with earth, as before: but inſtead of the eyes at the extremity, as in the former way, the two eyes next the ſurface of the earth, of that part which come from the ſtem, are left to make ſhoots, which they readily do, and in the third year, the layer may be cut from the mother vine, as in the other caſe. In order to encourage the roots to ſtrike out, they need not be covered with the whole depth of earth the firſt year, unleſs it ſhould become neceſſary before the winter, to keep the roots from being chilled by water which might gather in the trench.

The ground being thoroughly prepared, by trenching, harrowing, and clearing it of every thing that can be hurtful to the vine, it is marked out, in order to be planted. The Romans planted their vines five feet aſunder in a poor ſoil, ſix feet aſunder in a middling ſoil, and at the diſtance of ſeven feet from each other in a rich ſoil. Sometimes too they left a ſpace of ten feet between them, that there might be ſufficient room for the ſtrong ſhoots to extend themſelves.

They generally planted their vineyards in a quincunx form, for which they marked out the ground by ſtretching acroſs it a line trimmed with bits of red cloth, or of ſome other conſpicuous colour, at ſuch diſtances from each other as it was intended to leave between the rows. A piece of reed was ſtuck into the earth at each ſpot indicated by the cloth, and this was repeated till the whole field was marked out in equal diſtances. The planter followed, and dug a hole at each alternate reed, two feet and an half deep in level ground, two feet and three quarters if it lay ſloping, and three feet deep where the declivity was conſiderable. He then removed the quick-ſets from the nurſery, taking them up with great care, and tranſplanted them the very ſame minute, if that was poſſible. All their ſhoots were previouſly pruned off, except one, which was the ſoundeſt and firmeſt, and of that only two eyes were left above ground. If any of the roots were hurt in taking them up, though all poſſible care was uſed not to injure them, they were cut off, very ſmooth. If two plants were ſet in the ſame hole, a few ſtones, of about five pounds weight, were laid between them in the bottom of the hole, to prevent their roots from interweaving together. They were likewiſe of opinion, that theſe ſtones ſaved the roots from being chilled in the winter, or ſcorched by the heat of the dog-days in the ſummer. Mago adviſed to lay the huſks and ſtones of grapes mixed with dung, in the holes, under the roots of the vines, as a means of ſtrengthening them, and of haſtening the production of young roots. During the chilling wet of the winter, they gave a warmth; and in the ſummer, they afforded a nouriſhing moiſture. Columella diſapproved greatly of putting two vines in the ſame hole, becauſe their roots conſtantly mingled together, and formed a kind of net-work, which retained too much moiſture in the winter, and, by robbing each other of nouriſhment, proved prejudicial to both. If the ſoil of the vineyard was poor, Mago directed that the holes ſhould be filled up with rich earth brought from elſewhere. The ground ſhould be a little moiſt when the vines are planted; but it had better be dry, than mirey wet.

Mr. Miller orders that the ground, which he before directed to be fallowed, be again well plowed in March; and that after having laid its ſurface even, the rows ſhould be marked out, from ſouth-eaſt to north-weſt, at the diſtance of ten feet from each other. He then croſſes theſe rows at the diſtance of five or ſix feet, and thereby marks the ſpot where each plant is to be ſet. The rows will conſequently be, in this caſe, ten feet aſunder, and the diſtance between the vines in each row will be five or ſix feet; nearer than which they ought never to be planted. If they are ſet in ſquares ſo near together as ſix feet, there cannot be room for a ſufficient current of air to paſs between them when their branches are extended on one ſide; and for want of that the damps in autumn will be detained among the vines, to the great prejudice of their fruit. In places abroad, continues he, where they regard the quality of their wine more than the quantity, they never plant their vines at leſs than ten feet, row from row, and ſome allow twelve: and he confirms the juſtneſs of this rule by what happens to other fruits, which are never ſo well coloured, ſo early ripe, or ſo well flavoured, when in cloſe plantations, as when they are produced on trees where the air can circulate freely about them, and the rays of the ſun have free acceſs to the branches, whereby the juices are better prepared.

Preferring cuttings to layers, as well as to rooted vines, he directs, that the cuttings be taken from the vine in the autumn, and that their ends, being made ſmooth, they be laid in the ground, about two inches deep, the reſt of the cutting being left at full length; only obſerving to cover them with dry litter, or peas haulm, in dry froſty weather. In moiſt weather, the covering ſhould be taken off, leſt it heat, and make the cuttings grow, which would greatly injure them. In April, which he reckons the beſt ſeaſon for planting vines in England, the cuttings ſhould be taken out of the ground, and their upper parts cut off, ſo as to reduce them to about fourteen inches in length, according to the diſtance of the buds or eyes. He thinks it of great ſervice to leave their tops on all the winter, becauſe the air would otherwiſe penetrate the wounded part, and greatly injure the remaining eyes. The lower ends of the cuttings ſhould be put in water, about three inches deep, ſetting them upright, for ſix or eight hours, before they are planted, in order to moiſten them and open their pores: then, at the centre of every croſs mark, before made, a hole ſhould be dug with a ſpade, about a foot deep, and one ſtrong cutting ſhould be ſet, a little ſloping, in each of theſe holes, which ſhould afterwards be filled up immediately with earth preſſed down gently to the cutting. This earth ſhould be raiſed about three inches round each cutting, ſo as juſt to cover its upper eye or bud, to prevent the wind and ſun from drying it; for only that upper bud will ſhoot when the plant is thus managed.

Mr. Miller juſtly blames his countrymen for planting their vineyards, in the few attempts that have been made of them in England, with ſuch grapes as are the ſweeteſt and beſt for eating; this being contrary to the general practice abroad, where the rough auſtere grapes, which are by no means palatable, but which are by experience found to afford a noble rich wine, are preferred. This is alſo agreeable to the conſtant practice of the makers of cyder, who obſerve, that the beſt eating apples yield but a poor juice, and that the rough ſorts afford a ſtrong vinous liquor. I believe, continues he, that it will be found true in all fruits, that where the natural heat of the ſun ripens and prepares their juices, ſo as to render them palatable; whatever degree of heat theſe juices have more, either by fermentation, or from any other cauſe, will render them weaker, and leſs ſpirituous. Of this we have many inſtances in fruits: for if we tranſplant any of our ſummer or autumn fruits, which ripen perfectly in England without the aſſiſtance of art, into a climate a few degrees warmer, theſe fruits will be mealy and inſipid. So likewiſe, if we bake or ſtew any of theſe fruits, they will be good for little, becauſe they will loſe all their ſpirit and flavour by the additional heat of the fire: and on the other hand, many fruits which are not even eatable whilſt raw, are thereby much improved. Some of theſe, which have been tranſplanted into a warmer climate, have been ſo altered by the greater heat of the ſun, as to excel the very fineſt of the fruits that are ripened in this country. The grape moſt likely to ſucceed in England, is the Auvernat, or true Burgundy grape, which thrives very well in ſeveral places north of Paris.

Columella adviſes every prudent huſbandman to ſtock his vineyards with different ſorts of vines, becauſe the weather is not ſo equal in any year, but that it may be more hurtful to ſome, than to others. If, therefore, he plants but one kind of vine, and the weather happens to be prejudicial to it, he will be deprived of his whole vintage: but if he has vineyards of various ſorts, ſome of them may eſcape, and yield him fruit. He recommends particularly, that each kind of vine be planted by itſelf; becauſe otherwiſe one of the following inconveniencies will enſue; viz. either he muſt gather his late grapes with thoſe that are early ripe, which will cauſe an acidity in the wine; or if he waits till the late fruit come to maturity, the early grapes will be rotten, or deſtroyed by birds or rain: for the diſtinguiſhing of each kind cannot be truſted to the gatherer's diſcretion. The flavour of the ripe grapes is hurt by the addition of the unripe; nor will the wine made of them both, mixed together, keep till it is old. When each ſort is ſeparate, the vine dreſſer will be able to prune and manage it in the moſt proper manner.

He cautions his readers ſtrongly againſt the too prevailing opinion of thoſe who imagine, that the chief care and trouble are at an end when the vineyard is planted. He obſerves, that the vine is a tender delicate ſhrub, which can very ill bear neglect, and which, when young, often deſtroys itſelf, by being permitted to run too much to wood, or to bear too great quantities of fruit. Moſt people are ſo intent on having much fruit, that they load the vine with too many bearing branches, without having any regard to future years, or to poſterity; and then complain, that their vineyards do not anſwer their expectation, when they themſelves have deſtroyed them, either through covetouſneſs, negligence, or ignorance. When the vine has arrived at its full ſtrength and maturity, it can better bear ſome neglect. Believe Silvinus, ſays this excellent huſbandman to his friend, what I know from my own experience, that a vineyard judiciouſly planted with good vines, and well cultivated, never fails to bring its owner a moſt abundant return. This he confirms from Græcinus, by the example of Pavidius Veterenſis, who had two daughters, and a farm planted with vines. He gave the eldeſt daughter one third of his farm, on her marriage, and yet had as much fruit from the remaining two thirds, as he had before from the whole. He afterwards gave half of the remainder to the younger daughter, on her marriage, and ſtill had as good an income as at firſt. This, ſays Columella, muſt ariſe from the remaining thirds being proportionally better cultivated, than the whole had been before.

When the vineyard was perfectly well cultivated, and in a good ſoil, the Romans planted cuttings in the ſpaces between the vines, where they grew as in a nurſery. The vines and cuttings ſoon throve and gathered ſtrength, when the ground was kept in ſo looſe a ſtate by frequent digging, as to be reduced to powder, and always perfectly free from weeds, which would conſume the nouriſhing moiſture that ſhould feed the plants, whoſe roots extended eaſily in ſuch looſe mould. It was a general rule, that the diggings ſhould be repeated once a month, from the firſt of March to the firſt of October; and all weeds were carefully pulled up by hand, and carried off the ground, leſt they ſhould take root again. Mr. Miller ſays, that as the ſpace between the rows of vines is great, the ground there may be ſown or planted with any kind of eſculent plants, provided they are kept at ſuch diſtance from the vines, that theſe be not injured by them. This huſbandry, which is alſo the method in France, may be continued three or four years, till the vines come to bearing: but after that, no ſort of crop ſhould be ſet between them in the ſummer; becauſe, the clearer the ground is kept, the more heat will be reflected to the grapes. After they are gathered, a crop of coleworts, for ſpring uſe, may indeed be planted between the rows, and the ſtirring of the ground for them will be of great ſervice to the vines.

From the time that the vine firſt begins to bud, all ſuperfluous ſhoots muſt be carefully rubbed off, that the nouriſhment may be conſumed by thoſe only which are to be reared. Two ſhoots are generally ſet apart for growth; the one as a reſerve, in caſe the other ſhould fail. As ſoon as they riſe, a prop ſhould be ſet in the ground, for each of them. This prop ſhould be ſlender, becauſe the weak tendrils of the vine will then lay hold of it more eaſily than if it was thick. As the ſhoots grow up, they are tied to the props with a ſoft ſlack binding, till their tendrils have encircled them; and at leſs than four feet from the ground, ſticks are faſtened acroſs the props, that the vines may extend laterally, and thereby be the leſs expoſed to the force of winds. In nurſeries, this croſs ſtick, or rail, ſhould not be above a foot high, leſt ſtrong winds ſhould tear the young plants out of the earth. When the ſhoots are grown nearly to their full height, their tops are broken off, to make them increaſe in thickneſs and ſtrength, rather than run up into a needleſs length. The moſt thriving ſhoot, which is to be the leading wood branch, muſt be trained up ſtrait, and kept clear of ſecondary ſhoots for three feet and a half from the ground: but ſuch as grow above that height may be permitted to remain till the autumnal pruning; for if they are all rubbed off, new ſhoots will immediately ſpring out from other eyes, ſo that, perhaps, none may be left for the next year's buds. The ſhoots which are rubbed off from time to time ſhould never be ſuffered to grow ſo ſtrong, as not to be eaſily diſplaced with the finger; for the heat in ſummer hurts the vine greatly wherever it has been wounded with a knife. For this reaſon, if it ſhould be abſolutely neceſſary to uſe the knife, a piece of the ſhoot which is cut off ſhould be left prominent from the ſtem, to ſtop the effect of the heat, which, in that caſe, will not proceed farther.

About the middle of October, or before the cold came on, the Romans *ablaqueated*, as they called it, the roots of their vines; that is, they laid them bare, ſo as to expoſe to view the upper ſmall roots which the vine had put forth in the ſummer, and which ſhould be cut off with a knife; for if theſe are ſuffered to grow large, the lower ones will decay, and the vine will then be nouriſhed only by roots, which, extending themſelves along the ſurface of the earth, or but little deeper, muſt be expoſed to the inclemency of the winter's froſt, and be liable to be parched by the drought and heat of the ſummer. Whatever roots appear within a foot and an half of the ſurface muſt therefore be cut off. The beſt way is to cut them about an inch from the ſtem, and to leave that ſtump prominent; for if they are cut cloſe, either others will ſhoot out, or the water which ſtands in the hollow made round the root, being frozen, will deſtroy the ſtem to the very pith, where the ſcar is: but both theſe accidents are prevented, by cutting them off at a little diſtance from the ſtem. And now will appear a reaſon why the vines ſhould ſtand upright in the ground: it is, that if they are inclined, they muſt be liable to be wounded when they are ablaqueated; for while the digger is intent on digging, and forming a hollow round the vine, he may inadvertently wound the vines which grow obliquely, or even cut them quite through. If the winter is mild, the roots may remain uncovered till March; but if the ſeverity of the weather forbids this, the hollows ſhould be filled up by the beginning of December. Where the winters are very ſevere, ſome dung, or, if it can be eaſily come at, pigeon's dung, or urine which has been kept a long while, ſhould be laid to the roots before they are covered. The vines ſhould be thus ablaqueated every winter, for the firſt five years; and after that, as the lower roots will then have got pretty ſufficient ſtrength, it need not be repeated above once in three years.

From theſe directions of Columella, we may aſſign a reaſon why Mr. Miller does not ſpeak of ablaqueating the vine. Columella wrote for Italy, where the heat of the ſun is very powerful, and dries the ſurface of the earth to a conſiderable depth. It was therefore neceſſary, in order to ſecure moiſture for the roots, to plant and keep them deep in the earth: but as the degree of heat in England is much milder, as well as of ſhorter duration, and as the earth here is refreſhed by much more frequent ſhowers during the ſummer, Mr. Miller directs the vines to be planted much ſhallower, and finds that it is not neceſſary to ablaqueate them. He rather guards againſt their taking too deep root.

The Romans reared all their vines in one ſtem to ſome height above the ground; and therefore, as ſoon as they had finiſhed ablaqueating them, they cut off the weakeſt of the two ſhoots, which they called the ſhoot of reſerve, and pruned the remaining ſhoot to two eyes. Mr. Miller directs that both the ſhoots be cut down to two eyes, and that the earth be drawn up in a hill about each plant, which will be a great defence againſt froſt. The wound ſhould be made obliquely, almoſt in the middle between the joints, leſt water ſhould lodge in the pith, if the ſhoot were cut horizontally: but the ſlope muſt not be toward the eye, leſt this ſhould be hurt by the trickling down of the ſap, or tears, which will ooze from the wound. Mago recommends the ſpring, as the fitteſt time for pruning the vine; becauſe, being then full of ſap, it affords an eaſy paſſage to the knife: but Columella does not approve of this, unleſs it be in countries where the winters are very ſevere: otherwiſe, he thinks the autumn the beſt ſeaſon. The early writers on huſbandry forbid touching the vine with the knife during the firſt year; and Columella, who likewiſe diſapproves of it, making experience his guide, neither ſuffered his vines to become wild, by running too much to wood; nor did he, by cutting off the young ſhoots entirely, force them to ſhoot from the ſtem, which ſeldom proves ſo fruitful as ſhoots from the young wood.

During the ſecond year's growth, the ground ſhould be kept conſtantly ſtirred, as in the preceding year, only with this difference, that it may be done once ſeldomer. The weeds muſt be kept under, till the vines, by extending their branches, ſhade the ground, and thereby prevent their growing under them. All ſuperfluous twigs muſt be conſtantly rubbed off as before, and only one ſhoot ſhould be permitted to grow up. The props muſt be continued as in the former year. If any of the plants died in the firſt year, two ſhoots may be reared up on the ſtrongeſt of the vines next the vacant ſpace; one to form the ſtandard ſhoot, and the other to be made a layer, to ſupply the place of the dead vine. After the vintage, this ſhoot muſt be laid down, or if it be not long enough to riſe out of the earth on the other ſide of the hole, only its extremity need be put into the ground, as already directed. Next year, the layer muſt be cut half through, in the bend, that ſo it may not rob its mother too much, but be brought to be nouriſhed by its own roots. When it is two years old, it may be cut off from the mother plant, and its root muſt be carefully ablaqueated, that it may ſtrike the deeper into the earth. If the neighbouring vines cannot furniſh layers, a rooted vine muſt be brought from the nurſery; for it is too late to recruit a vineyard, when we ſhould be gathering its fruit.

For the third year's growth, the vine muſt be ſupported with ſtronger and higher props than before. Theſe ſhould be fixed, either a foot from the vine, that they may not hurt the roots, and that ſo the vine-dreſſer may dig all round the vine; or in the middle between two vines. The firſt way is the beſt, becauſe the vine and prop mutually ſupport each other. If the prop is fixed near the vine, it ſhould ſtand ſo as to ſhelter the vine from the north. It is of great importance that the prop ſtand very firm. On each upright prop muſt be put a croſs pole, ſufficiently ſtrong to bear the weight of the fruit. This year the vine may be permitted to make two ſhoots, to cover the croſs pole on each ſide with bearing branches, unleſs the vine be yet too weak to nouriſh them. All ſuperfluous ſhoots and twigs muſt be carefully rubbed off. The ground muſt be frequently ſtirred, to keep it looſe, and deſtroy weeds. The roots muſt be laid bare in October. The places of dead plants muſt be ſupplied, as directed for the preceding year, and this muſt be a conſtant rule every year. When a vine dies after it has ſtood for ſome years, the hole or trench which is made for the layer or young plant, muſt be dug deeper and wider than it need to be after a young vine, in order that all the roots of the old one may be taken away. The trench ſhould then be partly filled with freſh earth, or a good deal of dung mixed with the former ſoil. If each ſide of the vine has produced two ſhoots, and both of them ſhew plenty of fruit; yet one muſt be taken away, that the other may thrive the better, and bring its fruit to greater perfection.

When this vintage is finiſhed, the vine may be pruned ſo as, in a fertile ſoil, where it thrives well, to leave three eyes, to produce bearing ſhoots for the next year; but four eyes ſhould ſeldom be left. The binder muſt ſeparate theſe ſhoots, and tie them to the frame, to which another croſs pole is now added, in the form of a ſtar: or theſe croſs poles may be ſupported by four props. The ſhoots ſpread in this manner become a counterpoiſe to each other. Theſe croſs frames are the more neceſſary if the vines are expoſed to ſtormy winds, or if they ſtand on ſteep declivities, where every means of propping them is wanted. In warm and dry ſituations, the frame may be extended on all ſides, in the form of an arched roof, the better to ſhade the thirſty earth: but in cold and froſty climates, the vines muſt be ſupported only on ſingle frames or eſpaliers; for then the earth is more eaſily warmed by the ſun, the fruit is more thoroughly ripened, and a freer paſſage is afforded to the air. The frames ſhould not be lower than four feet, nor higher than ſeven. Young vines ſhould be brought to this height gradually. The moiſter the ſoil and climate are, the higher ſhould be the frame; for there, the thriving ſtate of the vines admits of raiſing their branches, and their fruit being thereby raiſed higher from the earth, is the leſs liable to rot. In this ſituation, the winds blow freely through them, and dry up the dews and noxious fogs; the vines bloſſom more kindly, and yield a better wine. On the other hand, vines in a poor ſoil, on a ſteep declivity, and ſubject to ſcorching heat, require lower frames. If the vineyard is well placed, the beſt height is five feet; though there is no doubt but that the wine is the better flavoured, the higher the frames are.

If the vineyard is interſected by foot paths which divide it into a number of ſmall partitions, the ſun and wind have the freer acceſs to the vines; as hath alſo the eye of the maſter, which is of great advantage. The labour too ſeems leſs to the vine dreſſers, when it is thus portioned out in ſmall diviſions. The paths afford convenient paſſage for the grape gatherers, for thoſe who repair the frames, and for bringing in manures, or what elſe may be wanted. The owner can likewiſe diſtinguiſh the fruitfulneſs of each ſpot, and thereby be enabled to apply proper remedies. Where the rows of vines ſtand very far aſunder, too much ground is generally left uncultivated between them; one half of which is commonly uſed for alleys, or foot-paths.

The trunk of the vine ſhould be carried up ſtrait to within a foot of the top of the frame; not only to conduce to its beauty, but alſo to its fruitfulneſs and duration: for the moiſture which nouriſhes plants never has ſo free a motion through a crooked ſtem, as it has through a ſtrait one; the bendings proving ſo many lets or hinderances to the equal circulation of the ſap. The top of the vine ſhould be faſtened to the prop, ſo as to prevent its being bent, or dragged down, when it is loaded with fruit; and for greater ſecurity in this reſpect, the arms, or branches, which proceed from thence, ſhould be trained along the frame, and tied to it, ſo that only thoſe parts of the ſhoots on which the fruit grows may hang ſloping down from the edge of the frame: nor ſhould this be at right angles from the binding, becauſe that poſition would endanger their breaking. When thus ſituated, they are leſs expoſed to rain and hail, than when they are faſtened to the frame. They ſhould however be tied up before the grapes are ripe, to guard againſt their being rotted by the dew. When the vine is five years old, it will be ſufficient to leave one fruit bearing ſhoot on each of its arms, or branches: but, ſome years after, when it has attained its full ſtrength, a luxuriant vine, in a rich ſoil, may convey nouriſhment to eight fruit-bearing ſhoots; and, indeed, unleſs it be checked by a quantity of fruit, it will waſte itſelf in wood and leaves: whereas a weak vine, in a poor ſoil, will ſoon be exhauſted if it is burthened with fruit.

The branches of a vine ſhould never be ſuffered to grow bigger than the ſtock: but, to ſupply their place, ſhoots iſſuing from their ſides ſhould be trained, and as ſoon as theſe begin to bear fruit, the old hard wood ſhould be cut away. Fewer bearing ſhoots ſhould be left on the branch which extends northward, than on that which is directed toward the ſouth; becauſe this laſt requires the greateſt ſhelter from the ſcorching heat of the ſun, and therefore ſtands moſt in need of leaves. All ſuckers muſt be cut away from the root, and the place whence they ſprung ſmoothed with a knife; for then it will ſoon ſkin over. No ſhoots muſt be ſuffered to grow from the trunk, nor ſhould any knobs or warts be left on it. All dry, cracked, and ſhrivelled bark, muſt be taken off. Moſs likewiſe, which ſhackles the vine, as with a fetter, and ſoaks it with its pernicious moiſture, muſt be carefully ſcraped off: and if the trunk is any way damaged, or rendered hollow by rain or inſects, it muſt be cut away to the ſound wood. The wound ſhould then be covered with earth which has been moiſtened with lees of oil; for this will defend it from inſects, ſun, and rain, and therefore make it heal the ſooner. All broad, ill-ſhaped, withered ſprays, and ſuch as hang downward, commonly called danglers, muſt be cut off; and the ſtrait ſhoots muſt be preſerved. When the vine is freed from all theſe incumbrances, it will thrive the better, and yield the purer wine. The vine dreſſer ſhould be particularly attentive, that all wounds in the ſolid wood be made ſloping and round; becauſe they afford the leaſt lodgment to water, and are the ſooneſt cloſed.

Sometimes a ſtrong ſhoot ſtrikes out of the fork of two of the leading branches, and cripples one of them. In this caſe, the crippled branch muſt be cut off, and the young ſhoot reared in its ſtead: but if it be taken in time, the young ſhoot ſhould be cut off. Whatever grows out of the trunk of the vine muſt be cut away ſo ſmooth, that no water may lodge in the ſcar: but what grows on the young ſhoots of the ſame year, ſhould be cut off between the two firſt eyes; leſt by cutting it too near the main ſhoot, this alſo ſhould be hurt by the wound, and the neighbouring bud be killed.

As to the length of the fruit-bearing ſhoots, there is no general rule; for it may depend greatly on the quality of the ſoil, and the vigour of the vines, as well as on the diſtance between the eyes; for where the joints are ſhorter, a leſs length of ſhoot may be equally loaded with fruit. The laſt year's vintage ſhould alſo be conſidered: for thoſe parts of the vine which then bore great plenty of fruit; muſt be ſpared in the following year; and ſuch as produced but a ſmall quantity, may be loaded the more. Moſt particulare care ſhould be taken, that every cutting inſtrument which touches a vine, be ſharp and well tempered; for otherwiſe, the labour of the vine-dreſſer is greater, and the vine is rather torn than cut; ſo that there then remains an uneven ſcar, in which the juices putrify, ſo as often to kill the vine.

Mr. Miller agrees with Columella in keeping the vine clear of uſeleſs ſhoots, and in the frequent ſtirring of the ground: only, as the vines in England are not planted ſo deep as in Italy, he cautions againſt digging too deep cloſe to the vines, leſt their roots be cut or bruiſed. He differs ſomewhat in the method of propping and pruning, which he directs to be done as follows.

At the beginning of May, in their ſecond year, when the vines are ſhooting, two ſtakes, ſomewhat taller and ſtronger than thoſe of the preceding year, ſhould be fixed down to the ſide of each plant, and the two ſhoots ſhould be faſtened to them.

In the autumn, the vines which have produced two ſtrong ſhoots of equal vigour, muſt be cut down to three eyes each. When they have a ſtrong ſhoot and a weak one, the ſtrong ſhoot muſt be ſhortened to three eyes, and the weak one to two: and ſuch as have but one ſtrong ſhoot, ſhould be ſhortened to two eyes.

In March of the third year, two ſtakes ſhould be placed down by the ſide of all ſuch vines as have two ſhoots, at ſuch diſtance on each ſide of the plant, that the ſhoots, faſtened thereto, may form an angle of forty-five degrees with the ſtem: but they ſhould not by any means be bent down horizontally, as ſome injudiciouſly adviſe and practice: for the branches, then lying too near the earth, are generally injured by the damps which ariſe from thence, eſpecially if they have fruit, which is never ſo well taſted, nor ſo ripe, as when they are a little elevated. In May, the ſtrong ſhoots ſhould be faſtened to the ſtakes.

If the two ſhoots of the former year have produced two ſtrong branches, the uppermoſt of theſe ſhoots upon each branch ſhould be ſhortened down to three good eyes, not including the lower eye, which ſeldom produces any thing more than a weak dangling ſhoot; and the lower ſhoot ſhould be ſhortened to two good eyes; theſe being deſigned to yield vigorous ſhoots for the next year, as the former are to bear fruit. Where the vines are weak, and have not produced more than two or three ſhoots in the ſummer, but one of theſe ſhould be left with three eyes, for bearing; the other muſt be ſhortened down to two, or if it be weak, to one good eye, in order to obtain ſtrong ſhoots the following ſummer: for nothing is more injurious to young vines, than leaving too much wood upon them, or over bearing them.

In March of the fourth year, all ſmall horizontal roots, which may have been produced near the ſurface of the ground, ſhould be cut off cloſe to the trunk. A ſtake ſhould be placed about ſixteen inches from the root, on each ſide of the vine, and the bearing branches ſhould be faſtened thereto. Then another, and taller, ſtake ſhould be thruſt down near the foot of the vine, and to this ſhould be tied the two ſhoots which were pruned down to two eyes. In May, the ſhoots which ſhew fruit muſt be faſtened to the ſtakes, with baſs, to prevent their being broken, until they are extended to three joints beyond the fruit; when they ſhould be ſtopped, by nipping off the end: but the ſhoots, which are deſigned for bearing the next year, ſhould be trained upright to the middle ſtake; by which method, neither of them ſhading the other, each will enjoy the benefit of the ſun and air. The ſhoots ſhould be conſtantly kept in their right poſition, to prevent the inverting of their leaves; for when that happens, it greatly retards the growth of the fruit.

Mr. Miller very juſtly cenſures the abſurd practice of thoſe who pull off from their vines the leaves which grow near the fruit, in order to let in the rays of the ſun, to ripen it; not conſidering how much they thereby expoſe their fruit to the cold dews which fall plentifully in autumn, and which, being imbibed by the fruit, greatly retard it: beſides, no fruit will ripen ſo well when it is entirely expoſed to the ſun, as when it is moderately ſcreened with leaves. By pulling off the leaves, which are abſolutely neceſſary to prepare the juices before they enter the fruit, and of which juices the groſs parts are perſpired by them; the fruit muſt either be deprived of nouriſhment, or elſe, ſome of the groſs particles will enter with the more refined parts of the juices, and thereby render the fruit worſe than it would be if the leaves were left upon the branches.

This naturally leads me to another opinion, which I have long been inclined to entertain: it is, that not only the ſtripping the vine of its leaves, but alſo the ſummer pruning, which is intended to haſten the ripening, and increaſe the goodneſs of the grapes, has the contrary effect. For in the ſpring, and while plants are in a growing ſtate, their juices are of a watery acid nature, abounding in what the chemiſts call their native ſalt. As the ſummer advances, or as, reſpectively in each, their ſeed, or fruit, begins to ripen, their juices loſe that watery acid ſtate, and become gradually milder: and when the ſeed, or fruit, is come to full maturity, the juices of perennial plants become of an oily mucilaginous quality. This change in the nature of the juices of plants is gradual, and perfect, in proportion to the flouriſhing ſtate of the plant. Now, if a conſiderable length is cut off from the young ſhoots of the vine, while it is yet in its luxuriant growing ſtate, and the motion of the ſap is ſtill briſk in it; a check muſt be given to nature in her juices. This is confirmed by the effects of numbers of facts and experiments. As young ſhoots ſpring out again after this ſummer pruning, the juices are probably again brought to a thin watery ſtate, in order to carry on that newly excited vegetation; the change of the juices into their milder and thicker ſtate is thereby retarded, and conſequently the richneſs and mellow ripeneſs of the fruit is impeded. It would therefore ſeem more adviſable to defer ſhortening the ſhoots, till they have nearly arrived at their full length, and the grapes are beginning to ripen. The perfecting of the fruit requires ſo ſtrong an exertion of all the powers of nature, that few, if any, ſhoots will then ſpring out; by which means the buds for the next year will be preſerved ſtrong, and the grapes will arrive at a more perfect maturity.

Mr. Miller directs, that the vineyard, being now arrived at a bearing ſtate, ſhould be treated after the following manner. Too many branches ſhould never be left upon a root, nor ſhould thoſe be too long: for although a management contrary to this may be productive of greater quantity of fruit, yet that fruit will not be ſo well nouriſhed, nor will its juice be ſo good, as when it is but moderately plentiful: neither will the roots of the plants be ſo much weakened in this laſt caſe, as they muſt be in the former. The ground ſhould be conſtantly kept clear of weeds; and no ſort of plant ſhould be ſuffered to grow on it, excepting that which it is intended to cultivate. It ſhould be manured every third year, according to the nature of the ſoil. If the land is ſtiff, and inclinable to bind on the ſurface, ſea-ſand, or ſea-coal aſhes, are very good manure: but if it is looſe and dry, a little lime mixed with dung will do it the moſt ſervice. After each ſpring digging, the ſtakes are fixed as already mentioned, and the ſame care and management of the vines, as was before directed, muſt be continued. Mr. Arnoux ſays, that, in Burgundy, they bind the branches of the vine in an horizontal poſition, at the height of half a foot from the earth, to props three or four feet high, ſtuck into the ground, without any order, at the diſtance of about a foot aſunder. They tie the ſhoots to theſe props as they extend in length, and find in this method the advantage that one branch is not ſhaded by another, but for as little a time as is poſſible.

Columella directs, that the props and frames be carefully examined after every pruning, and that whatever is amiſs in them be repaired. Broad and flat props are preferable to round ones, and oak is the beſt wood they can be made of. Next to them, are round props of juniper, laurel, foreſt pine, and elder. Such as are rotten muſt be taken away, and new ones put in their ſtead. The bindings ſhould be new every year. The ligature which faſtens the ſtem to the prop ſhould not be always in the ſame place, leſt it ſhould occaſion a wound. The four branches ſhould be tied gently to the croſs poles, ſo as not to twiſt or bend them much. The ſhoots ſhould be faſtened ſo as that, when they grow beyond the frame, they may go ſhelving from it, and not hang by their binding, which would be apt to break them, eſpecially when loaded with fruit. When two branches are ſo near together as to go to the ſame ſide of the frame, another pole ſhould be placed between the croſs ones, for one of thoſe branches to be faſtened to.

Thoſe who are curious in gardening know what great things Dr. Agricola boaſts of from the uſe of his mummies, in rearing the tendereſt plants, as well as in raiſing foreſt trees from cuttings. The lees of oil, as Columella directs, mixed with fine earth, to give it a conſiſtence, may probably anſwer the ſame purpoſes. Where lees of oil cannot be had, ſome other bitter vegetable ſubſtance might be contrived, which, being free from the acrid oil in all turpentines (as in Agricola's mummies) might prove very friendly to plants, and be particularly uſeful in preventing their wounds from bleeding, and in preſerving them from being ſcorched by the ſun, or hurt by inſects. It is neceſſary that this ſubſtance be bitter, that it may hinder the inſects from preying on the tender juicy fibres, for inſtance, of the vine, wherever a wound is made. Even loam, by itſelf, is found to be ſerviceable for theſe purpoſes; and ſo is either goat's, ſheep, or cow's dung, well mixed with a due proportion of earth. The vine-dreſſer ſhould therefore conſtantly have ſome ſuch ſubſtance ready to apply to every wound he makes in the vine. Perhaps too, it may prove uſeful to the cuttings, when theſe are planted, by retaining the juices, till they are employed in their office of vegetation, and thereby help to ſave them from being parched up by drought, as well as to render them leſs liable to be ſoaked in a wet ſoil, or by a rainy ſeaſon.

Columella gives very particular directions for raiſing groves, in which trees grow till they are ſtrong enough to become props for vines; as alſo for making nurſeries of trees proper for ſupporting vines, or being married to them, as the ancients termed it. The plenty of wood in this kingdom, and the ſtill greater abundance of it in America, renders that taſk unneceſſary in this work.

He recommends the poplar as the moſt friendly tree to the vine, next the elm, and then the aſh. As the poplar has fewer leaves, and theſe are not reliſhed by cattle (which is an object of great importance in Italy, where graſs is ſcarce) many reject it. The aſh, whoſe leaves are agreeable to ſheep and goats, is chiefly planted in rugged and mountainous places, where the elm does not thrive well. The elm is the moſt frequently planted, becauſe it agrees exceedingly with the vine, and cattle are very fond of its cuttings.

When the trees are to be planted out, pits ſhould be dug for them ſome weeks before they are removed. Theſe pits ſhould be made in a direction which may not interfere with the vine: as eaſt and weſt, where it is neceſſary to plant the vine on the ſouth-ſide of the tree, becauſe of the cold; or ſouth and north, where the vine is to be ſet on the eaſt or weſt-ſide of the tree. If the trees are planted in a field, where corn is to grow, and in a rich ſoil, the diſtance between them ſhould be about forty feet: but in a poor ſoil, where nothing elſe is planted, twenty feet will be ſufficient.

Whatever tree is planted for the purpoſe of ſupporting the vine, it ſhould not be pruned for the firſt two years. If it be an elm, and grows but ſlowly, all its branches ſhould be cut off excepting one, which ſhould be the faireſt and ſtraiteſt that can be ſingled out. If it does not grow ſo upright as one would wiſh, ſome inches of the ſtump of another branch may be left near it, and by tying it thereto it may be trained up ſtrait, in order to form the trunk of the tree. In the next year, the ſtump muſt be cut off and ſmoothed. If there is no branch fit for this purpoſe, the whole top muſt be cut off, at the height of nine feet, that cattle may not reach the young ſhoots. It ſhould be cut with one ſtroke, if poſſible; otherwiſe it ſhould be ſawed off, afterwards ſmoothed, and then covered with loam mixed with ſtraw, to preſerve the wound from the ſun and rain. In two or three years, when a new head is grown, the uſeleſs branches ſhould be cut off, and the reſt formed into the following order. In a ſtrong ſoil, an elm ſhould not have a branch within eight feet of the ground; nor within ſeven in a poor ſoil. At theſe heights, three branches ſhould be left as equally diſtant as can be, in the circumference of the tree, to form what is called the firſt ſtory. At three feet above them, three other branches are left, but not in the ſame line as the lower ones, if there be a poſſibility of avoiding it, becauſe theſe would rub againſt the tender buds of the ſhoots of the vine hanging from the higher branches, and ſhake off the grapes. The tree is to be formed into ſtories, in this manner, up to the top. The branches are ſuffered to extend more or leſs wide, as the ſoil is rich or poor, in order that the ſhoots of the vine may be ſpread accordingly. Care ſhould be taken in lopping the elm, that the body of the tree be as little hurt as poſſible, and that the bark be not torn off, for this would do it great prejudice. The earth ſhould be kept looſe around the trees; and all ſuckers, or whatever elſe might ſhade the vine, ſhould be cut away. When the tree grows old, and, either by a wound or otherwiſe, water lodges in it, a hole ſhould be bored, or a channel cut, to give an outlet to the wet.

The vines ſhould be planted before the trees are very ſtrong. A young elm may bear a young vine, but it would be killed by an old one; wherefore their ages and ſtrength ſhould be proportioned. A trench muſt be dug for the vine, two feet and a half wide, three feet deep, five or ſix feet in length, and at leaſt a foot and an half diſtant from the tree; for if it be planted nearer, the roots of the tree will not permit thoſe of the vine to ſtrike deep enough, and as the tree grows, it will oppreſs the vine. For a vine that is to be planted in the ſpring, the trench ſhould be dug in the preceding autumn; that the earth may be mellowed by the winter's rain and froſt: and if it is to be ſet in the autumn, the holes ſhould be laid open ſome weeks before, that the ſoil may have the benefit of the ſun and rain. Though Columella had before found fault with putting two plants in the ſame hole; he here adviſes to put two in each trench, a foot aſunder, that they may the ſooner clothe the tree. A northerly wind, and cold dews, ſhould be avoided at the time of ſetting them. If the climate is temperate, inſtead of having two plants in the ſame trench, a trench may be made on the eaſt and another on the weſt-ſide of the tree, and a vine may be planted in each; by which means their roots will have ſufficient room to extend in. Though Mr. Miller, as I obſerved before, thinks it of little conſequence whether a tree that is tranſplanted be ſet to the ſame aſpect as it had in the nurſery; Columella recommends, as a circumſtance which is attended with great advantage, particularly to vines (but he extends it to all trees which are removed from the place of their firſt growth) to mark them before they are taken up, in order that the ſame ſide may ſtill be turned to the ſun. In dry and warm ſituations, where neither a ſevere winter, nor a very wet one, need be feared, the autumn is the beſt ſeaſon for planting both vines and trees; laying under their roots the depth of half a foot of the richeſt and fineſt mould, and covering them with well dunged earth. The vine ſhould be planted in the trench with its ſtem inclining to the tree, againſt which it is to riſe up ſtrait; and it muſt alſo be defended from cattle. In hot countries, the vine ſhould be planted on the north-ſide of the tree; in cold ones, on the ſouth; and in temperate climates, either on the eaſt or the weſt, that it may not be all the day in either the ſun or the ſhade.

In the next autumn, the vines are pruned, as already directed, for frames. When they have reached the firſt ſtory, ſhoots ſhould be diſtributed to each branch, leaving a leading ſhoot, which is to go up to the top of the tree: and thus each ſtory is gradually covered. It is a rule with many, to load chiefly the lower part of the tree, becauſe there the vine bears moſt grapes, and they are moſt eaſily gathered: but thoſe who regard the quality more than the quantity of their wine, clothe the upper branches moſt, and garniſh the reſt with bearing ſhoots in proportion to their ſtrength. The future pruning conſiſts in cutting off the ſhoots which bore fruit for the laſt vintage, and in rearing others in their place. If the vine is very thriving, the bearing ſhoots may be permitted to hang down ſloping from the branch, to which their extremities ſhould then be brought back, and tied: or if the vine is very luxuriant, they may be carried to the next tree. Though theſe ſhoots yield a great deal of fruit, they muſt be cut off at the next pruning, becauſe, otherwiſe, they would weaken the vine too much. No ſhoots ſhould be ſuffered to grow out of the firm wood, unleſs they are wanted in order to marry them to a widowed branch.

The young vine is tied to the tree at about four feet from the ground, and with this binding its growth may be checked, if it be too luxuriant, or if the tree has been deprived of its branches. It ſhould be tied again at about half way up, and a third time at the top. The vines ſhould be looſened every year, becauſe they are then moſt eaſily pruned and cleared of all imperfections; and they are refreſhed by being bound in new places. They are alſo then in leſs danger of being galled by the binding. The bearing ſhoots ſhould be ſo laid on each branch, as that, being tied above the third eye, they may hang ſlanting down: but they muſt not be tied tight, leſt the binding ſhould cut them. At the ſame time that ſome ſhoots are thus laid for bearing fruit, others ſhould be trained up to the body of the tree, to produce wood for the next year.

If the vine does not clothe the tree ſufficiently, a ſhoot may be turned down to the ground at the autumn pruning, and made a layer, from which as many young plants may be raiſed, as, being led up to the tree, will cover it enough. When the trees decay, young ones ſhould be immediately planted in their ſtead; and when the vines begin to be worn out, they ſhould be renewed by layers from neighbouring vines, rather than by quickſets.

To the foregoing directions for the cultivation of tall vines in Italy, and the ſame are equally applicable to all other warm countries, Columella adds the following account (which we ſhall likewiſe abridge from him) of the manner in which vineyards of lower growth were managed in the provinces of the Roman empire.

The huſbandman there never trenched all the ground, but only opened a deep furrow, in which the vines were ſet. This might be ſufficient where the ſoil was naturally looſe. In ſome of theſe vineyards, the plants ſtood without any props; in others, they were faſtened to rails; ſometimes they were tied to dwarf trees; and ſometimes they were ſuffered to run upon the ground. In the firſt of theſe caſes, a ſingle ſtem was reared up, free from ſide-ſhoots, till it had acquired ſtrength enough to ſupport the fruit bearing branches, which, when they were of a ſufficient length, were bent down in a circular form, and tied to the lower part of the ſtem. In the ſecond caſe, the fruit bearing ſhoots were trained to rails, or eſpaliers, as they grew. In both theſe ways, the planting, pruning, and other culture, differed ſo little from the general directions already given, that it would be needleſs to particulariſe them here; eſpecially as I ſhall ſoon have occaſion to ſpeak pretty fully of the management of low and of middle ſized vines, as now practiſed by the French, whoſe beſt vineyards conſiſt of none elſe. As to letting them trail upon the ground, Columella juſtly thinks it ſo bad a method, that no excuſe can poſſibly be offered for it, unleſs the country be indeed uncommonly ſubject to very high winds: — and then, perhaps, a doubt may ariſe, whether ſuch a place be at all proper for the vine.

In Gaul, the trees for ſupporting the vines, beſides being kept very low, were, of choice, ſuch as had the feweſt leaves. The poplar was therefore much eſteemed for this purpoſe; for which the hornbeam, the mountain aſh, and ſometimes the willow, were alſo reared. The willow was planted only in moiſt places, where other trees could not thrive well; becauſe it was thought to hurt the taſte of the wine. The elm was likewiſe ſo managed, whilſt young, as to be turned to a dwarf; as it may eaſily be. In dry and hilly ſituations, the ſtories of theſe trees were about eight feet high; and in vallies, or moiſt places, about twelve feet. Theſe trees were generally divided into three branches, out of which ſeveral leſſer boughs aroſe; and all the ſmall twigs were uſually cut off, at the time when the vine was pruned, to prevent their ſhading the fruit too much. If the dwarf trees were planted where corn grew, they were ſet twenty feet aſunder in rows forty feet diſtant from each other: but when they were planted where there was no corn, their uſual diſtance was twenty feet every way. Here the young ſhoots of the vines were more frequently carried from one tree to another, than when the trees grew high. If the trees were too far aſunder to afford a ſupport to the ſhoots, poles were extended between them, and theſe were up-held by props, as ſoon as the weight of the grapes began to be too heavy for them. In all other reſpects, the culture of the vine was the ſame as in Italy.

In clearing the vines of their ſuperfluous ſhoots and leaves, Columella obſerves that, in the provinces, in places which were ſhaded, or where the ſun had not much force, or which were moiſt and cold, the vine dreſſers uſed to ſtrip the vines of many of their leaves, that the fruit might be the better ripened by the warmth of the ſun, and not be rotted by too much moiſture: but in places that were dry, warm, and expoſed to the heat of the ſun, the grapes were left covered with their leaves and twigs; and if the vine had but few ſhoots and leaves, the fruit was ſheltered by ſome other covering: "Thus," ſays he (in the paſſage before quoted), "my uncle, Marcus Columella, a man ſkilled in all the liberal arts, and the moſt diligent farmer in Bœtica, covered his vines with mats in the beginning of the dog days; becauſe, during that ſeaſon, the country was ſubject to a ſcorching eaſterly wind, which, like a fiery vapour, burnt up the grapes, if they were uncovered."

The authors of the Maiſon Ruſtique draw their precepts with regard to the method of cultivating vineyards in France, from the actual and moſt approved practice of Burgundy, Champagne, and Orleans, the wines of which countries are deſervedly held in the higheſt eſtimation.

Their directions for the choice of the ſoil, its ſituation, aſpect, the manner of planting it, and the future cultivation of the vine, are ſo like to thoſe of Columella, that it would be needleſs to repeat them here.—They are, indeed, more explicit as to the grafting of the vine, which is performed in cleft, as for many ſorts of fruit trees, but with this difference, that a ſmooth part of the vine, at the diſtance of about ſeven or eight inches from the ſtem, and between two joints, is the moſt eligible part for inſerting the cion, which, as repeatedly ſaid before in other ſimilar caſes, ſhould always be taken from the beſt bearing branch of the moſt fruitful vine. All ſmall roots are cut away from about the place where the graft is to be inſerted, and after it has been exactly fitted in the cleft, ſo as to make the inner bark of the cion coincide preciſely with that of the ſtock, the wound is carefully bound up tight with ſlips of the inner bark of a young lime tree, of a willow, or with baſs, in ſuch manner as effectually to preſerve it from the entrance of air or wet. The graft and its ſtock are then bent gently downward into a hole made on purpoſe to receive them, and are covered with earth ſo as to leave only two eyes of the cion above ground. The cion ſhould be uſed as ſoon as poſſible after it has been cut, and its length ſhould be about twelve inches.

Neither the middle ſized vines, nor the low ones, of which two ſorts all the beſt and principal vineyards in France conſiſt, ſhould be ſhaded by any neighbouring buildings, or trees. The tall vines in the ſouthern provinces of France, ſuch as Provence and Languedoc, are, like thoſe in Piemont, Italy, and other very warm countries, reared up to trees, or formed into alcoves or arched walks, the better to defend them from the too ſcorching heat of the ſun. The ſorts thus planted are chiefly the Cioutat, the Corinth, the Damaſcus grape, and the Bourdelais. The vines about Auxerre are trained up againſt eſpaliers and trelliſes; but thoſe of the loweſt growth, of which moſt of the vineyards about Paris, Beaune, Tonnere, Chablis, &c. conſiſt, are faſtened only to common props, and are generally found to produce the greateſt quantity of fruit, and, in ſome years, the beſt wine.

The people of Champagne, (who think that there is in the ſoil of their province a quality ſo peculiarly fit for the production of fine wine, as can never be found or imitated elſewhere,) plant their talleſt vines in their middling lands, and the low ones in their beſt grounds. The former of theſe are reared to the height of four or five feet, and the latter to about three. They obſerve, that their vineyards yield the higheſt flavoured wine when they are moſt expoſed to the ſun; and therefore they always prefer a ſloping ſituation, fully open to the ſouth, for their beſt growths. They alſo prefer ground which is ſomewhat ſtony, and not naturally ſubject to much moiſture. They manure this ſoil from time to time, by laying on dung and freſh earth; but with caution not to uſe too much dung, becauſe that would render the wine flat and inſipid, and apt to become ropy. They think cows dung better than that of horſes, for their fineſt ſoils, becauſe it is not ſo hot: but for ſtiff lands they uſe thoroughly rotted horſe-dung, and ſheep's dung, which they mix with about double the quantity of cow dung, to prevent its burning the roots of the vines. Towards the end of autumn, they ſpread in trenches cut acroſs the vineyard, layers of this dung and of freſh earth, and after this mixture has remained there all the winter, to moulder, and grow mellow, they lay about half a baſket full of it, early in the ſpring, to the roots of each vine, and particularly to thoſe of the lateſt planted; making for that purpoſe a hole around it, deepeſt at its back, where the ſloping ground is higheſt. This is done over the whole vineyard either every eight or tenth year, or, which amounts to the ſame, to an eighth or a tenth part of it each year.

The grapes moſt generally cultivated in Champagne are a ſmall black ſort; and to render the wine of that country the more perfect, great care is taken to root out all white ones, and ſuch as, though black, are large and coarſe: or, if thoſe vines are not pulled up, they are grafted with ſuch fruit as is deſired.

About the end of June, and ſometimes even in May, according to the forwardneſs of the vine, the upper end of each ſhoot is nipped off, in order that the greater quantity of nouriſhment may be conveyed to the fruit; for it is beſt that no part of a low vine be more than two feet and an half, or three feet, high from the ground. Theſe low vines are earthed, as it is called, every ſpring; that is to ſay, they are inclined down into a hole dug cloſe to them, and their ſhoots, being previouſly pruned to ſuch lengths as are moſt conſiſtent with the vigour of the vine, are covered with earth ſo as to leave only three or four of their eyes above the ground.---In Upper Picardy, it is the cuſtom to renew, as it is termed, the vineyards every year, by burying the vines in this manner, and converting each branch into a layer.

It is a general rule, that the ſtronger the ſoil is, the farther aſunder the vines ſhould be planted; and that no layers, grafts, or cuttings ſhould be uſed, but ſuch as have a ſmooth ſhining bark, and of which the wood is of a clear green when cut. Thoſe that are of a brown green, when a little bit of their rind is raiſed up with a knife, are rejected, as good for nothing.

To guard againſt the bad effects of froſts and fogs, the French vine-dreſſers, whenever they apprehended any danger of that kind, lay along that ſide of the vineyard from whence the wind blows, a ridge of dry litter, or ſtraw, which they then burn ſlowly: but if, notwithſtanding this, the vines are frozen, they cut them down very low, to enable them to bear the better the next year.

They hold it to be neceſſary, after a thick fog, to water their vines with juice of the roots or leaves of wild cucumbers, or with powdered coloquintida, mixed with water; and they are alſo of opinion that late pruning is frequently a means of guarding againſt the mildew, becauſe their vines do not then bloſſom till the ſun is become very powerful.

Careful huſbandmen never ſuffer any one to go into their vineyards very early in the morning when dews or damps fall in May, June, or September; becauſe the dew of thoſe months, being generally cold, would bliſter the leaves of the vines if it were to be touched, and thereby fixed upon them before the riſing of the ſun, which afterwards removes that danger by drying up and exhaling the moiſture: neither do they allow them to be entered, on any account, immediately after a haſty ſpring-ſhower, while the leaves are yet wet therewith, or when they are covered with a rime or hoar-froſt.

Sea-water, ſalt and water, or ſtale urine mixed with dung and earth, are of excellent ſervice to vines which do not bear well, and to thoſe whoſe leaves turn red for want of moiſture: and it is ſaid that, when their leaves become white and dry, when their wood ſwells, and when their fruit drops off, all which are ſymptoms of decay, they are recovered by rubbing the ſtem, and watering their roots, with aſhes reduced to powder and mixed with ſtrong vinegar.---It is moſt certain that ſtirring of the ground around them, and keeping it in a fine looſe ſtate, will have this deſirable effect; or rather it will keep them conſtantly in ſo vigorous a condition, that there will never be occaſion to recur to other means to promote their fertility: neither will there, if this eſſential principle of vegetation is duly applied to, be any danger of the grapes ſhrivelling or growing dry upon the vine; to remedy which, if it ſhould happen through careleſs management, the authors before quoted direct to pull off all the fruit thus injured, and to water the roots of the vine with ſtale urine. They add, that if the grapes rot upon the vine before they are ripe, ſome old aſhes, or barley-meal, ſhould be laid around the ſtem.

If the vines, as was before obſerved of other trees, are ſprinkled with water in which tanners have dreſſed their hides, no cattle will touch them.

The young leaves and fruit of the vine are often greatly injured by very ſmall green flies, which conceal themſelves in the young buds, and weave there a thin web, not unlike to that of a ſpider, in which they depoſit their eggs. All theſe webs, and the leaves on which the eggs have been laid, as well thoſe which ſtill adhere to the vine, as thoſe which have fallen off, muſt be carefully collected, and burnt out of the vineyard.

As ſnails and ſlugs, which do great damage to the vines, generally hide themſelves during the middle of the day, they ſhould be carefully picked up early in the morning, or juſt after dew or a ſhower of rain has fallen, eſpecially in the ſpring and autumn, which are the ſeaſons when they appear moſt; and they ſhould be cruſhed to death, or burnt.

The vine-fretters, which the French call gribouris, abound moſt in the lighteſt land. When a vine is attacked by theſe inſects, its ſhoots are ſhort and meagre, its leaves are full of holes, and it yields but very little fruit, and that extremely poor, though never ſo great pains be taken to cultivate it. Theſe inſects are much ſmaller than the ſmalleſt gnats, which they reſemble both in ſhape and colour. They prey upon the vine during the whole year; for, in September, they get into the ground, and there gnaw its roots, eſpecially thoſe of young plants; and in May when the buds of the vine ſwell, they leave their former holes, feed upon the ſurface of thoſe buds, and then upon the leaves, and afterwards they fix upon the grapes, pierce their ſkin, ſuck out their juice, and lay in them their eggs, from whence proceed an infinite number of little worms, which complete the deſtruction of the fruit by the time it ſhould be gathered. To prevent this miſchief, the authors of the Maiſon Ruſtique adviſe the ſowing of a few patches of beans in different parts of the vineyard; becauſe theſe pernicious inſects will then reſort to them, and may conſequently be deſtroyed by plucking up the beans and burning them.

To get rid of numbers of other inſects, all of which endeavour to find a place of ſhelter when the winter approaches, either by creeping into the ground, or into dung, or any litter that lies upon it; they recommend the method before-mentioned, of laying a little heap of haulm, ſtraw, or any kind of mulch, round the ſtem of each vine when the weather begins to be froſty, and burning it in the ſpring, in a place out of the vineyard. Innumerable multitudes of vermin will be deſtroyed by this means: but, to render the remedy effectual, the neighbours all around muſt have recourſe to the ſame expedient, or theſe pernicious creatures will ſoon ſpread a-new from one vineyard to another.

Mr. Miller's method of guarding againſt flies, and waſps, which are often ſo very numerous, and voracious, as entirely to eat up all the fineſt and higheſt flavoured berries of well ripened grapes, deſerves much attention even in vineyards, though it is more eaſily practiſed in gardens; but the preventing of this miſchief will make ample amends for yet greater trouble. It is, before the grapes are quite ripe, and conſequently before they will be in much danger of being attacked by theſe enemies, to hang upon the vines, from ſpace to ſpace (the nearer the better), phials half filled with ſugared water, and rubbed at the neck with a little honey. Theſe will attract the waſps and flies, which, in attempting to get at the liquor, will fall into the phials, and be drowned. They muſt be carefully looked over every third or fourth day, to take out and deſtroy the flies and waſps, and to repleniſh them with liquor.

If, when the fruit is ripe, the ſtalks of the bunches are cut half through, about a fortnight before they are gathered, the juice of the grapes will be much improved thereby; becauſe, as not near ſo great a quantity of nouriſhment can afterwards enter the fruit, the watery particles will have time to evaporate, and the juice will be the better digeſted. This is practiſed by ſome of the moſt curious huſbandmen in the ſouth of France. But if, after the bunches are cut off the vines, they are hung up in a dry room, upon ſtrings, ſo as not to touch each other, for a month before they are preſſed, both the ſtrength and the flavour of the wine will be yet more exalted. To this, in a great meaſure, is owing the delicious richneſs of the vines of that part of the Tiroleſe which borders on Italy, where it is the conſtant cuſtom to keep the grapes for ſome time before they are uſed.

As we have already enumerated the different ſpecies of grapes, it will be needleſs to repeat it here; but refer the reader to that account, which he will find under the article GRAPE.

When a vineyard is planted in a ſtrong ſoil, it ſhould conſiſt of morillons, otherwiſe called white and black pineaus; but there ſhould be more of the latter than of the former, and they ſhould be intermixed with treſſeaus, otherwiſe called Burgundy grapes.

The pineau does not attain to its full perfection in ſtrong lands, though the ſeaſon be never ſo hot: for, notwithſtanding all the help that can be given it in ſuch a ſoil, it ſtill wants that undefinable ſomewhat, without which no grape can yield a delicate wine: whether it be, that, in imbibing its nouriſhment from the earth, its juices retain a portion of the moiſture which is natural to that earth, and which blunts the ſpirits of the wine; or that, as experience has ſhewn in very many caſes, though the heat be as great as poſſible, a ſtrong ſoil does not yield to the grape that ſort of juice which acquires a fine high flavour, and a racy vinous quality, by fermentation. Thus, it is known from facts, that the Madeira grape planted in a rich valley, no longer yields the ſame wine it does on its native rock. Yet the pineau is the only grape that ſhould be planted in a ſtrong land; becauſe it ripens earlier than others, and always yields a ſure crop.

If ſome plants of the treſſeau, whoſe fruit never ripens eaſily, are mixed with the pineaus, it is, ſays the authors of the Maiſon Ruſtique, becauſe our forefathers, having found by experience that the pineaus cannot of themſelves yield in ſuch a ſoil, wine which has a ſufficient body to keep long, judged it neceſſary to add theſe treſſaus, which, though they ripen very ſlowly, never fail to yield that ſort of wine which, without being ſpirituous, is, on the contrary, thick and heavy, which is the ſtate it ſhould be in when produced by ſtrong land, in order to its becoming good.

In a ſandy ſoil, whether it be coarſe or light, pineaus, and eſpecially the white ſort, are the vines moſt proper for planting. The meunier, or miller grape, delights in light ſands; and coarſe ſands agree with the meliés, otherwiſe called melon grapes, whether theſe be white, black, or green. In the diſtrict of Auxerre, theſe ſands, though naturally warmer than the ſtrongeſt land, do not, for all that, yield equally good wine: (theſe ſtrong lands are here ſuppoſed to be ſuch as were before adviſed, and their expoſition good.) This is what experience teaches us daily with regard to ſands, which, furniſhing no rich nutriment to the vine, yields only grapes whoſe juice is flat and inſipid, and not ſo ſugary as thoſe of ſtrong lands.

To theſe pineaus are therefore joined the meliés, as before ſaid. The white melié is a good grape, and yields greatly: the black is leſs ſo. Theſe ſorts of grapes become excellent (ſo far as their nature permits) in theſe ſands, which, being much warmer than they are ſubſtantial, ſuit the nature of the meliés, which require a great heat to ripen them. Theſe grapes yield a wine which is not apt to turn yellow.

Upwards of two thirds of the vines planted in ſuch ſands, in France, are thoſe of white grapes; becauſe it is the cuſtom of thoſe places to make more white wine than red.

A reaſonable proportion of the treſſeau grape ſhould always be planted with the others in ſandy ſoils: not that it ever attains to perfection there; but that, by mixing it with thoſe other grapes, whoſe juice acquires only a moderate ſweetneſs in ſuch ground, they may be enabled to yield wine which has a good body.

As to ſtony lands, thoſe which abound in blackiſh and large ſtones, and of which the earth is reddiſh and ſomewhat moiſt, muſt be treated in the ſame manner as ſtrong ſoils.

Thoſe which have ſmaller and white ſtones, and of which the earth is leſs red, are better than the former. Beſides the white and the black pineaus, and a ſmall number of treſſeaus, theſe lands are planted with the beaunier; and all theſe grapes do well on them.

Stony land whoſe ſoil is yellowiſh, and where the ſtones are yet much leſs than the preceding, are ſtill better than them for the laſt mentioned ſorts of grapes: for theſe do ſo well in a ſoil of this kind, that they always yield there a wine which is at leaſt pleaſant. They may be intermixed here with a few plants of muſcats and of chaſſelas: for theſe will acquire maturity enough to be of ſervice to the others, and will help to make their wine keep the longer.

Stony lands, which have otherwiſe a mellow and good ſoil, yield the beſt and fineſt flavoured wine when they are planted with pineaus; and in this caſe the number of the white grapes of this ſpecies ſhould greatly exceed that of the black. Thoſe from which the grayiſh wine, commonly called partridge's eye, is deſired, ſhould be planted chiefly with ſerviniens, and here and there a few muſcats and chaſſelas; but no treſſeaus.

When ſuch lands as theſe are intended for red wines, they ſhould be planted with more black pineaus than white, with ſome ſerviniens, and with a few treſſeaus. Theſe will yield a ſtrong and mellow wine.

Experiments on the Culture of the Vine.

Extract of a letter from M. Rouſſel in Brie, to M. Du Hamel, written in the year 1755.

" I have begun to try the New Huſbandry upon the vine. It is hard to pay at leaſt one hundred and twenty livres (five guineas) a year, for dreſſing an arpent (about an acre and one fifth) of vineyard, to have only our poor Brie wine; eſpecially when the vines are entirely frozen, as they were laſt year, or laid bare to the very wood, by hail, as was the caſe in Auguſt laſt. I am therefore trying to find out a way to manage vines, without being at the expence of dreſſing, or propping them, and by which they may be leſs expoſed to the injuries of the weather, and leſs liable to be plundered by thieves. To this end, I pitched upon a ſpot of ground, about half an arpent in extent, which had formerly been a vineyard, but was grubbed up many years ago. I planted on it four hundred poplars, ſix feet aſunder, in a quincunx form. As the roots of this tree are few and ſmall, I thought that diſtance might be ſufficient. At the foot of each of theſe trees, I planted two vine cuttings, one on each ſide. The alleys are plowed, in order to their being ſown alternately, with corn, or pulſe, ſuch as lentils, beans, barley, oats, &c. the produce of which pays the expence of plowing. While the three feet on one ſide of the tree are ſown, the three feet on the other ſide are plowed, at proper times and ſeaſons; by which means, both ſides of the tree, and conſequently both the vines, receive in turns the benefit of the ſtirring of the ground. All my plants have taken well. I intend to let the vines run up the trees, without doing any thing to them; and ſhall wait with patience the event of their produce, which, be it more or leſs, will be ſo much clear gain, as it will not have coſt me any thing. This method was immediately approved of by the country people hereabouts, ſeveral of whom are now following my example. What helped to give them this good opinion of it, ſo ſuddenly, was, the example of a vine, which chances to grow a league from hence, in the middle of a field, at the foot of a pear-tree, and which never is either pruned or cultivated. Laſt year, when all the vines of this country were ſo damaged by the froſt, as not to produce any fruit at all; this vine eſcaped unhurt, and bore as many grapes as yielded a barrel of wine. If the future produce of my vineyard, which contains eight hundred vines, were to be eſtimated on this footing, it would amount to eight hundred barrels of wine every year. But as no one can be ſo abſurd as to make ſuch a calculation; ſo, on the other hand, I believe none will deny but that my vines, producing only the two hundreth part of that proportion, will yield me four barrels of wine, which will not have ſtood me in the leaſt extraordinary charge. And even ſuppoſing them not to yield me any thing, ſtill I ſhall loſe nothing, becauſe they will have coſt me nothing. The four hundred poplars, which do not ſtand me in above a penny apiece, (being planted only by ſlips, without making or digging either holes or trenches for them) cannot fail, in a ſoil that is quite fit for them, to be worth, twenty-five years hence, ten livres (eight ſhillings and nine-pence) apiece, or four thouſand livres (one hundred ſeventy-five pounds four ſhillings) the whole; which will be an excellent payment for the ground they will have taken up. I do not, however, mean to extend this method to all my vineyards. In moſt of them, the ſoil, though fit for the vine, is too dry and ſtony for the poplar. In Italy, vines are frequently planted at the foot of mulberry and other trees. The only thing neceſſary in that caſe, is, to make the alleys of a breadth proportioned to the ſhade of the trees."

Experiment on the vine, cultivated according to the principles of the New Huſbandry, with remarks thereupon, by M. de Chateauvieux.

" When I began to reflect attentively on the principles of the New Huſbandry, I ſoon perceived that it might prove a means of perfecting the culture of our vineyards, as well as that of our other lands.

" I was the more readily induced to turn my thoughts towards that important branch of agriculture, as it ſeemed to me to have been too much neglected for a long time. I plainly ſaw, that our methods of cultivating the vine, were, in general, not only defective, but badly executed, and that, in the common way of planting vineyards, the produce could not be proportioned to the great expence.

" I ſhall not at preſent enter into a detail of the principles and motives of my new ſcheme for the culture of the vine: that taſk would be too long for this narrative: and I ſhould likewiſe be glad firſt to ſee the advantages of my method confirmed by a ſeries of experiments repeated for ſeveral years together. My different operations, and firſt ſucceſs, are all that I ſhall mention now.

" Every country has in the culture of the vine, ſome practice or other peculiar to itſelf, and which is thought eſſential there, though it be rejected in other places. All agree in pruning the vine, and in ſtirring the earth round it: but neither of theſe operations is performed in the ſame manner every where.

" For the better underſtanding of my new culture, it is neceſſary that I ſhould give an idea of the manner in which our vineyards are laid out and planted. Their expoſition is generally to the eaſt or ſouth, on a good deep ſoil, which has a gentle declivity, or on the ſide of a hill. The whole ſurface of the ground is planted without order or ſymetry; ſo that the vines are, almoſt always, either too cloſe together, or too far aſunder: very few are at proper diſtances. As the old vines decay and periſh, the chaſms are filled up by layers from the next neighbouring vines. This is the general diſpoſition of our vineyards, from which great inconveniences muſt neceſſarily ariſe: but I ſhall not enter into that detail.

" With regard to the culture of the vine, it is ſufficient, for my preſent purpoſe, to obſerve, that the whole of that labour is now performed by hand, which renders it very expenſive. I ſay nothing of the manner in which it is executed; that part having appeared to me ſo very defective, that I have been obliged to alter and correct it in every point.

" By this ſhort preamble it may eaſily be ſeen, that, in order to improve the culture of the vine, and bring it to greater perfection, it was neceſſary that I ſhould attend chiefly to the three following things. 1. To diſpoſe the vines in a better manner, by planting them in ſtrait lines, and at equal diſtances from each other. 2. To contrive that diſpoſition ſo as to leſſen the preſent expence of culture, by uſing a plough to ſtir the ground in one part of the vineyard, whilſt the other ſhould continue to be ſtirred with the ſpade. 3. To execute the ſeveral cultures of the vine, in ſuch manner as to make them promote its vegetation more than they do in any of the common methods.

" I ſhall treat each of theſe articles ſeparately.

" The diſpoſition which ſeemed to me the moſt agreeable to the principles of the New Huſbandry, by which I was guided, was to lay the vineyard out in beds, as we do fields for corn, obſerving to leave an alley between every two beds, and making each bed five feet wide, in order to plant it with three rows of vines, which, by that means, would be thirty inches aſunder, and the vines at the ſame diſtance from each other in the rows.

" As to the alleys, I thought it would be right to make them alſo five feet wide: and what I ſhall ſay hereafter will ſhew, that about that breadth is neceſſary.

" However, as that diſpoſition might not be the beſt, I tried others on ſmall ſpots of ground, by planting the vines at other diſtances. Some were ſet in ſingle rows three feet and an half aſunder; others in double rows, and in beds, with alleys of three feet and an half between them. Theſe plantations were made in the ſpring of 1753.

" But as I could not expect to ſee the event of theſe trials, till a conſiderable time after making them, eight or ten years, at leaſt, being requiſite to ſhew what the ſucceſs would be, when the vines ſhould be come to their full ſtrength and bearing; I conſidered at the ſame time, by what means I might abridge an experiment which was to be of ſo long duration.

" To that end, I formed a bed of vines in a vineyard planted twenty-four years before. The vineyard was good, and yielded plentiful crops. I made my bed five feet wide, and planted it by laying down ſtocks of the old vines, to make the two outward rows, leaving two feet and an half diſtance from one layer to another. The old vines, which happened to be pretty well ſituated, formed the middle row. The remainder of the bed, which is two hundred and forty feet long, was planted with layers.

“ An alley, five feet wide, was made on one ſide of this bed, by pulling up the old vines within that diſtance. Some of theſe which were left, ſerved to form a row of vines, ready againſt the making of a ſecond bed parallel to the firſt. It is plain, that the making of a bed in this manner, requires a breadth of ten feet, viz. five feet for the vines, and five feet for the alley. This bed was thus made in November 1752.

“ After I had ſeen the crop which it produced in 1754, I no longer heſitated to extend this experiment; and accordingly, in November of that year, I made three other beds, like the former, and cloſe to it.

“ I not only made no doubt but that the vines, being ſo diſpoſed, and having an equal quantity of earth to draw their nouriſhment from, would thrive better than they do in our common method of cultivating them; but I likewiſe hoped that their being expoſed on all ſides to the influences of the ſun and air, by means of the alleys, would facilitate their vegetation, and haſten the ripening of the grapes.

“ The manner in which I propoſe diſtributing the vines, ſhews at once the poſſibility and facility of giving the alleys every neceſſary culture, with the ſame plough and the ſame cultivator as we uſe for the alleys of our corn fields. I have not found the leaſt difficulty in the execution of this practice.

“ The ground thus cultivated in the alleys, will be about a third part of the whole: the remaining two thirds will continue to be cultivated by hand, as uſual; and the expence will be conſiderably diminiſhed, by the diſpatch with which the plough, or cultivator, will perform its part.

“ The plough may be brought as near the vines as one pleaſes, provided care be taken not to damage them. An expert huſbandman will eaſily know how to manage in that reſpect.

“ Another diminution of the expence attending the common culture of vineyards is, that as, by the method which I propoſe, the number of vines will be fewer, they will of courſe require leſs labour, and therefore leſs coſt; and the vine-dreſſers, meeting with no hindrances or obſtructions between the vines planted regularly in rows, will do more work in a day, and that much better, than in the old way. There will alſo be leſs occaſion for many things neceſſary to the vine, ſuch as propping, tying up, dunging, &c. Conſequently this new culture will prove a conſiderable ſaving.

“ It is well known how much vines are hurt when too great a quantity of water is retained in the ground. It chills them too much, their juices become leſs exalted, numbers of weeds ſpring up, &c. Theſe inconveniences will be remedied in a great meaſure, by means of the alleys, by cutting with the plough, as I have done, towards the beginning of winter, a furrow along each ſide of the bed. The water will drain off into that furrow, and the bed will retain only the degree of moiſture neceſſary for the vines.

“ I ſhall ſpeak only of the two principal parts of the culture of the vine, viz. the pruning of it, and the ſtirring of the ground; and the time when each of theſe ought to be performed.

“ Before I began to execute the alterations I had thoughts of making in this culture, I had endeavoured to make myſelf ſo far maſter of it, as to be the leſs in danger of miſcarrying in my experiment.

“ The cuſtom of this country is, to prune the vine during and after winter; frequently beginning that work about the end of January. I always thought that a wrong ſeaſon; and judged that it would be much better to prune the vine before winter, immediately after the vintage is ended. Experience has ſince ſhewed me that I was right.

“ In November 1750, I pruned above fifty vines with my own hands: none of them ſuffered in the leaſt by the winter's froſt: they made ſtrong and vigorous ſhoots, and produced a greater quantity of grapes than any of the neighbouring vines.

“ The next year, and in the ſame month, I pruned the ſame vines again. This pruning had the ſame ſucceſs as the year before. Encouraged by this repeated experience, I determined to make the bed before mentioned, in my old vineyard. The vines have continued to be pruned before winter, always with ſucceſs, and without any ſort of inconvenience.

“ Satisfied with theſe firſt trials, I thought I might ſafely venture to extend the ſame practice to a larger extent of ground. I had about three acres of vines, which had produced very little wood for two years paſt. Their branches were ſo poor and ſlender, that they would ſcarce bear laying down: in ſhort, the vineyard periſhed daily. I conceived hopes of recovering it by means of this pruning. Accordingly, I pruned it in November 1754; and in 1755, the vines produced ſtronger and longer ſhoots. As the branches would then bear laying down, I began to repleniſh part of the vacant places. By this means, my vineyard was replanted with young vines, and quite renewed, only by altering the time of pruning.

“ This laſt pruning underwent a ſevere trial, from the exceſſive hard froſts of the winter of 1755: yet, intenſe as the cold was, my plants bore it, without being hurt at all. I then looked upon it as certain, that the vine might be pruned before winter, without any danger from the inclemency of that ſeaſon.

“ It was abſolutely neceſſary that the vine ſhould bear pruning at that time, in order to enable me to perform the other cultures in their proper and moſt favourable ſeaſons.

“ That the vine may be benefited as much as poſſible by every ſtirring of the earth about its roots, theſe ſtirrings ought certainly to be performed at the times when they may be moſt likely to excite the greateſt vegetation. Let us ſee whether the common practice anſwers that end. The uſual time of beginning to dreſs the vineyard is in the ſpring, immediately after pruning the vines. Three dreſſings are judged ſufficient; and it is generally thought, that the laſt ſhould be finiſhed by midſummer. The plants are then left to ſhift for themſelves, till the time of vintage, which is upwards of three months after. During this time, quantities of weeds generally ſhoot up, which ſhade the vines, and hinder the grapes from ripening as they ought. Careful huſbandmen pull them up: but the greater part are unwilling to take that trouble.

“ In the common way of cultivating the vine, the earth is firſt ſtirred when the buds are juſt ready to come out, and even after they are come out; a time always extremely critical, becauſe the uncertainty of the ſeaſon expoſes the buds to ſeveral dangers, which are increaſed by that ſtirring of the earth, from whence many exhalations, oftentimes very pernicious, proceed at this ſeaſon. Would it not be much better to let the vineyard reſt while the vine is budding?

“ The laſt ſtirring, which is given about mid-ſummer, is too long before the vintage, and therefore is almoſt always followed by great quantities of weeds. Might not this laſt culture be performed later?

“ I have experienced that theſe inconveniences may be avoided, without falling into others. To this end, after the vine has been pruned, before winter, let the earth be firſt ſtirred in that ſeaſon: the ſecond ſtirring, which would otherwiſe be immediately after winter, may then be deferred till towards the end of May: and the third ſtirring may be given in the beginning of Auguſt, or about the end of July.

“ This has been my method of cultivating my vines, ever ſince their being planted in beds. The beds are dug by hand, and the alleys are ſtirred with the plough or the cultivator.

“ The firſt ſtirring before winter produces the ſame effect on the vineyards, as it does on our beds of corn. The water is drained off, and the winter's froſts penetrate the earth, divide it, and keep it looſe and light.

“ It remains in this ſtate till towards the end of May, when it receives the firſt ſtirring after winter: and, to have a more certain rule to go by, the ſecond ſtirring ſhould not be given till after the props have been ſtuck, the vines have budded, and the ſhoots have been tied up to the props. This ſtirring may be given, either a little ſooner, or a little later, than is mentioned above, according to the ſeaſon. Sometimes one may be obliged to haſten it, if the ground is greatly burdened with weeds: but at whatever time it be performed near the end of May, it is certain that the vine will then have made great ſhoots, and that without having been diſturbed by any ſtirring of the earth during the time of its tender vegetation. As I have tried this culture in hot and very dry years, I have ſeen that the earth has not grown hard, but has retained the neceſſary degree of moiſture, ſo as to be ſtirred with the greateſt eaſe.

“ The third ſtirring, which is the ſecond after winter, being deferred till towards the end of Auguſt, or at leaſt till the end of July; weeds have not time to grow in any quantity between that and the ſeaſon of the vintage: and what will render it ſtill more beneficial, is, that this is the time when the grapes fill moſt, and are drawing towards a ſtate of maturity.

“ I may perhaps be thought not to enlarge enough on ſo important a ſubject as this is. It will, I confeſs, require being treated more fully hereafter: but in the mean time I beg the reader to conſider, that I am now relating only the ſucceſs of my firſt trials.

Good effects of this culture proved by the produce of a bea of vines two hundred and forty feet long, planted in 1752.

“ I obſerved, in the beginning of this account, that every culture of the vine is performed with much greater eaſe and expedition in vineyards laid out in beds, than in thoſe which are planted all over; but at random. The very ſituation of the vines planted regularly in beds, is ſufficient to ſhew with what eaſe every thing that they require may be done, and that they muſt, of courſe, be well cultivated in every reſpect.

“ In the next place, the pruning of the vine, and the firſt ſtirring of the earth before winter, are done at a time when the buſineſs of the field is over, and huſbandmen are, in ſome meaſure, un-occupied. That time, which would otherwiſe be in a manner loſt, may now be employed to very great advantage; and in conſequence of their being advanced in their work before the coming on of winter, inſtead of being over-loaded in the ſpring, by a multitude of things to be done at that time, they will have ample leiſure to attend properly, and without being hurried, to every branch of culture that a farm requires.

“ The effect of our culture has been extremely viſible. The new vines have grown ſo prodigiouſly, that they now greatly ſurpaſs thoſe of the old vineyards, which they were part of: the ſhoots too are thicker and longer, and the bunches of grapes bigger and more numerous.

“ When I firſt began to apply the principles of the New Huſbandry to the culture of the vine, I hoped indeed that the great fruitfulneſs of a ſmaller number of plants, might compenſate for the loſs of thoſe I was obliged to retrench: but I was agreeably ſurpriſed to find all the vines of my bed loaded with an equal quantity of grapes.

“ Though my conjecture was founded on principles which I knew to be true, I was ſtill farther confirmed in my opinion by an obſervation I had made, that, even in our beſt vineyards, there are always great numbers of vines which abſolutely bear no fruit at all, and many others which produce but very little; ſo that it is not on the great number of plants that the great produce of the vineyard depends, but on the goodneſs of thoſe plants.

“ Accordingly I concluded that I ought not to look upon my having taken up ſome vines in order to form the ally, as a loſs, provided thoſe in the bed were enabled by good culture to yield their utmoſt productions. The event ſhewed that I was right.

“ I likewiſe judged, that the grapes would ripen more perfectly in this new way, than in the old: and in that too I was not miſtaken; for they were much higher flavoured, and made far better wine.

“ Beſides theſe advantages, this culture preſerved my vines from a very bad accident, which happens frequently, eſpecially when the autumn is rainy: I mean, the rotting of the grapes. In our common vineyards, the grapes ripen, ſmothered beneath that quantity of leaves with which the vines are loaded, and ſurrounded by numbers of weeds, which often grow higher than the vines themſelves. Add to this, that the air around them is filled with various exhalations from the earth, which, for want of a free circulation, remain ſuſpended about the plants. Theſe cauſes cannot but make the grapes rot, and the wine that is made of them, muſt be greatly inferior to what it would otherwiſe be.

“ Our vines in beds, being much leſs, if at all, liable to any of theſe accidents, will have the advantage of preſerving their grapes ſound and without rottenneſs, till they are perfectly ripe. This I have already experienced, at a time when above half the grapes of my old vineyard were abſolutely rotten.

“ Notwithſtanding all the advantages of this new method, which, I may ſay, I have only glanced at; they would probably not be regarded, if they were not attended with greater fruitfulneſs than is obtained in the common way. I ſhall therefore ſhew, that the produce of my young vines was very conſiderable, and greatly ſuperior to that of my old vineyard.

“ My bed, as I obſerved before, was formed in November 1752; and the two outward rows conſiſted, in a great meaſure, of young layers, which not being old enough in 1753, to bear much fruit, I could not expect any great matter from them that year. However, they bore as much as could reaſonably be deſired. A violent ſtorm of hail which fell in June, left ſcarce any thing to be gathered in all our other vineyards.

“ The year 1754 produced, in general, but little wine. The young plants of my bed, being then only in their ſecond year, were too weak to diſtinguiſh themſelves by any extraordinary quantity of fruit; though their vigour gave great hopes for future years. However, even in this, they were loaded with ſo many and ſo large bunches of grapes, that they yielded rather more wine than the old vines which were next them.

“ The year 1755 was one of the beſt years for wine, that has been known for a long time. The quantity was plentiful, and the quality exceeding good. The youngeſt plants of my bed, which were only in their third year, ſeemed no way inferior to the old vines cultivated in the common way.

“ This bed, two hundred and forty feet long, and ten feet wide, including the alley, yielded three hundred and thirty-ſix pints of wine, Paris meaſure (eighty four Engliſh gallons), which was after the rate of two-fifths more than I had from my old vineyard; or to explain myſelf ſtill better, if my whole vineyard had been laid out in beds, it would have yielded five barrels of wine, for every three that it did yield.

“ Twenty beds of the ſize of that we are ſpeaking of, would make about an arpent; and ſuppoſing them all to produce alike, they would, after the rate of this, yield ſix thouſand ſeven hundred and twenty Paris pints (one thouſand ſix hundred and eighty Engliſh gallons), or twenty-eight hogſheads; which, in this country (the territory of Geneva,) is a prodigious quantity; ſuch as no vineyard here has ever yet produced.

“ The vintage of 1756 was neither plentiful nor good. I therefore did not make any compariſon; but remained ſatisfied with obſerving in general, that my bed yielded at leaſt as much as the old vineyard.”

VINEGAR, an acid penetrating liquor, prepared from wine, cyder, beer, &c. of conſiderable uſe both as a medicine and ſauce.

The proceſs of turning vegetable matters to vinegar, is thus delivered by Dr. Shaw: take the ſkins of raiſins, after they have been uſed in making wine; and pour three or four times their own quantity of boiling water upon them, ſo as to make a thin aqueous mixture. Then ſet the containing caſk, looſely covered, in a warmer place than is uſed for vinous fermentation; and the liquor in a few weeks time will become a clear and ſound vinegar; which being drawn off from its ſediment, and preſerved in another caſk, well ſtopped down, will continue perfect, and fit for uſe.

This experiment ſhews us a cheap and ready way of making vinegar from refuſe materials; ſuch as the huſks of grapes, decayed raiſins, the lees of wine, grounds of ale, beer, &c. which are frequently thrown away as uſeleſs. Thus, in many wine countries, the marc, rape, or dry preſſing of grapes, are thrown in heaps, and ſuffered to putrify unregarded, though capable of affording as good vinegar as the wine itſelf. In ſome places they bury copper-plates in theſe huſks, in order to make verdigreaſe; but this practice ſeems chiefly confined to the ſouthern parts of France. Our preſent experiment ſhews us how to convert them to another uſe; and the direction extends to all the matters that have once undergone, or are fit to undergo, a vinous fermentation, for that all ſuch matters will afford vinegar. Thus all our ſummer-fruits in England, even black-berries; all the refuſe waſhings of a ſugar-houſe, cyder-preſſings, or the like, will make vinegar, by means of water, the open air, and warmth.

The whole proceſs, whereby this change is effected, deſerves to be attentively conſidered; and, firſt, the liquor to be thus changed, being kept warmer than in vinous fermentation, it begins, in a few days, to grow thick or turbid; and without throwing up bubbles, or making any conſiderable tumult, as happens in vinous fermentation, depoſits a copious ſediment.

The effect of this ſeparation begins to appear, firſt, on the ſurface of the liquor, which gathers a white ſkin, that daily increaſes in thickneſs, till at length it becomes like leather; and now, if continued longer in this ſtate, the ſkin turns blue, or green, and would at laſt grow ſolid, and putrify: therefore, in keeping down this ſkin as it grows, and thruſting it gently down to the bottom of the veſſel, conſiſts much of the art of vinegar making, eſpecially from malt. For the difference between vinous and acetous fermentation, *ſee the article* FERMENTATION.

Method of making Cyder-VINEGAR. The cyder (the meaneſt of which will ſerve the purpoſe) is firſt to be drawn off fine into another veſſel, and a quantity of the muſt, or pouz of apples, to be added: the whole is ſet in the ſun, if there be a conveniency for the purpoſe; and, at a week or nine days end, it may be drawn off. *See* CYDER.

Method of making Beer-VINEGAR. Take a middling ſort of beer, indifferently well hopped; into which, when it was worked well, and is grown fine, put ſome rape, or huſks of grapes, uſually brought home for that purpoſe: maſh them together in a tub; then, letting the rape ſettle, draw off the liquid part, put it into a caſk, and ſet it in the ſun as hot as may be (the bung being only covered with a tile, or ſlate-ſtone) and in about thirty or forty days, it will become a good vinegar, and may paſs in uſe as well as that made of wine, if it be refined, and kept from turning muſty.

Or thus: to every gallon of ſpring-water, add three pounds of Malaga-raiſins; which put into an earthen jar, and place them where they may have the hotteſt ſun from May till Michaelmas; then preſſing all well, tun the liquor up in a very ſtrong iron-hooped veſſel, to prevent its burſting: it will appear very thick and muddy, when newly preſſed; but will refine in the veſſel, and be as clear as wine.

Thus let it remain untouched for three months, before it be drawn off, and it will prove excellent vinegar.

Method of making Wine-VINEGAR. Any ſort of vinous liquor, being mixed with its own fæces, flowers, or ferment, and its tartar, firſt reduced to powder; or elſe with the acid and auſtere ſtalks of the vegetable from whence the wine was obtained, which hold a large proportion of tartar: and the whole being kept frequently ſtirring in a veſſel which has formerly held vinegar, or ſet in a warm place full of the ſteams of the ſame, will begin to ferment a-new, conceive heat, grow ſour by degrees, and ſoon turn into vinegar.

The remote ſubjects of acetous fermentation are the ſame with thoſe of vinous; but the immediate ſubjects of it are all kinds of vegetable juices, after they have once undergone that fermentation which reduces them to wine: for it is abſolutely impoſſible to make vinegar of muſt, the crude juice of grapes, or other ripe fruits, without the previous aſſiſtance of vinous fermentation.

The proper ferments for this operation, whereby vinegar is prepared, are, 1. The fæces of all acid wines. 2. The leys of vinegar. 3. Pulveriſed tartar; eſpecially that of Rheniſh wine, or the cream, or cryſtals thereof. 4. Vinegar itſelf. 5. A wooden veſſel well drenched with vinegar, or one that has been long employed to contain it. 6. Wine that has often been mixed with its own fæces. 7. The twigs of vines, and the ſtalks of grapes, currants, cherries, and other vegetables of an acid auſtere taſte. 8. Bakers leaven, after it is turned acid. 9. All manner of ferments, compounded of thoſe already mentioned.

The French uſe a method of making vinegar different from that above deſcribed. They take two large oaken veſſels, the larger the better, open at top; in each whereof they place a wooden grate, within a foot of the bottom: upon theſe grates they firſt lay twigs, or cuttings of vines, and afterwards the ſtalks of the bunches, without the grapes themſelves, or their ſtones; till the whole pile reaches within a foot of the brim of the veſſels: then they fill one of theſe veſſels with wine to the very top, and half fill the other; and with liquor drawn out of the full veſſel, fill up that which was only half full before; daily repeating the ſame operation, and pouring the liquor back from one veſſel into another; ſo that each of them is full, and half full, by turns.

When this proceſs has been continued for two or three days, a degree of heat will ariſe in the veſſel, which is then but half full, and increaſe for ſeveral days ſucceſſively, without any appearance of the like in the veſſel which happens to be full, during thoſe days; the liquor whereof will ſtill remain cool: and as ſoon as the heat ceaſes in the veſſel that is half full, the vinegar is prepared: which, in the ſummer, happens on the fourteenth or fifteenth day from the beginning; but in the winter, the fermentation proceeds much ſlower: ſo that they are obliged to forward it by artificial warmth, or the uſe of ſtoves.

When the weather is exceeding hot, the liquor ought to be poured off from the full veſſel into the other twice a-day: otherwiſe, the liquor will be overheated, and the fermentation prove too ſtrong; whence the ſpirituous parts will fly away, and leave a vapid wine, inſtead of a vinegar, behind.

The full veſſel is always to be left open at the top, but the mouth of the other muſt be cloſed with a cover of wood, in order the better to keep down and fix the ſpirit in the body of the liquor; otherwiſe, it might eaſily fly off in the heat of fermentation. The veſſel that is only half full ſeems to grow hot, rather than the other, becauſe it contains a much greater quantity of the vine-twigs and ſtalks, than that, in proportion to the liquor; above which the pile, riſing to a conſiderable height, conceives heat the more, and ſo conveys it to the wine below.

Vinegar is a medicine of excellent uſe in all kinds of inflammatory and putrid diſorders, either internal or external: in ardent bilious fevers, peſtilential and other malignant diſtempers, it is recommended by Boerhaave as one of the moſt certain ſudorifics. Weakneſs, fainting, vomiting, hyſterical and hypocondriacal complaints have alſo been frequently relieved by vinegar applied to the mouth or noſe, or received into the ſtomach. Diſtilled vinegar has the ſame virtues, only in a ſtronger degree.

There are alſo medicated vinegars, as vinegar of antimony, of elder, litharge, roſes, ſquills, treacle, &c. which derive their chief virtues from the vinegar.

VINEYARD, *Vinetum*, a plantation of vines without the aſſiſtance of walls, &c. *See* VINE.

VINOUS, ſomething that relates to wine, or that hath the taſte and ſmell of it.

VINTAGE, a crop of grapes, or the produce of a vineyard each ſeaſon.

VIPER, the name of a well known ſerpent, common in many parts of England.

The bathing the part bit by a viper with olive oil, is ſaid to effectually prevent the fatal conſequences, that would otherwiſe attend it.

VIVES, a diſeaſe in horſes, which differs from the ſtrangles only in this, that the ſwellings of the kernels under the ears of the horſe (which are the parts at firſt chiefly affected) ſeldom gather, or come to matter, but by degrees perſpire off, and diſperſe, by warm cloathing, anointing with the marſhmallow ointment, and a moderate bleeding or two. But ſhould the inflammation continue, notwithſtanding theſe means, a ſuppuration muſt be promoted by the methods recommended in the ſtrangles. *See the article* STRANGLES.

When theſe ſwellings appear in an old or full-aged horſe, they are ſigns of great malignity, and often of an inward decay, as well as forerunners of the glanders.

The mercurial ointment mentioned in the article Strangles may be prepared thus:

> Take of crude mercury, or quickſilver, one ounce; Venice-turpentine half an ounce; rub together in a mortar till the globules of the quickſilver are no longer viſible; then add two ounces of hogs-lard.

Some authors recommend this ointment to be uſed at firſt, in order to diſperſe the ſwellings, and prevent their coming to matter; bleeding and purging at the ſame time for that purpoſe; but as in young horſes they ſeem to be critical, the practice by ſuppuration is certainly more eligible and ſafe; for want of properly effecting which, the humours frequently ſettle, or are tranſlated to the lungs, and other bowels; or falling on the fleſhy parts of the hind quarters, form deep impoſtumes between the muſcles, which diſcharge ſuch large quantities of matter, as ſometimes kill the horſe, and very often endanger his life. *Bartlet's Farriery, pag.* 99.

ULCER, a ſolution of the ſoft part of an animal body, together with the ſkin.

The firſt intention in the cure of ulcers is bringing them to digeſt, or diſcharge a thick matter; which will in general be effected by the green ointment, or that with precipitate; but ſhould the ſore not digeſt kindly by theſe means, but diſcharge a gleety thin matter, and look pale, you muſt then have recourſe to warmer dreſſings, ſuch as balſam, or oil of turpentine, melted down with your common digeſtive, and the ſtrong beer poultice over them; it is proper alſo in theſe kind of ſores where the circulation is languid, and the natural heat abated, to warm the part, and quicken the motion of the blood, by fomenting it well at the time of dreſſing; which method will thicken the matter, and rouſe the native heat of the part, and then the former dreſſings may be re-applied.

If the lips of the ulcer grow hard or callous, they muſt be pared down with a knife, and afterwards rubbed with the cauſtic.

Where ſoft fungous fleſh begins to riſe, it ſhould carefully be ſuppreſſed in time, otherwiſe the cure will go on but ſlowly; if it has already ſprouted above the ſurface, pare it down with a knife, and rub the remainder with a bit of cauſtic; and to prevent its riſing again, ſprinkle the ſore with equal parts of burnt allum, and red precipitate; or waſh with the ſublimate water, and dreſs with dry lint even to the ſurface, and then rowl over a compreſs of linnen as tight as can be borne; for a proper degree of preſſure, with mild applications, will always oblige theſe ſpongy excreſſences to ſubſide, but without bandage the ſtrongeſt will not ſo well ſucceed.

All ſinuſſes, or cavities, ſhould be laid open as ſoon as diſcovered, after bandages have been ineffectually tried; but where the cavity penetrates deep into the muſcles, and a counter opening is impracticable or hazardous; where by a continuance, the integuments of the muſcles are conſtantly dripping and melting down; in theſe caſes injections may be uſed, and will frequently be attended with ſucceſs. A decoction of colcothar boiled in forge-water; or ſolution of lapis medicamentoſus in lime-water, with a fifth part of honey and tincture of myrrh, may be firſt tried, injecting three or four ounces twice a day, or ſome reſin melted down with oil of turpentine may be uſed for this purpoſe: if theſe ſhould not ſucceed, the following, which is of a ſharp and cauſtic nature, as recommended on Mr. Gibſon's experience.

> Take of Roman vitriol half an ounce, diſſolve in a pint of water, then decant and pour off gently into a large quart bottle; add half a pint of camphorated ſpirit of wine, the ſame quantity of the beſt vinegar, and two ounces of Ægyptiacum.

This mixture is alſo very ſucceſsfully appplied to ulcerated greaſy heals, which it will both cleanſe and dry up.

Theſe ſinuſſes or cavities frequently degenerate into fiſtulæ, that is, grow pipey, having the inſide thickened, and lined as it were with a horny callous ſubſtance. In order to their cure, they muſt be laid open, and the hard ſubſtance all cut away; where this is impracticable, ſcarify them well, and truſt to the precipitate medicine made ſtrong, rubbing now and then with cauſtic, butter of antimony, or equal parts of quickſilver and aqua fortis.

When a rotten or foul bone is an attendant on an ulcer, the fleſh is generally looſe and flabby, the diſcharge oily, thin, and ſtinking, and the bone diſcovered to be carious, by its feeling rough to the probe paſſed through the fleſh for that purpoſe. In order to a cure, the bone muſt be laid bare, that the rotten part of it be removed; for which purpoſe, deſtroy the looſe fleſh, and dreſs with dry lint; or the doſſils may be preſſed out of tincture of myrrh or euphorbium: the throwing off the ſcale is generally a work of nature, which is effected in more or leſs time, and in proportion to the depth the bone is affected; though burning the foul bone is thought by ſome to haſten its ſeparation.

Where the cure does not properly ſucceed, mercurial phyſick ſhould be given, and repeated at proper intervals: and to correct and mend the blood and juices, the antimonial and alterative powders, with a decoction of guaiacum and lime-waters, are proper for that purpoſe. *Bartlet's Farriery, pag.* 253.

ULIGINOUS, an appellation given to a moiſt, mooriſh, and fenny ſoil.

UMBEL, the extremity of a ſtalk or branch of a plant, divided into ſeveral peduncles, or rays, beginning from the ſame point, and opening in ſuch a manner, as to form an inverted cone.

UMBELLIFEROUS *Plants*, thoſe whoſe flowers are produced in an umbel, on the top of the ſtalks, ſomewhat reſembling an umbrella. Of this kind are the fennel, parſley, parſnip, carrot, hemlock, &c.

UNDERWOOD, coppice, or any wood not accounted timber. *See the article* Coppice.

VOOR, fallow land. *See the article* Fallow.

URE, the udder of a cow, ſheep, &c.

URITH, etherings, or windings of hedges.

URRY, a ſort of blue or black clay, lying near a vein of coal.

URINE, a ſerous and ſaline matter ſeparated from the blood of animals, and emitted by the canal of the urethra.

It is of excellent uſe as a manure, when deprived of its hot fiery particles by time, which will ſo alter its nature as to render it an extraordinary fertilizer of every kind of ſoil. Columella certifies that old urine is excellent for the roots of trees. Mr. Hartlib commends the Dutch for preſerving the urine of cows as carefully as they do the dung, to enrich their lands; and inſtances a woman he knew near Canterbury, who ſaved in a pail all the urine ſhe could, and when the pail was full, ſprinkled it on her meadow, the graſs of which looked yellow at firſt, but afterwards grew ſurprizingly. Similar to this is what Mr. Bradley relates, as of his own knowledge. Human urine was thrown into a little pit conſtantly every day, for three or four years. Two years after, ſome earth was taken out of this pit, and mixed with twice as much other earth, to fill up a hollow place in a graſs walk. The turf which was laid upon this ſpot grew ſo largely and vigorouſly, beſides being much greener than the reſt, that, by the beſt computation he could make, its graſs, in a month's time, was above four times as much in quantity as that of any other ſpot of the ſame ſize, though the whole walk was laid on very rich ground. The author of the Engliſh Improver is therefore very right in ſaying, that human urine is of greater worth, and will fatten land more, than is generally imagined by our farmers, whom he adviſes, to take all opportunities of preſerving this, and every ſort of urine, for their ground, as carefully as is done in Holland.

USTILAGO, the ſame with burnt grain. *See the article* Burnt-Grain.

UTENSIL, a domeſtic moveable of any kind.

W.

WAD, black lead.

WAGGON, a vehicle or carriage, of which there are various forms, accommodated to the different uſes they are intended for. *See the article* WHEEL.

WAIF, an eſtray, which, for want of the owner's appearance after it has been cried and publiſhed in the neighbouring markets, is forfeited to the lord of the manor.

WALK, an ornamental and uſeful part of a garden, differing from an alley by being wider. *See* ALLEY.

Walks are either ſtrait or ſerpentine; the materials of which they are formed are gravel, ſand, or graſs; but where gravel or ſand cannot be procured, they are ſometimes laid with powdered coal, ſea-coal aſhes, and ſometimes with powdered brick, but none equals thoſe made with gravel: and in order to the laying thoſe kind of walks, it is very proper to fill the bottom with lime, rubbiſh, flint ſtones, coarſe gravel, or other rocky materials, which will be of ſervice to prevent weeds from growing through the gravel, and to hinder worm-caſts; this bottom ſhould be ten inches or a foot thick, over which a coat of fine gravel, mixed with a due proportion of loam, ſhould be laid, to the thickneſs of ten inches. The common allowance for a gravel walk of five feet breadth is an inch in the crown, ſo that if a walk be twenty feet wide, it ſhould be four inches higher in the middle than on each ſide.

When a walk has been evenly laid, trodden down, and raked, it ſhould then be rolled well both in length and width; and in order to make them more firm, it will be neceſſary to give them three or four water-rollings, that is, they ſhould be rolled when it rains very faſt; this will cauſe the gravel to bind, ſo that when the walks come to be dry, they will be as hard as terrace.

Gravel walks are not only very neceſſary near the houſe, but there ſhould always be one carried quite round the garden, becauſe being ſoon dry after rain, they are proper for walking on in all the ſeaſons; but then theſe ſhould be but few, and thoſe adjoining to the houſe ought to be large in proportion to the ſize of the houſe and garden: the principal of theſe walks ſhould be elevated, and carried parallel with the houſe ſo as to form a terrace; this ſhould extend itſelf each way in proportion to the width of the garden, ſo that from this there may be a communication with the ſide walks, whereby there may be dry walking all round the garden.

Sand walks are alſo frequently made in gardens; theſe are leſs expenſive in the making, and alſo in keeping in order than thoſe of gravel; for as the greateſt part of the walks which are made in modern gardens twiſt about in an irregular ſerpentine manner, it would be very difficult to keep them handſome if they were laid with gravel, eſpecially where they are ſhaded by trees; for the dripping of the water from their branches in hard rains, is apt to waſh the gravel in holes, and render the walks very unſightly; therefore thoſe walks which go through woods and plantations are much better if laid with ſand, which will be dry and wholſome, and whenever they appear moſſy, or any weeds begin to grow on them, if they are ſcuffled over with a Dutch hoe in dry weather, and raked ſmooth, it will deſtroy the moſs and weeds, and make the walks appear as freſh and handſome as when firſt laid.

The breadth of theſe walks ſhould be proportioned to the ſize of the ground, which, in a large extent, may be twelve or fourteen feet wide, but in ſmall gardens five or ſix will be ſufficient.

The ground being traced out in the manner as the walks are deſigned, the earth ſhould be taken out of the walk, and laid in the quarters; the depth of this muſt be proportioned to the nature of the ſoil, for where the ground is dry, the walks need not be elevated above the quarters, ſo the earth may be taken out four or five inches deep in ſuch places; but where the ground is wet, the bottom of the walks need not be more than two inches below the ſurface, that the walks may be raiſed ſo high as to throw off the wet into the quarters, which will render them more dry and healthy to walk on: after the earth is taken out, the bottom of the walks ſhould be laid with rubbiſh, coarſe gravel, &c. to the thickneſs of five or ſix inches, and beaten down cloſe, to prevent the worms from working through it; then the ſand ſhould be laid upon this about three inches thick, and after treading it down, it ſhould be raked over to level and ſmooth the ſurface: the ſand that is fitting for this purpoſe ſhould be ſuch as will bind, otherwiſe it will be very troubleſome to walk on them in dry weather; for if the ſand be of a looſe nature, it will be moved by ſtrong gales of wind, and in dry weather will ſlide from under the feet; and if it is too much inclinable to loam, it will alſo be attended with as ill conſequence as that which is too looſe, for this will ſtick to the feet after every rain; ſo that where ſand can be obtained of a middle nature, it ſhould always be preferred.

Graſs walks in gardens were formerly held in great eſteem, and were looked upon as neceſſary ornaments to a garden; but of late years they have been much leſs regarded; for theſe long narrow ſlips of graſs are far from being pleaſing to the eye, and are for the greateſt part of the year uſeleſs, being generally too damp for perſons of tender conſtitutions to walk on; and whenever they were conſtantly uſed, they became bare in the places frequently trodden, ſo were rendered more unſightly; and as the intention of walks in gardens is to have at all ſeaſons a dry communication through them for exerciſe and recreation, graſs walks were very improper, becauſe every ſhower of rain made them ſo wet, as not to be fit for uſe for a conſiderable time, and the dews rendered them too damp to walk on either in the morning or evening, and if they are not kept conſtantly cloſe mowed, then they become not only unhealthful but troubleſome to the feet; beſides, whenever the ground is ſo dry, as that perſons may with ſafety walk upon graſs, the lawns and other parts of verdure in gardens are better adapted for uſe than any of theſe formal ſtiff walks, which were ſo much eſteemed in the laſt age.

WALK, among horſemen, is the ſloweſt, and leaſt raiſed of all a horſe's goings. It is performed by a horſe's lifting up his two legs on a ſide, the one after the other, beginning with the hind leg firſt. Thus, if he leads with the legs of the right ſide, then the firſt foot he lifts is the far hind-foot, and in the time he is ſetting it down, (which in a ſtep is always ſhort of the tread of his fore-foot on the ſame ſide) he lifts his far fore-foot, and ſets it down before his near fore-foot. Again, juſt as he is ſetting down his far fore-foot, he lifts up his near hind-foot, and ſets it down again juſt ſhort of his near fore-foot; and juſt as he is ſetting it down, he lifts his near fore-foot, and ſets it down beyond his far fore-foot.

WALL, the principal part of a building, as ſerving both to incloſe it, and ſupport the roof, floors, &c.

Walls are diſtinguiſhed into various kinds, from the matter whereof they conſiſt, as plaſtered or mud-walls, brick-walls, ſtone-walls, flint, or boulder walls, and boarded walls. In all which theſe general rules are to be regarded. 1. That the right angle therein depending is the true cauſe of all ſtability, both in artificial and natural poſition. 2. That the maſſieſt and heavieſt materials be the loweſt, as fitter to bear than to be borne. 3. That the walls, as they riſe, diminiſh proportionably in thickneſs, for eaſe both of weight and expence. 4. That certain courſes or ledges, of more ſtrength than the reſt, be interlaid, like bones, to ſtrengthen the whole fabrick.

Brick-walls are the moſt important and uſual amongſt us. In theſe, particular care is to be taken about laying of the bricks; that in ſummer they be laid as wet, and in winter as dry, as poſſible, to make them bind the better with the mortar: that in ſummer, as faſt as they are laid, they be covered up, to prevent the mortar, &c. from drying too faſt: that in winter they be covered well to protect them from rain, ſnow, and froſt, which are all enemies to mortar: that they be laid joint on joint in the middle of the walls as ſeldom as may be: but that good bond be made there as well as on the outſide. Care is to be taken that the angles be firmly bound, which are the nerves of the whole edifice. In order to which, in working up the walls of a building, it is not adviſeable to raiſe any wall above eight feet high, before the next adjoining wall be brought up to it, that ſo good bond may be made in the progreſs of the work; it may be worth notice, that a wall a brick and a half thick, with the joint, will be in thickneſs fourteen inches, or very near; whence one hundred and fifty or one hundred and ſixty bricks will lay a yard ſquare meaſured upon the face of the building; and to the ſquare of ten feet are uſually allowed ſeventeen hundred or eighteen hundred bricks. Flint, or boulder walls, are much uſed in ſome parts of Suſſex and Kent, for fence-walls, round courts, gardens, &c. A right and left-handed man fits well for this work, as they have a hod of mortar poured down upon the work, which they part between them, each ſpreading it towards himſelf, and ſo they lay in the flints. The mortar for this work muſt be very ſtiff.

Of all materials for building walls for fruit-trees, brick is the beſt; it being not only the handſomeſt, but the warmeſt and kindeſt for the ripening of fruit; and affording the beſt conveniency for nailing, as ſmaller nails will ſerve in brick than will in ſtone walls, where the joints are larger; and if the walls are coped with free-ſtone, and ſtone pilaſters or columns at proper diſtances, to ſeparate the trees, and break off the force of the winds, they are very beautiful, and the moſt profitable walls of any others.

In ſome parts of England there are walls built both of brick and ſtone, which are found very commodious. The bricks of ſome places are not of themſelves ſubſtantial enough for walls; and therefore ſome perſons, that they might have walls both ſubſtantial and wholeſome, have built theſe double, the outſide being of ſtone, and the inſide of brick: but there muſt be great care taken to bind the bricks well in the ſtone, otherwiſe they are very apt to ſeparate one from the other, eſpecially when froſt comes after much wet.

There have been ſeveral trials made of walls built in different forms; ſome of them having been built ſemicircular; others in angles of various ſizes; and projecting more towards the north, to ſcreen off the cold winds: but there has not as yet been any method which has ſucceeded near ſo well as that of making the walls ſtrait, and building them upright. Where perſons are willing to be at the expence, in the building of their walls ſubſtantial, they will find it anſwer much better than thoſe which are ſlightly built, not only in duration, but in warmth: therefore a wall two bricks thick, will be found to anſwer better than one of a brick and a half: and if in building of garden-walls they are grouted with ſoft mortar, to fill and cloſe all the joints, the walls will be much ſtronger, and the air will not ſo eaſily penetrate, as it does through thoſe which are commonly built.

If the walls are built on arches, and the trees planted at thoſe arched places, the trees will be thereby enabled to extend their roots underneath the wall, and be greatly benefited, and forwarded in their growth.

It has been hitherto an almoſt unvaried practice, to plant all the finer fruits againſt walls, without ſufficiently inquiring into the motives for ſo doing. But it ſhould be obſerved in the firſt place, that the borders under the walls are ſeldom made ſo wide as they ought to be, conſidering that the trees which are planted there can extend their roots but one way: and ſecondly, that due care is not taken to adapt the quality of the ſoil there to the nature of the trees; a precaution which ought to be attended to by thoſe who are curious in their fruit, and which would coſt only the trifling expence of bringing in a ſufficient depth of proper earth.

The chief reaſon aſſigned for planting trees againſt walls is, the additional heat procured by the reflected rays of the ſun, and the warmth communicated to the wall itſelf by the ſun. This, ſay the advocates for this practice, haſtens the ripening of the fruit, and exalts its flavour; beſides, that the ſhelter of the walls protects trees, natives of warmer climates, from our ſevere north and north-eaſt winds.

To this it may be anſwered, that it is a conſtant obſervation, that all plants brought from a warmer climate to a colder, endeavour to bloom at their uſual ſeaſon, unleſs they are prevented by cold. The conſequence of this is, that if the early part of the ſpring happens to be warm, the bloſſoms of ſuch trees ſwell, and expand themſelves: but as we cannot be exempted from froſt ſo ſoon in the ſeaſon, theſe bloſſoms are nipped in the bud; that is, the firſt froſty night ſtops the circulation in them, and they then neceſſarily die. Nothing ſhews more inconteſtibly the ſtoppages of the circulation in trees, than tapping, for inſtance, a birch tree, early in the ſpring: for the warmth, or coldneſs, of the air at that time may be determined by the greater or leſs velocity with which the juice flows, or by the greater or leſs quantity of it, that is diſcharged, almoſt as certainly as by a thermometer. In froſt, the diſcharge ceaſes entirely. It therefore is not at all wonderful, that the circulation is interrupted, by the ſame cauſe, in the finer veſſels of flowers, and that the death of the flower is the neceſſary conſequence. A very ſharp froſt, even after the early fruits are ſet, has the ſame effect on their yet tender veſſels; and the owner is ſurpriſed to find his fruit fall off, in a few days after, without any ſeeming cauſe; unleſs recourſe be had to I know not what peſtilential quality in the eaſt wind, when the ſame effect would follow, did the froſt come from any other quarter. Hence it is evident, that fruit trees would be benefited, rather than hurt, by preventing their too early bloſſoming.

Some gentlemen endeavour to guard againſt this accident, by ſheltering their trees with ſkreens, which have a double effect; that of preſerving them from the warmth of the ſun by day, and that of defending them from the froſt by night. But if theſe trees were planted as ſtandards, where the air might play freely round them, the motion of the ſap would be leſs forward, and the bloſſoms would conſequently be leſs expoſed to the injuries which happen from their coming out too early. They would likewiſe eſcape another great inconvenience which attends their ſtanding againſt walls; namely, the two great inequality of the heat, as increaſed by the wall, and the coldneſs of the night, againſt which the wall affords no ſhelter, otherwiſe than as it ſkreens the trees from the wind.

A farther reaſon which renders walls the leſs neceſſary is, that the fruits planted againſt them ripen before the ſun has acquired its full force in this climate. This is what happens to all our apricots, to moſt of our nectarines, and to the fineſt of our peaches: for it is well known, that the month of July is our hotteſt ſeaſon, and that the heat of that month will therefore the moſt perfectly exalt the juices and flavour of fruit.

Walls may indeed be neceſſary for the later peaches: though even a Catherine peach will ripen on a ſtandard, in a favourable ſituation.

All the ſtone fruits are accounted peculiarly proper for walls, and ſo are many kinds of pears. Some of the finer ſorts of theſe laſt may indeed do well enough when ſo planted: but I cannot by any means think the cherry, for example, a proper tree for a wall, becauſe it will not bear the cutting neceſſary to train it in that manner. The late pears and peaches are, in my opinion, the only fruits really fit for this ſort of culture. However, for the ſake of thoſe who chooſe to continue to extend it to other kinds, we ſhall obſerve, that peach trees, and thoſe of nectarines, placed againſt walls, ſhould be ſet about twelve feet aſunder : apricots ſhould be allowed a breadth of ſixteen or eighteen feet; cherries and plums, twenty-five feet; and moſt ſorts of vigorous ſhootings pears, from thirty to forty, according to the goodneſs of the ſoil, and the height of the wall.

The root of the tree taken from the nurſery ſhould be placed in a hole dug about five inches from the wall, and its head ſhould be inclined thereto, with the bud turned outwards, to conceal the wounded part of the ſtock. The hole ſhould then be filled up, ſo as neither to leave chaſms between the roots, nor to preſs the earth down too hard upon them. Some of the twigs of the young tree ſhould then be faſtened to the wall, to prevent the wind's diſplacing it ſo as to break the tender fibres of its roots; the ſurface of the ground ſhould be covered with mulch, to keep out the froſt; and in the following ſpring, about the beginning or middle of March, according as the ſeaſon is earlier or later, the head of the tree ſhould be cut down to four or five eyes above the bud, juſt before it begins to ſhoot. In this cutting off the head, the gardener, to avoid as much as poſſible giving any diſturbance to the roots, ſhould ſet his foot down cloſe to the ſtem of the tree, and take faſt hold of the ſtock, below the bud, with one hand, to keep it ſteady, whilſt, with the other, he ſlopes off the upper part gently, with a ſharp knife, at the intended place, which ſhould always be juſt above an eye. This ſhould be done in dry wather ; for if much rain ſhould fall ſoon after, and wet get into the wounded part, the tree will be liable to ſuffer conſiderable damage : and for the ſame reaſon, together with its preventing the cloſing of the wound, froſty weather ſhould alſo be cautiouſly avoided. After the tree has been headed, the earth of the borders ſhould be looſened gently, to render it more fit to admit the fibres of the roots, and if the mulch which was laid on in the autumn be rotten, it may be dug into the border, at ſome diſtance from the roots, with all poſſible care not to diſturb or break them. When the dry weather comes on, a few ſods pared off from a paſture ground, and laid upon the ſurface of the border, about the roots of the trees, with the graſs downward, will preſerve a gentle moiſture in the earth, and be leſs apt to harbour inſects, than any ſort of dung or litter.

The above is the uſual method of tranſplanting trees from the nurſery to a wall. But Mr. Miller is convinced, from experience, that, inſtead of taking from the nurſery ſtocks (eſpecially of peaches and nectarines) which have then made one year's ſhoots from the bud, it is better to ſingle out ſuch as were budded the preceding ſummer, and have not made any ſhoot ; provided the bud be ſound and plump, and the bark of the ſtock well cloſed at the place of budding; becauſe, when this ſhall have put forth a ſhoot five or ſix inches long, in the following ſpring after being tranſplanted, as it will ſeldom fail to do, that ſhoot may be ſtopped by pinching off its top, and thereby be made to produce lateral ſhoots, which may be trained to the wall, without having any head to cut off, as muſt be done to thoſe trees which have had one year's growth in the nurſery. The benefit of avoiding this operation is particularly great to ſuch trees as are apt to bleed much, and ſingularly ſo to the moſt tender ſorts. The ſtock of the tree tranſplanted in bud, before it has made any ſhoots, muſt indeed be cut down, likewiſe in the ſpring, to juſt above the bud, becauſe this will rarely ſhoot unleſs that be done ; and the nearer it is cut to the bud, the ſooner will the head of the ſtock be covered by the bud : for there is no occaſion to leave on trees which are planted againſt a wall, a part of the ſtock, above the bud, to faſten the ſhoots to, as muſt be done with thoſe in the nurſery ; becauſe the ſhoots may here be immediately and properly ſecured, by faſtening them to the wall: nor is this cutting off the ſuperfluous part of the ſtock attended with any danger to the bud, if the wound be but covered with a little grafting wax, or clay, to keep out the wet.

No time is loſt, but ſome may be gained, by this practice; as the trees which have ſhot before their being tranſplanted muſt be cut down, and there is a hazard of their ſhooting again.

In watering of theſe new planted trees, which ſhould not be done unleſs the ſpring prove very dry, nor then often, or in great quantity; the pot ſhould have its noſſel on, ſo as to let the water out very gently, almoſt in drops only, as it were; for when it is poured down haſtily, it hardens the ground: and if the head of the tree is watered at the ſame time as its roots, and likewiſe gently, that refreſhing will be of great ſervice to it.

About the middle of May, the ſhoots of theſe trees, of which there will then often be ſeveral ſix or eight inches long, ſhould be nailed horizontally to the wall. All fore-right ſhoots, and ſuch as are weak, ſhould alſo then be rubbed off, to ſtrengthen thoſe that are left. But if no more than two ſhoots have been produced, and thoſe very ſtrong, the tops of theſe ſhould be nipped off at that time; and this will make each of them put out two or more ſhoots, whereby the wall will be the better furniſhed with branches. It will alſo be right to continue to refreſh them gently with water, from time to time, during the whole ſummer, if that ſeaſon ſhould be very dry, leſt their roots, having but little hold of the ground the firſt year after tranſplanting, ſhould be injured by the drought, ſo as to retard the growth of the tree.

In the beginning of October when the trees have done ſhooting, it will be time to begin to prune them. In doing this, the branches muſt be ſhortened in proportion to the ſtrength of the tree ; that is, if it be ſtrong, they may be left eight inches long; but if weak, they ſhould be ſhortened to four or five. The ſhoots thus cut ſhould then be trained horizontally to the wall, ſo as to leave the middle of the tree void of branches, for that part will be eaſily furniſhed with wood afterwards ; whereas, if the ſhoots are trained perpendicularly to the wall, the ſtrongeſt will draw away the greateſt ſhare of the ſap from the roots, run upwards, and leave the ſide branches ſo deſtitute of nouriſhment, as frequently to occaſion their decaying and dying.

In the next ſummer, when the trees begin to ſhoot, they ſhould be carefully looked over again; all fore-right or ill placed buds or ſhoots ſhould be rubbed off, and ſuch as are to remain, for future branches, ſhould be trained up horizontally to the wall, in due order, as they are produced ; for this is the principal ſeaſon in which all fruit trees are beſt and moſt effectually modelled to their intended form. Every gentleman who wiſhes his trees to proſper to the utmoſt, and to grow with as much beauty as they are ſuſceptible of, ſhould therefore perſonally look over them at this time, and, with his own hand, rub off their ſuperfluous buds and ſhoots: for if this elegant and eſſentially uſeful part of gardening is left to the hired gardener, it will often be neglected, or ſlovenly performed. Whoſoever omits it, deſerves not to have good fruit. This important buſineſs ſhould not be deferred till Midſummer, as is the common practice, becauſe numbers of uſeleſs ſhoots, which muſt afterwards be cut off, will by that time have robbed the other parts of their due nouriſhment: and beſides, it is by ſtopping ſome of the ſtronger ſhoots (by nipping off their tops) in May, that they are made to put out ſide ſhoots, which, being guided to the vacant parts of the wall, furniſh every part thereof regularly with proper wood. Care muſt, however, be taken not to multiply theſe branches too much, for fear of weakening the tree ſo as to diſable it for producing good fruit; and therefore no ſhoots ſhould be ſtopped in the ſummer, unleſs there be an abſolute neceſſity for new branches in any particular place. Neither ſhould the branches be laid in too cloſe together againſt the wall, becauſe the great numbers of their leaves then exclude the air from their ſhoots, ſo that theſe are never duly ripened, and the fruit which is afterwards produced on them cannot, conſequently, be ſo well taſted as that of trees whoſe ſhoots receive all the advantages of the ſun and air, to bring them to maturity.

In the third year, the branches till then trained horizontally will have acquired ſuch ſtrength, that there will not be much danger in permitting ſome of their ſhoots to go in a more perpendicular direction, in order gradually to give the whole tree the form of a fan, which is by much the moſt beautiful, as well as the beſt way here, becauſe the wall is thereby moſt equally filled with wood.

It is in continuing ſtrictly to obſerve the two foregoing rules, viz. to furniſh every part of the tree as equally as poſſible with bearing wood, and not to lay the branches in too cloſe together, that the art of pruning fruit trees in general, and particularly wall trees, chiefly conſiſts. The former of theſe will always be completely effected by pinching off the tops of the young ſhoots, wherever an increaſe of wood is wanted, in May, as above directed. But as ſome have adviſed the doing of this in June, and others even later, we muſt remark here, that if we reflect that young ſhoots made ſo late in the year have not time to acquire a ſufficient ſtrength and ſolidity of fibres to reſiſt the winter's froſt, May will certainly be found to be a much more proper ſeaſon: for whoever caſts an attentive eye over fruit trees after a hard winter, will find many of their ſhoots killed by the preceding froſt; and if he looks ſtill more cloſely, he will ſee, that moſt, if not all, of theſe have been injudiciouſly forced out in a too late ſeaſon. It is almoſt needleſs to ſay that April, which others again recommend for this work, is too early; becauſe the wounded branch would then be in danger of being deſtroyed by a froſty night. If theſe directions are judiciouſly followed, it will not be neceſſary to touch any fruit tree with a knife in the ſummer: and that the avoiding of this will be of infinite ſervice to every ſpecies of them, is manifeſt from the many accidents to which they are liable when cut too much at that ſeaſon. All the ſoft, tender, and pithy wooded ſorts, ſuch eſpecially as the peach tree, require a conſiderable time to heal their wounds, when theſe are great, and in the mean while wet and rain eaſily ſoak into the wounded parts, ſo as frequently to make the branches canker and die.

As to the diſtance at which the branches of fruit trees, or rather the ſhoots of thoſe branches, ſhould be trained againſt a wall; nature gives us a ſure guide, if we but attend to the ſize of the fruit and of the leaves: for it ſhould be ſuch that neither of theſe upon an upper branch may touch the branch underneath.

The winter pruning, as it is called, of fruit trees is commonly performed in February or March: but the beſt ſeaſon for it is in October, when their leaves begin to fall; for that will be early enough for their wounds to heal before the froſt comes on, ſo that there will be no danger of their being hurt thereby. Thus all the aſcending ſap in the ſpring will be employed to nouriſh only thoſe uſeful parts of the branches which are left; whereas, if they are not pruned till February, the greateſt part of the ſap then in motion in the branches, as may be obſerved by the ſwelling of the buds, will be drawn up to the extreme parts of the branches, to nouriſh bloſſoms which muſt afterwards be cut off: for the extreme buds of ſtrong ſhoots always ſwell ſooner than moſt of the lower ones, and conſtantly draw from thoſe below.

It is the conſtant practice of gardeners, founded upon long experience, to prune weak trees early in the winter, that they may be the leſs endangered by the cutting, and luxuriant trees late in the ſpring, in order to check their luxuriancy.

WALL-FLOWER, a ſpecies of yellow flower, ſo called from its growing naturally on old walls.

All ſorts of wall-flowers, except the double ones, are raiſed from ſeeds, either by ſowing when the ſeeds are ripe, or in the ſpring; thoſe which produce double flowers are raiſed from ſlips, which ſhould be planted in a ſhady ſituation, either in April or May, which, when ſufficiently rooted, may be tranſplanted where they are intended to blow; theſe flowers appear in the ſpring, and are much admired for their fragrancy.

WALLNUT-TREE, the name of a well known tree formerly held in great eſteem in this country, for its wood, which is, in fact, often very finely veined; but, on account of its aptneſs to be worm-eaten, it has of late given place to the beautiful and much ſounder mahogany, with which our cabinet-makers have been pretty plentifully ſupplied from the Britiſh ſettlements in the Weſt Indies.

As an uſeful fruit tree, independent of its timber, which is, however, ſtill of good value, it merits the huſbandman's attention; nor can the gentleman eaſily find a more ſtately one to adorn his park with, or to form a noble avenue to his manſion.

Theſe trees are raiſed from their nuts, which it is beſt to keep in dry ſand, with their outer covers on, till February; that being the right time for planting them. If they are intended for timber trees, they ſhould be ſown in the places where they are to remain, in order that the breaking or otherwiſe ſhortening of their roots, and eſpecially thoſe of the tap kind, may not ſtint their growth, and make them run out in branches: but if they are deſigned for fruit, their fertility will be increaſed by tranſplanting them, becauſe their downright roots, which are thoſe that chiefly encourage the luxuriant growth of wood in all ſorts of trees, will be thereby checked, and they will be made, in lieu of them, to ſtrike out numbers of lateral roots, which, as experience has proved, always conduce greatly to the production of the largeſt and faireſt fruit. The moſt proper ſeaſon for tranſplanting them is when their leaves begin to decay; and the beſt age, when they have had three or four years growth in the nurſery. Mr. Miller ſays he has frequently experienced that there is little danger of their ſucceeding although they be eight or ten years old when they are tranſplanted: but, however that may be, it is certain that they will root beſt, grow largeſt, and laſt longeſt, if they are removed young. The leſs their branches are cut at the time of tranſplanting, or indeed at any time after, the better they will proſper; for much lopping often cauſes them to decay: but if there be a neceſſity for taking off any of their boughs, it ſhould be done early in September, that the wound may have time to heal before the cold and wet comes on. It is likewiſe eſſential to cut the branch off quite cloſe to the trunk, leſt the ſtump which is left ſhould decay, and rot the body of the tree; to prevent which, eſpecially if the wound be large, it will be right to ſmooth it well with a chiſſel, and then to cover it over carefully with a cement of clay or wax, as in the caſe of grafting, with a piece of tarpawling, or of ſheet lead, over that.

Theſe trees ſhould not be planted nearer together than forty feet, and more may be yet better, if they are deſigned for fruit. They delight in a firm, rich, loamy ſoil, or ſuch as is inclinable to chalk or marl; and they will thrive very well in ſtony ground, or on chalky hills, as is evident from thoſe large plantations near Leatherhead, Godſtone, and Carſhalton in Surry, where great numbers of theſe trees planted upon the downs produce annually large quantities of fruit, to the no ſmall advantage of their owners.

In order to preſerve this fruit, it ſhould be left upon the tree till it is thoroughly ripe, and then, as it would be exceedingly troubleſome to gather it by hand, it may be beaten off, but not with ſuch violence as is commonly uſed, from a miſtaken notion that the tree is improved thereby: for moſt certainly it cannot be benefited by that rough way of forcing off the young wood upon which this fruit grows. The nuts thus obtained ſhould be laid in heaps for two or three days, after which they ſhould be ſpread out, and when they have parted from their huſks, which they will then ſoon do, and have afterwards been well dried in the ſun, to remove the moiſture of their ſhells, which would otherwiſe make them mould, they ſhould be laid up in a dry place, where neither mice nor other vermin can get at them. In this manner they will remain good for four or five months: or, which is a yet better way, and will keep them ſtill longer, let them, when their outward moiſture has been dried by the ſun, be put up in jars, or other cloſe veſſels, with dry ſand between their interſtices. The laying of them for four or five hours in an oven gently heated, as is the practice of ſome, will indeed dry the germ, and prevent their ſprouting: but if the oven is too hot, it will make the kernels ſhrink, and prevent their being peeled with any tolerable eaſe.

Were it only for the oil that theſe nuts afford, the trees which produce them would be worth ſome care. Mr. Evelyn ſays that one buſhel of them will yield fifteen pounds of peeled kernels, and that theſe will yield half that weight of oil, which the ſooner it is drawn, is the more in quantity, though the drier the nut, the better in quality. He adds, that the lee, or marc of the preſſing, is excellent to fatten hogs with. Certainly it would be good manure for land; as are the cakes of lin-ſeed, rape, &c. after the oil has been ſqueezed out of them. The green huſks boiled, without any mixture, make a good colour to dye a dark yellow. The kernel being rubbed upon any crack or chink of a leaking veſſel, ſtops it better than either clay, pitch, or wax.

The French are very fond of the kernels of theſe nuts ſcooped out of the ſhells before they are hardened, with a ſhort broad braſs knife; becauſe iron ruſts and communicates a diſagreeable taſte to the kernels. When ſcooped out, they are ſteeped in ſalt and water for a few hours before they are ſet upon the table, as well to take off all taſte of bitterneſs, as to make them peel with the utmoſt eaſe.

WANG-TOOTH, a jaw tooth.

WANT, a mole. *See the article* MOLE.

WANTY, a broad girth of leather, by which the load is bound upon a horſe.

WAPENTAKE, the ſame with what is commonly called a hundred, and generally uſed in the northern counties beyond the Trent.

WARBLES, ſmall hard tumours on the ſaddle part of a horſe's back, occaſioned by the heat of the ſaddle in travelling, or its uneaſy ſituation.

A hot, greaſy diſh-clout at firſt frequently applied, will ſometimes remove them. Camphorated ſpirits of wine are alſo very effectual for this purpoſe to diſperſe them, eſpecially if a little ſpirit of ſal ammoniac be added to the camphorated ſpirit. If there be a neceſſity for working the horſe, care ſhould be taken to have the ſaddle nicely chambered.

WARP, miſcarry, ſlink her calf.

WARREN, a franchiſe, or place privileged, either by preſcription or grant from the king, to keep beaſts and fowl of warren in; as rabbits, hares, partridges, pheaſants, &c.

By ſtatute 21 Edw. III. a warren may lie open, and there is no need of cloſing it in, as there is a park.

In the ſetting up a warren, great caution is to be uſed for the fixing upon a proper place, and a right ſituation. It ſhould always be upon a ſmall aſcent, and expoſed to the eaſt or the ſouth. The ſoil that is moſt ſuitable, is that which is ſandy; for when the ſoil is clayey or tough, the rabbits find greater difficulty in making their burrows, and never do it ſo well; and if the ſoil be boggy or mooriſh, there would be very little advantage from the warren, for wet is very deſtructive of theſe animals.

All due precautions muſt be taken, that the warren be ſo contrived, that the rabbits may habituate themſelves to it with eaſe. Many would have it, that warrens ſhould be encloſed with walls; but this is a very expenſive method, and ſeems not neceſſary nor adviſeable; for we find but very few that are ſo, and thoſe do not ſucceed at all the better for it.

The dung of rabbits is a great fertilizer of uſeleſs lands, and Mr. Mortimer tells us that he has known vaſt crops of rye upon barren lands that have been old warrens well dunged by rabbits; and large oak and aſh upon the ſame, though the ſoil was very ſhallow.

WASTE, a name given to ſuch lands as are in no man's poſſeſſion, but lie common.

WATER, a ſimple, fluid, and liquid body, reputed the third of the four vulgar elements. Sir Iſaac Newton defines water to be a fluid ſalt, volatile and void of taſte: but this definition Boerhaave ſets aſide, inaſmuch as water is a menſtruum or diſſolvent of ſalts and ſaline bodies, which does not agree with the notion of its being a ſalt itſelf; for we do not know of any ſalt that diſſolves another. This laſt-mentioned philoſopher, therefore, defines water, a very fluid, ſcentleſs, taſteleſs, tranſparent, colourleſs liquor, which turns to ice with a certain degree of cold.

Though water be defined a fluid, it is a point controverted among philoſophers, whether fluidity be its natural ſtate, or the effect of violence. We ſometimes find it appear in a fluid, and ſometimes in a ſolid form; and as the former, in our warmer climate, is the more uſual, we conclude it the proper one, and aſcribe the other to the extraneous action of cold.

Boerhaave, however, aſſerts the contrary, and maintains water to be naturally of the cryſtalline kind; ſince, wherever a certain degree of fire is wanting to keep it in fuſion, it readily grows into a hard glebe, under the denomination of ice. Mr. Boyle is of the ſame opinion. Ice, he obſerves, is uſually ſaid to be water brought into a preternatural ſtate by cold; but with regard to the nature of things, and ſetting aſide our arbitrary ideas, it might as juſtly be ſaid, that water is ice preternaturally thawed by heat.

If it be urged, that ice, left to itſelf, will, upon the removal of the freezing agents, return to water; it may be anſwered, that (not to mention the ſnow and ice which lie all ſummer on the Alps, and other high mountains, even in the torrid zone) we have been aſſured, that in ſome parts of Siberia, the ſurface of the ground continues more months in the year frozen by the natural temperature of the climate, than thawed by the heat of the ſun; and a little below the ſurface of the ground, the water which chances to be lodged in the cavities there, continues in a ſtate of ice all the year round; ſo that when, in the heat of the ſummer, the fields are covered with corn, if you dig a foot or two deep, you ſhall find ice and a frozen ſoil.

Water is generally divided into ſalt and freſh, with regard to the ocean and rivers. But, according to Dr. Shaw, it ſeems diviſible into as many different ſpecies, as the earth is into beds. Thus there are mineral waters of various kinds, according to the mineral ſubſtance they run over, and become impregnated with; though this impregnation ſometimes happens in the way of vapour and exhalation. Water, therefore, in general, may be as mixed a body as earth, and perhaps neither of them naturally exiſts in any conſiderable purity.

In a general analyſis of water, the doctor found, 1. That common warm water throws up numerous little bubbles, and explodes, in the exhauſted receiver of the air-pump; for which reaſon, water contains what may, by way of diſtinction, be called æther or ſpirit.

2. It contains a merely aqueous part, diſtinct from æther and the ſediment, as appears from diſtilled common water.

3. It contains a dry ſolid matter, which is either earthy or ſaline, as appears upon a full evaporation, and from the inſides of tea-kettles, which, after long uſe, are lined with a ſtony matter, that beats off in flakes or cruſty pieces.

Water is not only contained in the earth as in a reſervoir, but likewiſe floats in the atmoſphere. In both caſes, it is actuated, rarified, and put in motion by heat, ſo as to prove inſtrumental in producing effects. Thus it produces clouds, rains, dews, ſprings, and rivers. It refreſhes the earth, recruits vegetables, and is the ſupport of fiſh and other animals by conveying nutriment to all their parts. It is alſo the firſt and immediate inſtrument of fermentation, putrefaction, corruption, and change in all vegetable and animal ſubjects.

But the nature and uſes of water, will beſt appear from the following experiments:

1. That water is contained in many ſolid bodies, and to appearance in dry bodies, was proved thus: a piece of the hardeſt and drieſt bone being procured, and diſtilled in an earthen retort, with degrees of fire, a very large proportion of water, along with much oil and volatile ſalt, was obtained: whence it appears, that animal matters are reſolvable into the four chemical principles, water, oil, ſalt, and earth. This experiment holds true even of the oldeſt hartſhorn, the drieſt and hardeſt woods, earths, and pulverized ſtones.

Whence it alſo appears, that water may be concealed in ſolid bodies, and make a conſtituent part thereof: for it is not meant that water inſinuates itſelf into the ſuperficial pores of bodies, ſuch as wood, ſkins, &c. ſo as to ſwell them in moiſt weather, and leave them ſhrunk in dry; but that it remains permanently intermixed as an eſſential ingredient, or as a part of ſolid bodies. *See* BODY.

2. That water may be collected from the drieſt air, or in the hotteſt climate, was proved by the following experiment:

Half a pint of common water was put into a cylindrical glaſs, wiped perfectly dry on the outſide; then was added to the water, two ounces and three quarters of pulverized

and

ſeems rational: for the water then, not only ſupplies the moiſture wanted in the earth, but it diſſolves every ſubſtance ſoluble in water, and thereby converts to an additional manure, what might otherwiſe have remained long in its original ſtate. Care ſhould, however, be taken, to drain off the water before the ſeaſon of ſtrong froſts is expected; becauſe froſt is obſerved to deſtroy all kinds of vegetables much more when the plants are full of ſap, than when they are in a dryer ſtate. We may eaſily comprehend that it muſt have this effect, when we conſider with what force it breaks every veſſel containing water expoſed ſo as to be frozen: for froſt dilates all fluids to ſuch a degree, that the veſſels in which they are muſt be broken thereby. Hence it is that ſucculent plants ſoon become a putrid maſs after a hard froſt: and thus it is that the ſtrongeſt trees are ſometimes burſt with a loud report.

When the water is brought to the deſired height, the main channel ſhould be cut, with ſuch a deſcent as only juſt to keep the water in a gentle motion. That channel ſhould be made in the higheſt part of the paſture, and proportioned to the quantity of water neceſſary to be introduced. If a hollow intervenes between the place at which the water is brought into the field, and another riſing ground in that field; it will be worth the farmer's while to convey it a-croſs that hollow, by pipes made of wood, or any other ſubſtance, laid either horizontally over that hollow, or underneath it. The motion of the water in this horizontal channel ſhould be different, according to the quality of the ground. If it is a ſtrong earth, the channel may be cut nearly horizontally: but if it is a light looſe ſoil, a quicker current ſhould be given to the water, in proportion to the degree of lightneſs of the earth; or great part of the water will otherwiſe be loſt, by ſinking into it. In a light ſoil of this kind, it may be proper to line this main channel with brick or ſtone, well cemented with lime, to hinder the water from eſcaping through the crevices; or at leaſt to cover it with clay well rammed. As to the degree of deſcent moſt proper for the main channel, in order to give a current to the water, M. Bertrand, to whom we owe one of the ingenious diſſertations on this ſubject in the memoirs of the Berne Society, obſerves, that Vitruvius required ſix inches in an hundred feet, which is a great deal too much: but that the moderns, who have made the moſt exact experiments in this reſpect, are ſatisfied with two inches in ſix hundred feet, when they cannot have more, and recommend particularly the avoiding of all ſharp angles in the winding of the channel, and the making of its bottom quite ſmooth and even. He adds, that this is nearly the declivity of the aqueduct of Rocquancourt, by which the water is conveyed to Verſailles; the diſtance there being three thouſand four hundred yards, and the ſlope, in all, only three feet.

The main channel ſhould be of breadth, rather than depth, ſufficient to receive all the water that is intended to be conveyed through it, and that breadth ſhould leſſen gradually as the water is carried off in leſſer channels, in order that the water may preſs into thoſe ſmaller ducts, which are to iſſue all along from the chief. The leſſer channels ſhould be as ſhallow, and as numerous, as can be: for the more equally the water is diſtributed over the graſs, the greater will be the improvement. They ſhould be made particularly wherever the water collects itſelf into a ſtream: for though cutting ſo much turf may ſeem to waſte a great deal of land, yet it proves not ſo in the end; becauſe the quicker the water runs over the graſs, the more it benefits the paſture.

To keep the channels in repair, they ſhould be frequently cleaned, eſpecially after every cutting of the hay. The ſlime then taken out of them ſhould be ſpread upon the paſture, and the next growth of the graſs will be greatly improved thereby. Care ſhould alſo be taken to have drains to carry off the water, ſo that none of it may ſtagnate upon the land.

The beſt way of watering a flat meadow, which is uſually ſurrounded with a ditch, is to ſtop the out-let of the ditch, and, by bringing in a quantity of water, to overflow the whole meadow, for ſuch time as ſhall be judged neceſſary to moiſten the earth ſufficiently: but the water ſhould not be continued upon it ſo long as to wither the graſs. If this can be done in a rainy ſeaſon, it will be ſo much the better; becauſe the water will then be loaded with the enriching mud and ſlime waſhed down from the higher grounds.

The firſt heavy rains which fall in the latter end of the autumn, and which carry with them the rich particles of putrified animals and plants, are thought to be more fertilizing than at any other ſeaſon of the year, and are therefore brought into the paſture, as often as the abſence of the cattle fed on them will permit.

The next beſt to rain, is clear and ſweet ſpring water, flowing from a copious ſource. Here it is generally objected, that ſpring water is hard, and therefore not fit for the nouriſhment of plants. But Dr. Home, who judges otherwiſe, expreſſes himſelf thus on this very occaſion. "Is not hard water more nouriſhing for vegetables than ſoft water? I imagine that the ſalt of vegetables enters their veſſels in ſuch a form as hath the ſalt which is found in hard waters. The ſalt of hard waters ſeems likewiſe to be of the nitrous kind, of which the nouriſhment of plants is alſo ſuppoſed to be. This query thwarts the general opinion; for no gardener will make uſe of hard water, if he can avoid it. I watered ſome plants with it, and thought that they grew better than thoſe which were watered with ſoft water."

This is confirmed by an ingenious correſpondent of the Berne Society, who made ſeveral experiments on the qualities of different waters, and found that their greater or leſs hardneſs made very little difference in their effects, when uſed for watering of paſtures. The water of an excellent ſpring, which, upon trial, was found to be hard, fertilized greatly the paſture upon which it was let in.

Spring water may be uſed later in the winter, than any other, becauſe, being warm, a mild froſt will not freeze it, even when expanded on the paſture. It ſhould however be turned off ſoon enough to let the earth become a little dry before ſevere froſts ſet in. It may likewiſe be uſed earlier in the ſpring, than other waters, and to better advantage, by reaſon of the warmth which it communicates to the ground where it flows: and it becomes extremely proper in the ſummer, becauſe it cools during the night (the only time for watering at that ſeaſon) the heated ſoil, and graſs ſcorched by the power of the ſun.

The equal warmth of ſpring-water, is what renders it peculiarly uſeful for watering paſtures. The laſt quoted correſpondent of the Berne Society tried its heat, in Swiſſerland, on the twenty-ſixth of May, when the earth had been very little warmed by the ſun, after a long winter's cold. He then found M. de Réaumur's thermometer, placed in the ſpring of water, ſtand at eight degrees and a half (equal to forty-ſeven and a half of Farenheit's) above the freezing point. On the fifth of July, in the evening, when the heat of the air was very great, Réaumur's thermometer, again placed in the ſpring, ſtood at nine degrees and a quarter (equal to forty-nine of Farenheit). He afterwards tried whether the warmth of the ſpring was conſiderably increaſed towards the end of the ſummer, when the earth was extremely heated: but even then, Réaumur's thermometer ſcarcely reached ten degrees (equal to about fifty of Farenheit's). By this we ſee, that ſprings which yield a full and conſtant ſtream vary very little in their degrees of warmth.

For the ſame reaſon it alſo is, that a perpetual verdure reigns around ſuch ſprings, even during the hardeſt froſt; and if their water could be preſerved from freezing when ſpread over a field during the winter, it would be right to let them in upon paſtures in that ſeaſon: but as they ſoon loſe their heat when diſperſed over the graſs, this is by no means adviſable.

Experience has taught the inhabitants of the Alps (and the ſame will hold equally true in all mountainous countries), that it is not adviſable to water paſtures with the floods which ariſe from melted ſnow, or with the water of rivers fed thereby. One reaſon which ſeems to render the water that deſcends from mountains perpetually covered with ſnow the leſs uſeful for watering paſtures, is, that as all vegetation is at a ſtand in ſuch places, no vegetable matter can be mixed with this water; and it therefore cannot communicate the fertility which ariſes from waters fraught with thoſe rich ſubſtances.

We are frequently told of correcting the crudity of water, by making it turn a wheel, or putting it otherwiſe into

Fig. 1.

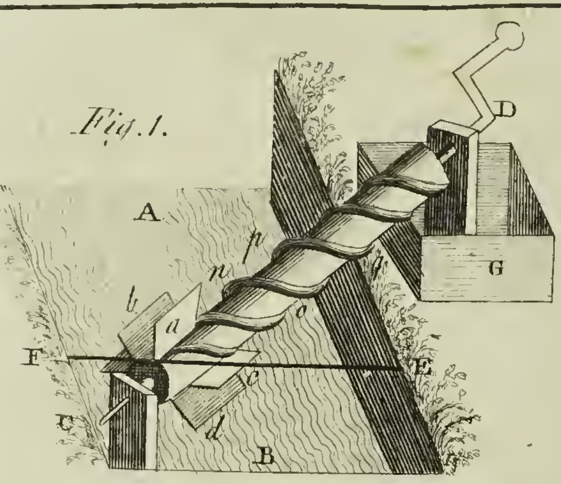


Fig. 3.

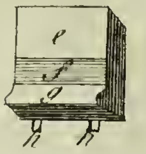


Fig. 4.

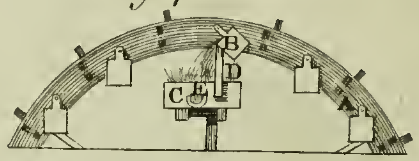


Fig. 2.

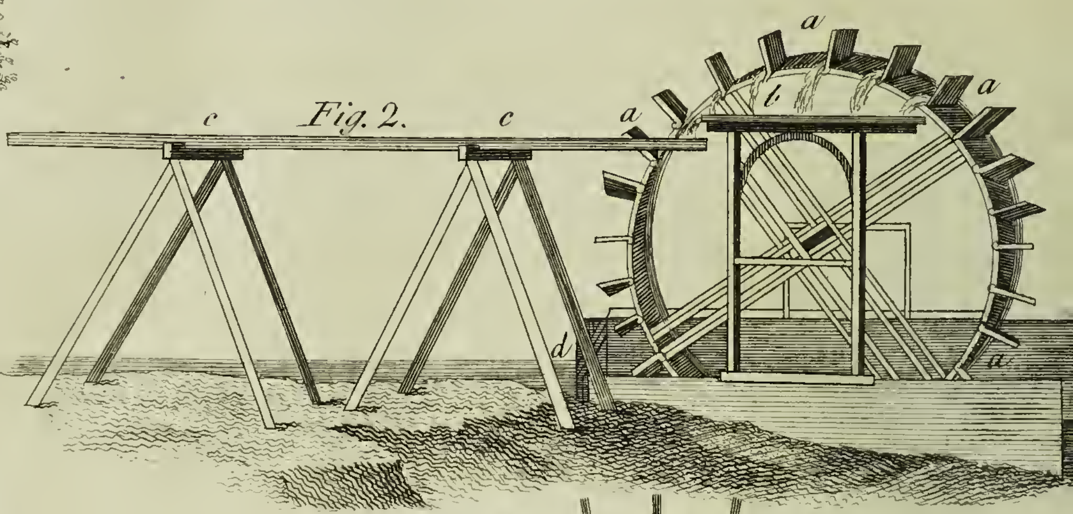


Fig. 5.

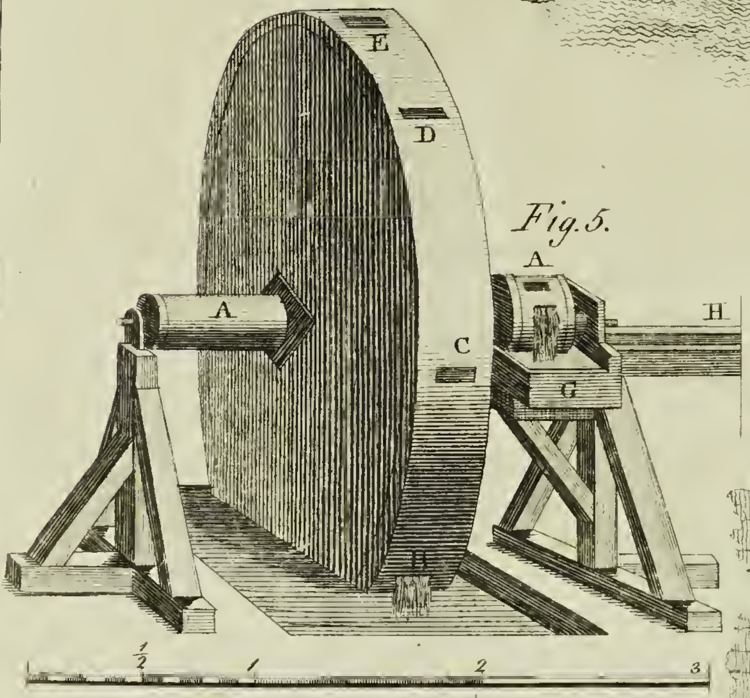


Fig. 6.

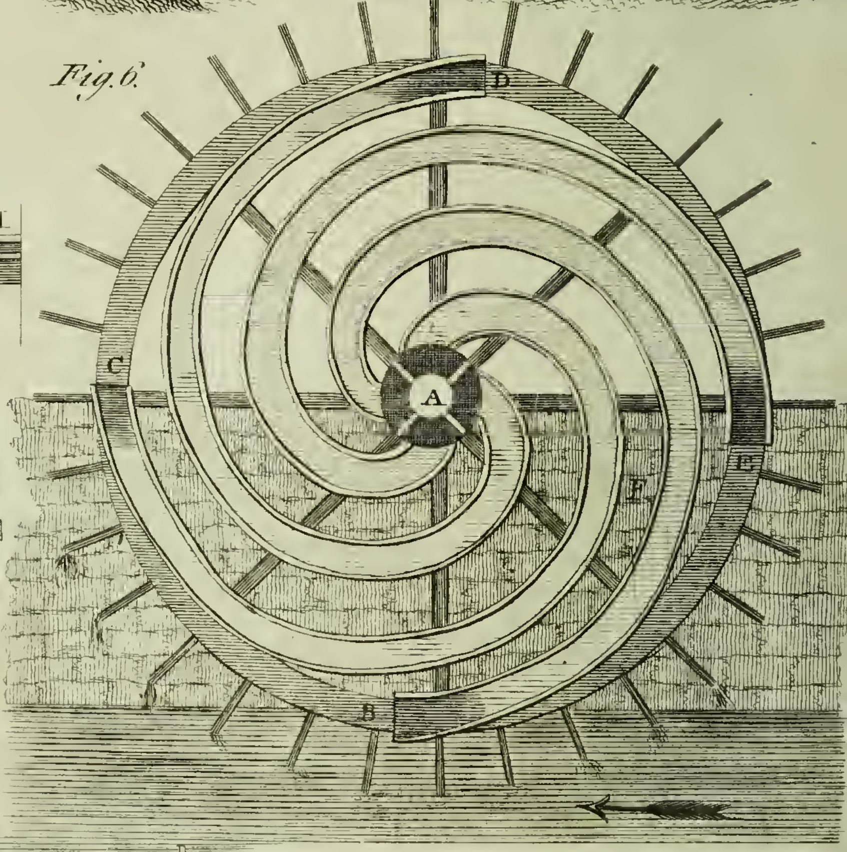


Fig. 8.

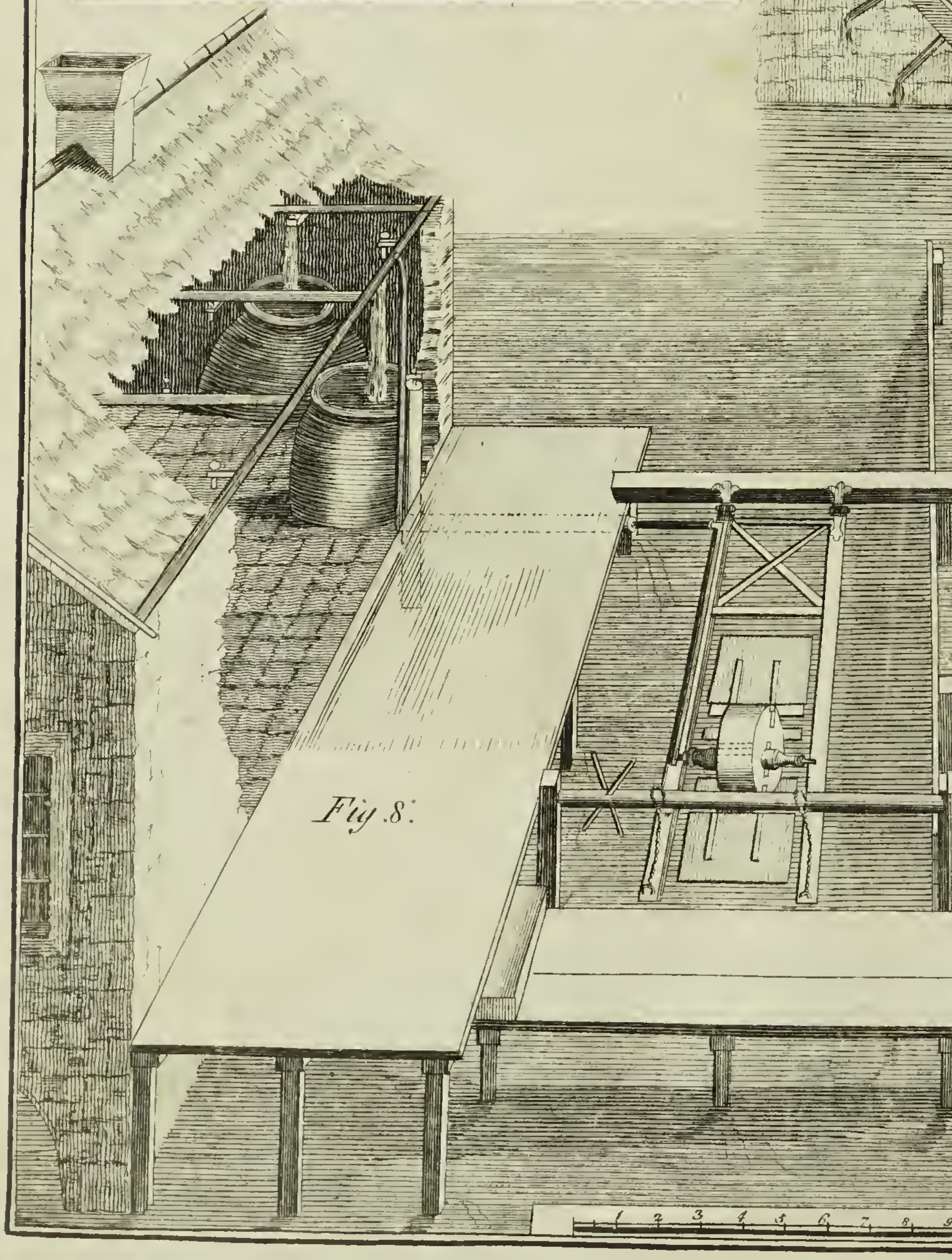


Fig. 7.

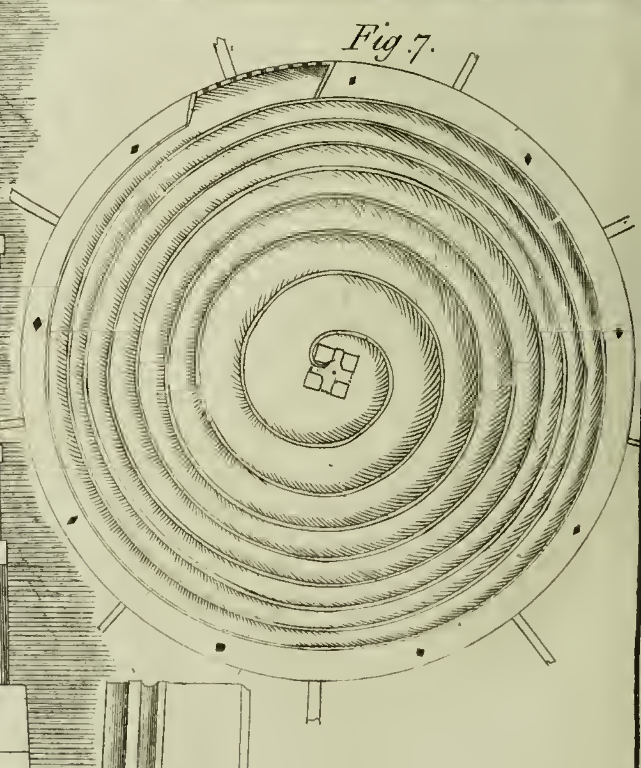
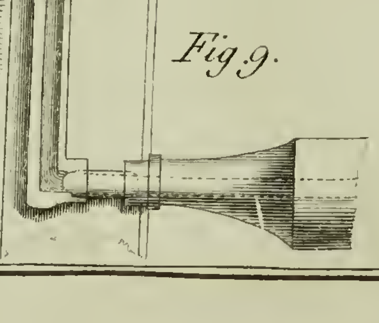


Fig. 9.



to violent motion: but I know not what good effect this can have.

What are commonly called barren ſprings, are ſometimes corrected by mixing dung with their water in ponds made higher than the paſture intended to be watered. Yet this, though an old cuſtom, is liable to ſome objections; one of which, in particular, is, that the water will depoſit its richneſs on the firſt part of the paſture over which it flows, and therefore improve the graſs very unequally. But if dung has this effect, it will anſwer equally well, if it be ſpread upon the land. Care ſhould, indeed, be taken, that the current of the water be very ſlow over a paſture newly dunged; becauſe the fertilizing particles of the dung may otherwiſe be carried off by the ſtream, before they can have had time to penetrate into the earth.

When dung, marle, or lime, is laid on a paſture which has a conſiderable deſcent, the beſt way is to lay a larger proportion on the higher parts; becauſe the common rain water will waſh ſome of their richer particles down to the lower.

As clayey ſoils retain water, and by that means chill the plants growing on them, they are the leaſt fit for watering of any. If the water abides on them, they become poachy; and when dried again, they gape, and become ſo hard that no plant can pierce them. Some ſenſible farmers have likewiſe obſerved, that their clayey lands have always yielded leſs graſs in wet years, than when the ſeaſon has been dry; which is a manifeſt proof that a ſoil of this kind does not admit of watering, unleſs it be a little, in caſe its ſurface is become hard after the hay has been taken off, or when the graſs is ſhort. Such lands are fitter for arable, if their ſituation permits it.

Hazel earth, which is a loam mixed with gravel, and of a clayey nature, is the ſtrongeſt ſoil that can be watered with propriety: and that this has been ſurprizingly benefited thereby, is evident from ſeveral inſtances given in the Memoirs of the Berne Society, even of large tracts of ſuch ground that have been vaſtly improved by this means: but I ſhall mention here only the following.

“ In the ſummer of 1758, part of the paſture ground belonging to a farmer in Swiſſerland was ſo entirely covered with ſtones and gravel, by the ſudden overflowing of a ſtream, that it looked like a bank of ſand. As the removing of this quantity of ſtones and gravel would have coſt a great deal of labour and expence, the owner of the land carried off only the largeſt ſtones, and threw over the gravel a reddiſh earth taken from a neighbouring hill; but ſo thinly ſpread, as only to fill the interſtices between the pebbles, without entirely covering them. He then ſowed this ſpot with hay ſeeds, and let in upon it the waters of an adjacent ſpring and a neighbouring rivulet. Theſe waters were let in ſparingly at firſt, till the graſs began to appear, and after that they were flowed more abundantly. The conſequence of this prudent conduct was, that the graſs thus raiſed bore cutting once the firſt year, and after having been moved twice in the ſecond, promiſed an excellent after-math at the time when this account was written, which was in the beginning of the autumn of that ſecond year. The very firſt year's crop grew ſo prodigiouſly, that the graſs was lodged, even though the pebbles were then felt under foot, if one trod upon it.” *See the article* Meadow.

When the land is above the level of the adjacent water, recourſe muſt be had to ſome engine to raiſe it to a proper height, in order to overflow it; though this will be attended with a very conſiderable expence, eſpecially at firſt.

The oldeſt inſtrument uſed for this purpoſe is known by the name of Archimedes's water ſcrew, and is thus deſcribed by Mr. Emerſon.

C *p* D (Plate XXVII. Fig. 1.) is a cylinder which turns upon the axis C D. About this cylinder there is twiſted a pipe, or rather ſeveral pipes, *no*, *pq*, running ſpiral wiſe from end to end. This cylinder is placed higher at one end, D, than at the other; and its uſe is to ſcrew up the water from the lower end to the higher. A B is a river running in the direction A B. *a*, *b*, *c*, *d*, are ſeveral floats fixed to the cylinder. E F is the ſurface of the water. As the cylinder ſtands in an inclined poſition, the upper floats *a*, *b*, are ſet out of the water, and the under ones *c d* within it: ſo that the water acts only upon the under ones *c*, *d*, and turn about the cylinder in the order *a*, *b*, *c*, *d*. By this motion, the water taken into the ſpiral tubes at the low end is, by the revolution of the cylinder, conveyed through theſe pipes, and diſcharged at the top into the veſſel G. If A B is a ſtanding water, there is no occaſion for the floats *a b c d*; and then the cylinder is to be turned by the handle at D. Inſtead of the pipe, a ſpiral channel may be cut round the cylinder, and covered cloſe with plates of lead. The cloſer theſe ſpiral tubes are, the more water is raiſed: but it requires more force. Alſo the more the cylinder leans, the more water it carries; but to a leſs height.

Where a conſiderable quantity of water is to be raiſed, a greater force is requiſite, than can be applied to ſuch a handle. Her royal highneſs the princeſs dowager of Wales has cauſed an inſtrument of this kind to be erected at Kew, by the ingenious Mr. Smeaton, and by means thereof a ſufficient quantity of water is ſupplied, for all the ponds, and other uſes, in that elegant and extenſive garden: but it is there worked by horſes.

The moſt common engine for raiſing water is the Perſian wheel, of which Mr. Worlidge gives the following deſcription.

“ This wheel is made much after the manner of that of an under-ſhot mill, viz. with a double ring, into which are let two pins, on which the floats are faſtened. Theſe floats are made hollow; the half that is the moſt remote from the wheel, holds the water which is taken in at the open place, above the middle of the back of the float, and as the wheel goes round, and the float laden with water riſes, ſo the water, by degrees, tends towards that part of the float which is next the wheel, and as the float ſurmounts the ciſtern or receiver, the water empties itſelf into it, every float ſucceeding the one the other, emptying itſelf into the receiver: ſo that if one float contain a gallon of water, and there be thirty floats on the wheel, at one motion round it delivers thirty gallons of water into the ciſtern. Such a wheel will be about fifteen foot diameter, the floats at eighteen inches diſtance, and will deliver the water at eleven or twelve foot above the level of your ſtream, and will go four times round in one minute, and carry up about one hundred and twenty hogſheads of water in an hour, with twelve or eighteen inches penning or ſtopping of but an ordinary current of water which will water very well thirty or forty acres of land: for if your land be cold and clayey, too much water does it hurt; and if it be light, warm, or ſandy, a little water does it much good. It is alſo to be obſerved, that this motion is conſtant, and will laſt many years without repair, ſo that it ſtand not ſtill, for one ſide to dry and wax lighter than the other: alſo obſerve, that the ſlower it moves, the better it delivers the water.

“ The view of this wheel we have in Plate XXVII. Fig. 2. *aaaa* ſignify the wheel; *b*, the ciſtern that receives the water; *cc*, the trough ſtanding on treſſels, that conveys the water from the ciſtern to the place you deſire; *d*, the hatch, or pen-ſtock that bays up the water to a reaſonable height, under which the water drives the wheel; *e* (Fig. 3) one of the floats preſented open to your eye, apart from the wheel; *f*, the place that is to receive the water; *g*, the open place out of which the water iſſues; *hh*, the two pins or ledges riveted on to the foreſide of the float, and wherewith you are to fix the float to the two rings of the wheel. Theſe, or ſuch like wheels, are much uſed in Spain, Italy, and France, and are eſteemed the moſt eaſy and advantageous way of raiſing water in great quantity, to any height within the diameter of the wheel, where there is any current of water, to continue it in motion, which a ſmall ſtream will do.

“ How many acres of land lie on the declining ſides of hills, by the ſides of rivers, in many places where the water cannot be brought unto it by any ordinary way? yet by this wheel placed in the river, may the land be continually watered, ſo far as is under the level of the water when raiſed.”

Inſtead of raiſing the water by means of the hollow floats placed around the outer circumference of the rim of the wheel, as here deſcribed; M. Belidor propoſes, for wheels of kind, to raiſe it in buckets placed at equal diſtances upon the ſide of the rim of the wheel, and ſuſpended by a pin, upon which they play, as at A Fig. 4. When, by the rotation of the wheel, one of theſe buckets comes to B, which is the ſummit of the wheel, the upright piece D, which is faſtened to the ſide of the trough C, turns that bucket upon its ſide, and thereby makes it empty itſelf into the trough C, from whence the water is diſcharged into a receiver at E. — As theſe buckets keep full of water till they are carried up to the top of the wheel, where they are turned over, a much greater quantity of water may, undoubtedly, be raiſed by them, than can be by the floats of the Perſian wheel, from which much muſt be ſpilled as it is carrying up. The ſize of theſe buckets ſhould be adapted to the force of the current of the water which they are to take up.

Another wheel for raiſing water, though not to ſo great a height, is repreſented in Fig. 4. This engine was firſt invented by M. de la Faye of the Royal Academy of Sciences at Paris, and is now uſed with great ſucceſs by the honourable Mr. Hamilton, at his ſeat at Pain's-hill in Surry, where that gentleman has ſhewn how far a barren ſpot may not only be rendered uſeful but even an ornament to the adjacent country.

This machine conſiſts of a wheel whoſe ſize is adapted to the height to which it is intended to riſe the water. A perſpective view of this machine is repreſented Fig. 5. and its internal parts Fig. 6. The wheel turns upon its axis at A, and has ſeveral curved pipes, B, C, D, E, fixed to it, as repreſented in the figures. The mouth of each pipe aſcends as the wheel is turned round by the ſtream, in the direction indicated by an arrow, and the water deſcends from C towards F, till it reaches the hollow axis, A, A, from the opening at the end of which it is diſcharged into the trough G, and thence conducted by troughs, as H, or other channels, to whatever place it may be wanted.

But if there be a neceſſity to raiſe the water higher than the axis of the wheel, we would recommend an ingenious machine, uſed for above twenty years at Zurich, for ſupplying a large dye-houſe there with water from the Limmat, and of which a deſcription in the German language appeared in the third volume of the Zurich Acts, from whence the following account is tranſlated.

The wheel itſelf differs little in appearance from other water-wheels. Its diameter, excluſive of the ladle-boards is not quite three feet. It is coated all over with tin plates, and forms a ſhort cylinder, or rather drum, of the above diameter, and one foot thick. On its periphery the ladle-boards are fixed, as in other under-ſhot water-wheels, and by means of which it is put in motion by the ſtream. It turns on a hollow axis (like the laſt machine) of proportional thickneſs and length, and has one of its flat ſides applied againſt a projection, or ledge, made round the axis, to which it is preſſed cloſe, and held faſt by a wedge driven through the axis at the other ſide. That part of the axis which paſſes through the wheel is ſquare, that the wheel may not ſlip, or be able to turn, without turning the axis with it: the remaining part of it is round. The wheel is hung in the water to about one third of its height, and ſupported in a moveable frame, ſo that it can be lowered, raiſed, or even taken out of the water at pleaſure. In the periphery of the wheel are holes, by which the water enters. The axis turns as uſual, on two pivots, one of which is of braſs, conſiderably larger than the other, and hollow from end to end, communicating with the canal in the axis. The hollow pivot, which may be conſidered as a braſs pipe, has its end fitted cloſe to a leaden pipe, in which it turns. The leaden pipe, by a double bending, is confined to the wall of the dye-houſe, where it is bent perpendicularly upwards, and riſes along the wall to the height of ten feet above the axis; it is there bent again under the eaves, and continued into the dye-houſe itſelf.

The ſingular and remarkable operation of this little wheel depends ſolely on its internal ſtructure. The water entering at the circumference of the wheel, runs in a ſquare ſpiral canal, which paſſes round the wheel, and conſiſts of a number of circumvolutions, within one another, like the ſpring of a watch, till at length it comes into the axis. A neceſſary condition here is, that each of the inner circumvolutions be of the ſame magnitude with regard to their content, as the outer one; or that the width of the ſpiral canal be gradually enlarged in each circumvolution, in proportion as the diameter diminiſhes; that is, the bore of each of the inner ſpirals muſt be to the bore of the outer one, as the diameter of the latter is to the diameter of the former.

The wheel thus furniſhed with its ſpiral canal, is to be hung ſo deep in the river, that half a ſpiral, at leaſt, may, in each revolution, be filled with water. To keep it in this ſtate it would be neceſſary to immerſe it to the axis, or further: but as its motion, at ſuch a depth, would be extremely ſlow, a kind of ſcoop is made at the outer opening of the ſpiral pipe, which takes up ſo much water at once, as is ſufficient to fill the due proportion of the outermoſt ſpiral in one revolution. One half of the outer ſpiral being thus filled with water, the other half remains filled with air: as the wheel turns the water and air paſs into the ſecond ſpiral, then into the third, fourth, and ſo on, till a ſufficient number of turns brings the water and air to the axis, from whence they paſs into the upright pipe, as already mentioned: thus the entrance and diſcharge of water continue without intermiſſion, ſo long as the wheel is kept in motion. When the wheel ſcoops up juſt the proper quantity of water, and turns with due velocity, the water may be forced up in the perpendicular pipe to a height equal to the ſum of the diameters of all the circumvolutions of the ſpiral canal.

If we conſider the operation of this machine, we ſhall eaſily ſee the neceſſity of the inner circumvolutions being made to widen in the proportion above mentioned; and that, without this condition, the water paſſing from the large outer ſpiral, would be crouded and retarded in the inner, and in great part forced back.

It is alſo obvious that juſt half of one of the ſpirals muſt be filled with water at each revolution, for if leſs be taken in, there will be a diminution in the quantity delivered, and if more, it will be preſſed too much together, and its quantity alſo diminiſhed.

The velocity with which the wheel moves, or the number of revolutions it makes in a given time, is another eſſential point in regard to the quantity of water, and may conſiderably influence the quantity of water neceſſary to be raiſed. When this is known, and the height determined, it will be eaſy to conſtruct a wheel in ſuch a manner, as to anſwer the purpoſe intended.

We ſhall conclude our account of this ingenious contrivance, with the following directions for conſtructing it. The two flat ſides of the wheel ſhould be made of two ſtrong circular pieces of good oak, the inner ſides of which muſt be planed as ſmooth as poſſible, and fitted to one another; and to keep them from bending or warping, ſecured by pieces on the outſide. The plan of the ſpiral lines is repreſented in Fig. 7. Plate XXVII. Theſe ſpiral lines being marked out on the wood, a groove muſt be cut about a quarter of an inch deep, in order to make a channel for the partition, which muſt be formed of a thin piece of copper. The channel being filled ſomewhat more than half with good cement that will bear water, the piece of copper muſt be ſet in regularly, care being taken to keep the cement warm, or previouſly to heat the metal. The ſcoop alſo, which at every revolution of the wheel takes up a proper quantity of water from the river, may be made of the ſame metalline plate. The piece of copper for forming the partition muſt be cut at firſt exactly ſtrait, and of an equal breadth throughout. This work being finiſhed, the wheel muſt be put on the axis as far as the ledge made for it to reſt againſt, and cemented. The ſecond piece of wood requires little preparation: ſome cement muſt be ſpread all over it, and the whole ſurface covered with a thick piece of woollen cloth, which muſt alſo be done over with cement on both ſides: while the whole continues warm, it muſt be put on the axis, and preſſed cloſe to the other part of the wheel, ſo as to cover the as yet open ſide of the ſpirals. The two parts are held firm together, by means of a wedge or key paſſing through the axis, and a proper number of ſcrews, placed round the circumference: theſe ſcrews are ſtrong iron pins, ſomewhat longer than the wheel is thick, and a nut, when they are placed through the wheel, is ſcrewed on the other. Thus the inſide of the wheel, or drum is finiſhed. The diſpoſition of the ladle-boards, the ſhape of the axis, and the ſtructure of the frame by which the machine is ſupported, will be partly underſtood from what has been already ſaid, and more fully from Fig. 8. Plate XXVII.

It has been already obſerved, that the wheel in the limmat is covered with tin plates; but this is of little or no conſequence. It is however adviſeable not to have one large opening, for the entrance of the water, but either a perforated plate, or a wire-grating nailed before it, in order to prevent weeds, or any other filth from paſſing into the ſpiral tube, and preventing, if not wholly ſtopping, the courſe of the water.

The frame or ſcaffold in which the wheel hangs, and the means of raiſing or lowering it in the river, without diſturbing the courſe of the water in the machine, deſerves particular notice. It is plain from Fig. 8. that the wheel reſts on two arms, which, for the greater ſecurity, are bound together by croſs-pieces. At the fore-end they are both ſuſpended by iron chains, which paſs over a roller ſo as to be wound off or on: on the other end they move on two ſtrong joints or hinges. The communication of the leaden pipe, with the braſs one, or hollow pivot, at the end of the axis, is drawn on a larger ſcale, in Fig. 9. This pipe is bent cloſe by the pin, to a right angle, and goes horizontally along one of the arms of the frame as far as the hinge, (ſee Fig. 8.) where it is again bent to a right angle, oppoſite to the dye-houſe, and communicates in the ſame manner as the hollow pivot of the axis, with another horizontal pipe, in which it moves round freely, without any impediment to the paſſage of the water, in raiſing or lowering the wheel. This large pipe paſſes under a ſtage built along the wall of the dye-houſe, and thence up the wall, where it diſtributes the water in the manner repreſented in the figure.

But though water is ſo neceſſary to the growth of plants, yet in lands that abound with it, there is a neceſſity for conveying it away, the beſt methods for doing which the reader will find under the articles Bog, Drawing, Moor, &c.

Water-Farcy, a diſeaſe incident to horſes, and is of two kinds; one the product of a feveriſh diſpoſition terminating on the ſkin, as often happens in epidemical colds; the other is dropſical, where the water is not confined to the belly and limbs, but ſhews itſelf in ſeveral parts of the body, by ſoft ſwellings yielding to the preſſure of the finger. This laſt kind uſually proceeds from foul feeding, or from the latter graſs and fog, that often comes up in great plenty with continued cold rains, and breeds a ſluggiſh viſcid blood. In the former caſe, I have ſeen the limbs and whole body enormouſly ſwelled, and very hard, the belly and ſheath greatly diſtended; which were as ſurprizingly reduced in four and twenty hours, by ſlight ſcarifications within ſide the leg and thigh, with a ſharp penknife, and three or four ſtrokes on the ſkin of the belly on each ſide the ſheath; from theſe ſcarifications there was a conſtant and ſurprizing large dripping of water, which ſoon relieved the horſe; when a few purges compleated his recovery.

In the other ſpecies of dropſy the curative intentions are to diſcharge the water, recover the craſis or ſtrength of the blood, and brace up the relaxed fibres throughout the whole body. To this end, purge once a week or ten days; and give intermediately either of the following drinks, or balls.

> Take black hellebore freſh gathered, two pounds; waſh, bruiſe, and boil in ſix quarts of water, to four; then ſtrain out the liquor, and put two quarts of white wine on the remaining hellebore, and let it infuſe warm forty-eight hours; then ſtrain off, mix both together, and give the horſe a pint night and morning.
>
> Take nitre two ounces, ſquills powdered, three drams, or half an ounce; camphor one dram, honey enough to form into a ball, to be given once a day alone, or waſhed down with a horn or two of the above drink.
>
> Take of the leaves and bark of elder, of each a large handful; chamomile flowers half a handful, juniper berries bruiſed two ounces; boil in a quart of water to a pint and a half, to which add honey and nitre, of each one ounce.

Give this drink every night, or night and morning; and to compleat the cure, and ſtrengthen the whole body, give a pint of the ſubſequent infuſion every night and morning, for a fortnight, faſting two hours after it.

> Take gentian root and zedoary, of each four ounces; chamomile flowers and the tops of centaury, of each two handfuls; Jeſuits bark powdered two ounces; juniper berries four ounces; filings of iron, half a pound: infuſe in two gallons of ale for a week, ſhaking now and then the veſſel.

Before we cloſe this article, we think proper to lay down the ſymptoms of an incurable farcy, that the owners of ſuch horſes may ſave themſelves unneceſſary expence and trouble in their endeavours to obtain a cure.

When a farcy by improper applications, or by neglect has ſpread and increaſed; or after long continuance reſiſted the medicines above recommended; if freſh buds are continually ſprouting forth, while the old ones remain foul and ill-conditioned; if they riſe on the ſpines of the back and loins; if the horſe grows hide-bound, and runs at the noſe; if abſceſſes are formed in the fleſhy parts between the interſtices of the large muſcles; if his eyes look dead and lifeleſs; if he forſakes his food and ſcours often, and his excrements appear thin, and of a blackiſh colour; if the plate, or thigh vein continue large after firing, and other proper applications: theſe ſymptoms denote the diſtemper to have penetrated internally, and that it will degenerate into an incurable conſumption: it is alſo moſt probable, that the whole maſs of fluids are tainted, and become incurable by art. *Bartlet's Farriery, pag.* 193.

WATTLE, a kind of hurdle formed with ſplit wood, and uſed for making folds for ſheep.

WAX, *or* Bees-Wax, a ſubſtance formed by bees from the farina of flowers. *See the article* Bee.

WAY-BREAD, plantain.

WEANEL, an animal newly weaned.

WEED, any plant growing in a field different from what the farmer intended.

There is not a field where we do not find ſome of theſe; they grow in the greateſt plenty on the richeſt ſoils.

Weeds will appear impediments to vegetation, if we conſider the following particulars.

They rob the plants we deſire to cultivate of their food; they prevent theſe plants from branching out from the root, and they leſſen the vegetable paſture in the land where they are ſuffered to grow.

Weeds are nouriſhed by the ſame food that would nouriſh uſeful plants; and therefore, when allowed to grow along with them, muſt rob them of part of their food. Although it is allowed, that the food of all plants is not exactly of the ſame kind; yet as plants ſuck in whatever juices, or ſmall particles of matter are touched by their roots, it may be juſtly ſaid, that all kinds deprive the earth of that vegetable food which would nouriſh others. Experience convinces the farmer of the truth of this: for he finds, that his crop is bad in proportion to the quantity and kinds of weeds with which his land is infeſted.

Weeds cover the ſurface of the land on which they grow, and thereby, confining the plants we deſire to cultivate, prevent them from branching out from the root. For all plants, when confined by others at their ſides, inſtead of branching out, as ſome of them are inclined to do, make vigorous efforts to get above thoſe by whom they are confined.

Some perſons have attempted to ſhow, that corn never wants room to grow; and that it is the want of food alone which makes ſome plants decay, when they are ſet too thick. If this is true, weeds can do no harm to plants, by covering the ſurface, and confining them while they grow. But let a perſon caſt his eyes upon a plantation of any kind, and he will immediately obſerve, that where the plants are placed very near to each other, they ſtretch out chiefly to the length; and where they are placed at a greater diſtance, they grow not ſo much to the length, but more to the thickneſs, and branch out on all ſides. So that the proportion of nouriſhment which the plants receive, makes them grow either to the length principally, or to the thickneſs, and branch out, according as they are placed near, or at a diſtance from each other. The ſame thing happens, when there are many weeds growing amongſt corn. Some fields are ſo much infeſted with weeds, that, though no grain is ſown, the plants come up very thick. This obliges the farmer to give plenty of ſeed: in conſequence of which the ſurface is quite covered; and the plants of corn being confined by the weeds, inſtead of branching out from the root, and producing two or more ſtalks, as they are naturally diſpoſed to do, puſh up one ſtalk only, that ſo they may the more eaſily get above their rivals. The proportion of nouriſhment which they receive, makes them grow to the length, inſtead of branching out from the roots; makes them produce one ſtalk and ear only, inſtead of many. Experience confirms the truth of this. When land is rich, and at the ſame time much infeſted with weeds, the plants of corn grow tall enough; but ſeldom have more than one ſtalk.

Some kinds of weeds have great numbers of ſmall roots, which they extend to a great diſtance. Theſe roots bind the ſoil in ſuch a manner, as to leſſen the vegetable paſture; or rather, make it very difficult to enlarge it by tillage. It may be obſerved, that when a field is much infeſted with quickening graſs, the ſoil is ſo firmly bound together by the roots, that it is not poſſible to pulverize it. When ploughed, the earth of the furrow is turned over whole, and the harrows ſcarcely make any impreſſion upon it.

It is of great importance, therefore, to know how to deſtroy theſe uſeleſs and noxious plants, that ſo all the vegetable food in the ſoil may be applied to the nouriſhment of the uſeful plants we deſire to cultivate; that theſe uſeful plants may have room to extend themſelves, and branch from the root on all ſides; and that the vegetable paſture, which, by the rain that falls, and the natural weight of the ſoil, is always leſſening, may be the more eaſily enlarged.

Different kinds of weeds.

Plants are commonly divided into two ſorts; annuals, that is, ſuch as in one year come to perfection, carry ſeed, and die; and perennials, that is, ſuch as continue in life for more years than one. Annual plants are almoſt all propagated by the ſeed. Perennials are propagated, ſome by the ſeed, others by the root, and a third ſort both by the ſeed and root.

Weeds may be divided in the ſame manner, into annuals and perennials. But, in treating of the methods of deſtroying them, we will be better underſtood, if they are divided into theſe two ſorts; weeds that are propagated by the ſeed, and weeds that are propagated by the root. It is needleſs to conſider the weeds that are propagated both by the ſeed and the root, as a third ſort. For when their ſeeds infeſt the land, they muſt be treated as weeds that are propagated by the ſeed; and, when their roots infeſt the land, they muſt be treated as weeds that are propagated by the root. It is neceſſary, however, to divide weeds into theſe two ſorts, into which we have divided them: for, in ſome caſes, that kind of management proper for diſcouraging the one ſort, tends to encourage the growth of the other.

But, beſides theſe two ſorts of weeds mentioned, it will not be improper that we likewiſe take notice of thoſe ſhrubs by which ſome land is greatly infeſted. Theſe, though they are not commonly reckoned in the claſs of weeds, and though ſome of them may have their particular uſes; yet, as they are plants different from what the farmer deſires to cultivate in his fields, they fall under the definition which we have given of weeds, and ſhall be reckoned by us a third claſs.

Methods of deſtroying weeds.

The deſtroying of weeds is certainly one of the moſt important parts of agriculture. By allowing them to grow, we allow the land, as was formerly obſerved, to be robbed of its vegetable food, and its vegetable paſture to be greatly leſſened.

It may be inquired, what becomes of this vegetable food of which they rob the land? it is either conveyed to the air, and ſent to enrich other land, or it is turned into a form that renders it deſtructive.

When weeds wither and putrefy above ground, the ſalts and oils which they contain, and of which they deprived the land on which they grew, become volatile, and fly off into the air, and leave little more than their earth remaining.

When weeds carry ſeed, and ſhed it upon the land, and when the roots, by the nouriſhment they receive, are enlarged and extended; the vegetable food, of which they have deprived the land, is turned into a form that renders it deſtructive, into ſeeds and roots, by which the land is further exhauſted.

The ſeeds and roots of weeds, though deſtructive to uſeful plants, by robbing them of their food, yet they contain vegetable food in themſelves; and, when the ſeeds are picked up by birds, and the roots eaten by animals, the vegetable food is carried off. But, if theſe weeds are deſtroyed, and reduced to a ſtate of corruption, the vegetable food, which they have taken from the land, and rendered deſtructive, is reſtored to it, and becomes beneficial: ſo that land that is poor, and unfit for carrying crops of uſeful plants, by being full of weeds, may be made rich and fertile, by deſtroying them.

From theſe things it appears, that the deſtroying of weeds is one of the moſt important parts of agriculture. As it is important, ſo likewiſe it is difficult.

There is ſcarcely a field, in which we will not obſerve weeds of the two firſt kinds mentioned; of the kind that is propagated by the ſeed, and the kind that is propagated by the root. Some of theſe, perhaps, it may be eaſy to deſtroy, as they are foreigners, and not adapted to the ſoil; but others of them being natural to the ſoil, in that kind of it that is moſt proper for them, it may be expected, not only that it will be very difficult to deſtroy them, but alſo, that, by the culture given to the land, they will thrive wonderfully, carry great crops of ſeed, and multiply and extend their roots. As the deſtruction of weeds is then ſo important and difficult, it is a work that muſt be particularly attended to.

Weeds have been divided into three ſorts. To deſtroy theſe different ſorts, different management is required. It is neceſſary therefore to treat of them ſeparately.

Methods of deſtroying weeds that are propagated by the ſeed.

Weeds are very different in their natures. The ſeeds of ſome of them will putrefy in a few years, if they lie moiſt in the earth, and are prevented from vegetating. But the ſeeds of others will lie many years in this ſituation, without having their vegetative power deſtroyed. This we know from experience. Land infeſted with different kinds of weeds, has been frequently thrown out into graſs, and allowed to remain in that ſituation for ſome years. Though allowed to lie only a few years, ſome kinds of weeds are found to be deſtroyed, when the land is broke up again; but, though it lie twenty years, ſome other kinds are found in as great plenty as before.

The firſt ſort may be deſtroyed by turning the land infeſted with them, from tillage into graſs, and allowing it to remain in that ſituation for five or ſix years.

Both ſorts may be deſtroyed by bringing the ſeeds to vegetate, and then tearing up the young plants. Seeds will not vegetate without air. Some require a greater proportion, and ſome a ſmaller. The ſmall ſeeds will not vegetate without a very great proportion of it. It may be obſerved, in fallowing land which is full of weeds, that great numbers of them appear after every ploughing. This ſhows, that ſome of the ſeeds had not a ſufficient quantity of air, in their former ſituation, to make them vegetate. Now, to give theſe ſmall ſeeds the proportion of air neceſſary for them, they muſt be brought near the ſurface, and the earth about them rendered free and open. If the land is frequently ſtirred and turned over, both theſe will be done. For every time the land is ſtirred and turned over, ſome ſeeds, that before lay deep, are brought near the ſurface, and the earth about them alſo rendered free and open: and, beſides, the plants that have appeared are thereby torn up and deſtroyed.

Every farmer that practiſes ſummer-fallowing, is now fully convinced of the truth of this. For he obſerves, when the ſeaſon is favourable, and his fallow is well and frequently ploughed and harrowed, and time allowed betwixt every ploughing and harrowing for the weeds to vegetate, that his land, for ſeveral years, is not ſo much infeſted with weeds as before.

It has been obſerved, that ſeeds will not vegetate without air, and that to give the ſmaller kinds the quantity which they require, they muſt be brought near the ſurface, and the earth around them rendered free and open. It is neceſſary likewiſe to obſerve, that water is as requiſite to promote vegetation as air; and that the bringing ſeeds near the ſurface, and rendering the earth free and open around them, as it ſupplies them with air, tends to deprive them of water. In the performance, therefore, of thoſe operations by which the land is ſtirred and turned over, to promote the vegetation of the ſmall ſeeds, great care muſt be taken to preſerve the ſap, as much as is poſſible. This will be done, if, in ſtirring the land, the ſurface is made ſmooth and plain. It is obvious, that, when the ſurface is rough and uneven, the drought has eaſy acceſs; but, when it is ſmooth and plain, the winds have leſs influence, and the ſap is better preſerved. Every farmer will obſerve, that, in dry weather, when land is allowed to lie ſome time after it has been ploughed, without being harrowed, the drought has eaſy acceſs, the ſap is exhaled, and the ſeeds in it, though near the ſurface, and the earth around them free and open; yet, being deprived of water, are prevented from vegetating: whereas, when the land is harrowed immediately after it is ploughed, the ſap is preſerved, and the ſeeds ſpring up. Hence the cuſtom of ſowing barley immediately after the plough. Barley is commonly ſown in a dry ſeaſon; and therefore the land is not allowed to lie long after it is ploughed, leſt the ſap ſhould be exhaled; but is immediately ſown and harrowed, by which the ſap is preſerved.

The vegetation of ſeeds in land is promoted, not only by ſtirring and turning over the land, but alſo by the application of dung and ſome other manures. Dung raiſes a fermentation; this opens the pores of the ſoil, allows the air to reach the ſeeds, and gives them liberty to put forth their roots. If dung, therefore, is laid upon land infeſted with weeds, and the land carefully ſtirred and turned over ſeveral times, all the ſeeds in it, by degrees, will be brought to vegetate; and thus the weeds will be deſtroyed.

It muſt be owned, that this practice, though proper for deſtroying weeds, may, in ſome caſes, deſtroy ſome of the virtues of the dung, before it is applied to promote the vegetation of the uſeful plants we deſign to cultivate. Dung promotes vegetation, by producing a fermentation in the ſoil upon which it is laid; and, by this fermentation, ſeparating its particles. If this fermentation is, in a great meaſure, over before ſeed is ſown, the natural weight of the ſoil, making it ſubſide, will render the vegetable paſture, while the plants are growing, much leſs than it would have been, if the dung had not been ſo ſoon laid on; and more harm may be done by this, than advantage gained by deſtroying the weeds. But, though it may be improper to follow this method, when ſeed cannot be ſown for a conſiderable time after the dung is laid on, as is the caſe ſometimes when ſummer-barley is ſown on fallow; yet it may anſwer very well, when ſeed is to be ſown ſoon after, as is the caſe when wheat is ſown. The advantages ariſing from the deſtruction of the weeds, though not in the firſt caſe, yet in the laſt, may probably do more than overbalance the loſs ariſing from ſome part of the ſtrength of the dung being exhauſted before ſeed is ſown.

It may, perhaps, be thought a little ſurprizing, that dung ſhould be propoſed as a means of deſtroying weeds, when it is univerſally conſidered as a great encourager of them. It is certain, that the laying dung upon land makes more weeds appear, than otherwiſe would do. If the ſeeds of theſe weeds are in the dung, it muſt be owned, that it increaſes, and not diminiſhes their number. But, if the ſeeds are in the land, and the dung only makes them vegetate, it becomes a proper means of deſtroying them.

It ſeems to be the general opinion, that the great plenty of weeds that appear on land after it is dunged, are produced from ſeeds mixed with the dung. But there are ſome reaſons to believe that this is a miſtake.

It is obſerved, that dung produces weeds, when it is taken from a dung-hill, ſo much heated as to deſtroy the vegetative power of any ſeed.

It is obſerved likewiſe, that the ſame dung produces weeds, according to the nature of the land on which it is laid. It often happens, that dung carried from a town is laid upon different ſoils; and it is certain, that this dung does not produce the ſame kind of weeds on all ſoils, which it would do, if the weeds aroſe from ſeeds, mixed with it; but always produces the weeds, with which the ſoil upon which it is laid is naturally infeſted.

Theſe obſervations make it very probable, that the great quantity of weeds produced by dung, is entirely owing to the fermentation occaſioned by the dung; by which almoſt all the ſeeds near the ſurface, receiving a proper quantity of air, are thereby brought to vegetate.

To this it may be objected, That ſuch numbers of weeds do not appear upon land that is new marled, as upon land that is dunged. But, in anſwer to this, let it be obſerved, that a great quantity of marle is laid on, and in large pieces, and that it is ploughed in with a ſhallow furrow: and therefore, though a fermentation may be raiſed, yet the undiſſolved marle prevents a great part of the ſoil from being expoſed to the air, in ſuch a manner as to make the ſeeds in it vegetate; and alſo occaſions ſuch a hollowneſs, that, after the ſeeds begin to vegetate, ſuch of the plants as are tender (and ſeveral ſorts of them are not ſo hardy as corn) are eaſily deſtroyed by drought or froſt.

Before we leave this article, it is neceſſary to obſerve, that the ſeeds of ſome weeds, particularly the different ſpecies of the thiſtle, are carried to a conſiderable diſtance by the wind; and where any earth is thrown up in ſuch a manner as to intangle them, as at the root of a hedge, or ſide of a ditch, there they appear in great plenty. It is ſurpriſing, that many farmers allow them to grow there undiſturbed: the conſequence of which is, that their ſeeds are carried in great plenty into the adjacent fields, and thereby great damage is done; which might have been prevented by cutting them down, at a ſmall expence, before their ſeeds were ripened.

Methods of deſtroying weeds that are propagated by the root.

There are many different kinds of weeds propagated by the root, and theſe of very different natures. Some of them infeſt the land that is in tillage, and others the land that is in graſs. Any perſon may ſatisfy himſelf of this, by inſpecting our fields. The farmer is very ſenſible of it: he knows that ſome kinds of weeds flouriſh and increaſe in his land, while in tillage, if he does not take all pains to diſcourage them; and when he lays down his land in graſs, other kinds that did not appear before, ſoon diſcover themſelves; and, if undiſturbed, continue to increaſe, while the land remains in that ſituation.

The firſt ſort, it ſeems, have ſuch a tender blade, and ſuch tender roots, that they cannot pierce earth that is hard; but are of a kind that increaſe very faſt, when the ſoil is free and open.

The ſecond ſort have the blade and roots ſo ſtrong, that there is ſcarcely any ſoil that, of itſelf, will become ſo hard and ſtiff, as to prevent them from making their way through it; but are of ſuch a nature, as to be eaſily torn up, when the land is free and open; and do not eaſily ſtrike root again when torn up.

The natures of theſe weeds point out methods of deſtroying them.

The firſt ſort, as they chiefly infeſt land in tillage, may be deſtroyed by turning the land from tillage into graſs, and allowing it to remain for ſome years in that ſituation. This is confirmed by experience. Land over-run with quickening-graſs, and other root-weeds of the ſame kind, is frequently laid down in graſs, and allowed to continue for ſome years without being ploughed. This land, when broke up again, if allowed to lie in graſs for ſix or ſeven years, is found to be clean, and the roots of the weeds deſtroyed.

The number of years neceſſary for deſtroying the roots, depends upon the nature of the ſoil. If the ſoil is naturally hard and ſtiff, it is the ſooner brought to ſuch a ſituation, as to prevent the roots and blades of the weeds from piercing it. But, if it is naturally ſoft and ſpungy, it takes a longer time before it is brought to that ſituation. For while the blade, or roots of the weeds, can pierce the ſoil, their vegetation is not prevented. In ſome ſoils, it is ſix or ſeven years before the roots of the quickening-graſs are deſtroyed.

The number of years found neceſſary for deſtroying theſe root-weeds, has, no doubt, been partly the occaſion of eſtabliſhing the practice commonly obſerved. Three crops of corn are taken, and then the land is allowed to lie ſix years in graſs, or lea. At the end of theſe, the farmer ſuppoſes that the lea is come to maturity, and fit again for being ploughed. When it is only two or three years old, it is called, in ſome parts of the country, calf-lea; and, if ploughed at that age, is commonly very full of roots.

The ſowing land with graſs-ſeeds, inſtead of turning it out into lea, deſtroys the roots of theſe weeds ſome years ſooner. For thereby a ſward being brought immediately upon the ſurface, the land becomes firm, the blades of the weeds are unable to pierce it, and the roots are deprived of air. Ryegraſs-ſeed, or the common hay-ſeed, is the moſt proper for this. For the plants ariſing from theſe, ſoon cover the ſurface, and, by the number and ſmallneſs of their roots, bind the ſoil. Clover, particularly the broad clover, is improper. For the roots of it being large, they open the ſoil in growing and extending themſelves, and thereby prevent it from arriving at that degree of firmneſs, neceſſary for deſtroying the weeds ſo ſoon, as if no graſs-ſeeds are ſown, but the land immediately turned into lea.

The ſecond ſort may be deſtroyed by turning the land infeſted with them, from graſs into tillage; and it is not neceſſary to continue it long in this ſituation, for the weeds commonly diſappear after the firſt ploughing.

But as it may be inconvenient to turn a field infeſted with weeds, from graſs into tillage, or from tillage into graſs; it is neceſſary to conſider, if there are any methods of deſtroying theſe weeds, without altering the ſituation of the land.

When land in tillage is infeſted with weeds, they may be deſtroyed by frequently ſtirring and turning it over in dry weather. For the weeds being removed out of their place, the drought prevents them from ſtriking root again. The ſtirring the land in wet weather, is rather hurtful than beneficial. For though the roots of the weeds are removed from their place, yet the weeds themſelves are only tranſplanted. If the land is wet, they ſoon ſtrike root again; and the quickening-graſs, in particular, having its paſture enlarged, makes quicker progreſs than ever. But, if the land is dry, the weeds do not ſo eaſily ſtrike root again; or, if ſome of them ſhould ſtrike root, they continue for ſome time in a languiſhing condition, and if removed out of their place, while in this condition, are eaſily deſtroyed by the drought. If land then is frequently ſtirred and turned over, by degrees all the weeds will be deſtroyed: for, by every ſtirring or ploughing, ſuch of them as are in a languiſhing condition are deſtroyed, while thoſe that are ſtrong and vigorous are weakened.

When land is to be freed from ſeed-weeds, it cannot be made too fine, nor the ſurface too ſmooth; for the more perfectly theſe are done, the greater number of ſeeds are brought to vegetate. But, when land is to be freed from root-weeds, it cannot be turned up in too large pieces, nor the ſurface left too rough: for the larger the pieces, and the rougher the ſurface, the drought has the eaſier acceſs, and the roots are the more effectually deſtroyed.

When land in graſs is infeſted with weeds, and it is inconvenient to turn it into tillage, the weeds themſelves muſt be pulled up by the root, or frequently cut; which are the only ways of deſtroying them.

Some perſons aſſert, that ſheep are very fond of the yellow rag-weed, by which light land, when laid out in graſs, is very much infeſted. If this is true, the putting ſheep to paſture upon this graſs, for a ſeaſon or two, will effectually deſtroy this weed. This may be the more ſafely recommended, as the trial, though it does not ſucceed, cannot be attended with any danger or loſs.

Some land, after being a few years in graſs, is liable to be over-run with fog. This, it is ſuppoſed, is owing to the ſoil becoming ſoft and ſpungy near the ſurface. If this is the caſe, rolling, which makes the ſurface firm, will be of ſome uſe to deſtroy this pernicious weed. It may be obſerved, that, when there is a foot-path through a graſs-field over-run with fog, not ſo much frequented as to break the turf, the graſs upon the path is clean, without any mixture of fog.

There is a third ſort of weeds found to infeſt both the land that is in tillage, and the land that is in graſs. This ſort have not only the blade and roots very ſtrong, ſo as to be able to pierce the ſoil, though hard, but alſo are of ſuch a nature, as makes it difficult to tear them up; or have their roots of ſuch a kind, that they may be divided into a great number of plants.

Theſe weeds cannot be deſtroyed, either by turning the land infeſted with them, from tillage into graſs, or from graſs into tillage: but they may be deſtroyed by the methods mentioned, when the ſituation of the land is not changed. If the land is in graſs, they may be deſtroyed by digging them out, or by frequently cutting them. And, if the land is in tillage, they may be deſtroyed by frequently ſtirring and turning it over in dry weather. This work muſt be performed with ploughs properly made for cutting their roots. This kind of weeds puſh their roots very far down, and their roots are ſo tough and hard, that our common ploughs ſeldom break them. If there are any ſtones in the land, they puſh their roots among the ſtones; and, in ſuch places, the plough not having freedom to act, they continue undiſturbed. In this land too the plough, moſt proper for cutting theſe roots, cannot go with ſafety. But if the ſtones are dug out, and the land ploughed with a broad pointed ſhare, the roots, by degrees, will be cut, and the weeds deſtroyed.

Beſides theſe three ſorts of weeds mentioned, there is a fourth that chiefly infeſts land that is wet. Frequent cutting, and even digging out by the root, have been tried to deſtroy them, but to no purpoſe. They are not to be ſeen on dry land, and, when on land only inclining to be wet, appear very weak. This points out draining to be the proper method of deſtroying them, which indeed does it effectually.

We ſhall now conclude this article with obſerving, that all kinds of root-weeds, and many kinds of the ſeeds of weeds, may be deſtroyed by depriving them of air. For air is neceſſary not only to the vegetation, but alſo to the life of every plant.

When land is in tillage, the weeds may be deprived of air, either by burying them deep in the earth, or covering the ſurface. Trenching does the one, and a good crop of peaſe, potatoes, or any other plants that lie thick on the ſurface, does the other.

Fog, by which ſome lands in graſs are much infeſted, may be deſtroyed in the ſame manner. The method propoſed is this: the graſs muſt be kept from the month of March to the month of December, for winter-paſturing, and the next ſeaſon preſerved for a crop of hay. The fog being, by this management, covered for two ſeaſons by the graſs, is thereby deſtroyed.

As different methods are neceſſary in the extirpation of different weeds, and it is of ſome importance to know which of them are perennial, and which only annual, we have added a liſt of the moſt remarkable weeds which infeſt the arable and graſs lands in England, ranged according to their duration. A pomp of names is carefully avoided, and thoſe which Mr. Hudſon has given in his Flora Anglica are choſen: it is a misfortune that many farmers will not know what plants are meant by ſome of theſe names; but it is a misfortune ſcarcely to be avoided, ſince the Engliſh names of vulgar plants are ſo various; altering not only with the county, but with the place, and even ſometimes depending on the whim of a common labourer.

By far the greater number of annual weeds infeſt the arable lands: in graſs lands the perennials chiefly flouriſh. The reaſon is obvious; in the former the roots are continually deſtroyed by cutting; in the latter they are made to ſpread by cutting or eating down the ſtems: perennials uſually require more than a year to come to perfection; and the ſeeds by which annuals are propagated, are not ſo readily received into the more compacted turf, as into land whoſe parts are conſtantly undergoing a ſeparation.

The annual weeds which infeſt arable lands and gardens are chiefly theſe,

Ivy-leaved ſpeedwell, or ſmall henbit. April.
Annual darnel-graſs.
Bearded oat-graſs, bearded wild oats, or haver.
Little-field madder. May.
Cleavers, or gooſe-graſs. May.
Parſley-piert. May

Peail-wort, or chickweed breakſtone. This ſmall weed is very apt to infeſt gravel-walks; and if it be ſuffered to ſeed, will increaſe prodigiouſly, and grow very troubleſome. June.

Baſtard alkanet. May.

Small wild bugloſs. June.

Male pimpernel. May.

Venus's looking-glaſs, or codded corn-violet. June.

Dodder, hell-weed, devil's-guts, or ſcald. July.

This is found chiefly on beans; it ſtrangles the crop, and draws its nouriſhment from the plants about which it entwines itſelf. It infeſts alſo hops and flax.

Small corn-parſley. Auguſt.

Gooſefoot of ſeveral kinds flouriſhes on dunghills, and is often ſuffered by the farmers to grow there unmoleſted, by which the dung is much exhauſted. Auguſt.

Fool's parſley. This is generally allowed to be a ſtrong poiſon, and is very common in gardens.

Shepherd's needle, or Venus's comb. June.

Common chickweed. The peſt of gardens.

Knot-graſs. This plant is remarkably full of ſeed, and propagates itſelf ſurpriſingly: it will grow any where, particularly in places that are much trodden. The ſparrows, and other ſmall birds, a very fond of its ſeeds. June.

Black bindweed. June.

German knot-graſs, or annual knawel. Auguſt.

Purple-flowered chickweed, or ſpurrey; on ſandy lands. June.

Cockle. June.

Corn ſpurrey. Auguſt.

Petty-ſpurge. July.

Sun-ſpurge, or wart-wort. Theſe are both very common in gardens. July.

Red-poppy, or corn-poppy. June.

Wild larkſpur. This has increaſed ſo much of late years in Cambridgeſhire, as to become one of the common weeds among the corn.

Adonis flower, pheaſant's eye, red maithes, red Morocco. Frequent in the corn-fields of Kent.

Corn crowfoot. The ſeeds of this do not come forth till the ſecond year after ſowing. June.

Upright ground-ivy.

Red archangel, or dead-nettle. Common in gardens.

Great henbit.

Narrow-leaved all-heal.

Nettle-hemp, or hemp-leaved dead-nettle.

Red eye-bright.

Fluellin; ſharp-pointed, and round-pointed.

Gold of pleaſure; among the flax. June.

Shepherd's purſe.

White-flowered charlock, with a jointed cod. June.

Yellow-flowered ditto.

Wild muſtard, or charlock. May.

Theſe three, particularly the laſt, are the *opprobium* of the farmers: they who will not be at the pains to extirpate them by hand, might do well at leaſt to run a ſcythe over the crops, while the weed is in flower, and before their ſpring-corn (for it is that which is chiefly troubled with it) is got up too high.

Fumitory. April.

Yellow vetchling; very common in the corn-fields about Cambridge.

Common ſow-thiſtle. June.

Common groundſel.

Corn-marigold; the peſt of light lands: it is not fond of dung. In Denmark there are laws for the extirpation of this weed. June.

Common camomile, or corn-feverfew. June.

Stinking May-weed. June; ſomewhat earlier than the laſt.

Blue-bottles. July.

Panſies, or heart's-eaſe.

Leſſer nettle. Auguſt.

Oracee, of ſeveral kinds; along with the gooſefoot, on dunghills, and in gardens. Auguſt.

Annual weeds in paſture-grounds are only the following.

Purging-flax. May.

Knot-graſs. This ſpreads chiefly by the path ſides, and where dung or rubbiſh has lain.

Yellow rattle, or cock's-comb, vulgarly penny-graſs; in moiſt meadows. This keeps its ground, for the ſeeds are ripe at the time of cutting hay. June.

Eye-bright; in dry paſtures.

Red eye-bright.

Heart-trefoil, or clover. This is always mixed with clover, and particularly with the hop-trefoil, or non-ſuch. It is a harſher plant, full of hard, prickly ſeed-veſſels, and therefore not a good food for cattle: it is eaſily known from other clovers, by its ſeed-veſſels, and the ſpots upon its leaves.

Common creeping mouſe-ear. May.

Smooth-ſuccory hawk-weed. June.

Star-thiſtle; in dry barren paſtures, and by way-ſides. July.

Hairy ſheep's ſcabious; on high paſtures.

Biennial weeds in corn.

Viper's bugloſs, called in Cambridgeſhire, &c. cat's tail. It infeſts the corn very much every third year. July.

Mithridate-muſtard, or baſtard-creſs.

Common melilot. The ſeeds of this ground along with wheat, are known to give bread a very ſtrong taſte. June.

Spear-thiſtle. July. This, with many other kinds of thiſtles and other weeds, with downy ſeeds, are ſuffered to ſtand on banks, way-ſides, and fallow lands, in order to ſerve for a conſtant ſupply of weeds. If the waſte places were run over with an old ſcythe, this evil would ſoon be prevented.

Bennial weeds in paſtures.

Wild-carrot, or bird's neſt. June.

Cow-parſnep. July.

Common-mallow. May.

Rough-ſuccory hawk-weed. July.

Stinking hawk-weed. June.

Muſk-thiſtle. July.

Wild carline-thiſtle. June.

Perennial weeds in corn.

Field fox-tail, or mouſe-tail-graſs.

Common wheat-graſs, dog's-graſs, quick-graſs, or couch-graſs. As every piece of this moſt deteſtable creeping weed will grow, there is no way of deſtroying it, but by ploughing up the ground thoroughly, picking it out, and burning it.

Common field-ſcabious. Auguſt.

Small bind-weed. This ſpreads its roots deep and wide; and as every piece of them will grow, it is no eaſy matter to eradicate this pernicious plant.

Bladder-campion, white corn-campion, ſpattling-poppy. July.

White-campion. May.

Small-bramble, or dewberry-buſh. June.

Corn-mint. Auguſt.

White-archangel, or dead-nettle; chiefly in gardens and under hedges.

Corn reſt-harrow, or cammock. The roots of this mat together with great ſtrength, and are therefore very troubleſome, where land is to be ploughed for corn. This property, however, makes it an excellent plant to ſet on ſea and fen banks, to keep them firm and compact. July.

Tree ſow-thiſtle. Auguſt.

Way-thiſtle. The fallows are uſually well overſpread with this weed, whoſe downy ſeeds are eaſily ſpread by the wind. July.

Great knap-weed, or matfellon. Its roots are very ſtubborn and hard. July.

Corn horſe-tail.

Perennial weeds in paſtures.

Devil's-bit. June.

Great-plantain, or waybread. June.

Ribwort, or ribwort-plantain. June.

Yellow ladies bed-ſtraw, or cheeſe-renning. It is a vulgar notion, but a falſe one, that this herb will turn milk. The good women are fond of putting ſome favourite plant into their rennet, and thus attribute to it a quality which it has no right to claim. July.

Cowſlips, or pagils. April.

Round leaved bell-flower. Auguſt.

Leſſer throat-wort, or Canterbury-bells. July.

Meadow-ſaxifrage. Auguſt.

Burnet-ſaxifrage. Auguſt.

Crow-garlic. This gives milk and butter an inſufferable ſtrong taſte. June.

Broad-leaved dock. July.

Common-ſorrel. May.

Sheep's ſorrel.

White ſaxifrage, or ſengreen. May.

Agrimony. June.

Drop-wort. Hogs are fond of the roots. July.

Meadow-ſweet. June. Only in very moiſt meadows. Goats are very greedy of this plant, which neither horſes nor kine will touch.

Tormentil, or ſeptfoil. June.

Creeping-crowfoot, or butter-cups. May.

Bulboſe-crowfoot, or butter-cups. May.

Upright meadow-crowfoot. June.

The three laſt, which occupy ſo much room in almoſt all meadows, are not eaten by any ſort of cattle, being of a very hot and acrid nature; ſo that the notion of their giving butter a yellow tincture, is as falſe as it is vulgar.

Pilewort, or leſſer celandine. April.

Meadow-rue. June.

Bugle. May.

Self-heal. Auguſt.

Common yellow toad-flax. July.

Common ladies-ſmock, or cuckow-flower. April.

Crowfoot cranesbill. June.

Common broom: in dry paſtures. May.

Reſt-harrow, or cammock; in barren grounds.

Dandelion. April.

Rough dandelion. May.

Yellow devil's bit. Auguſt.

Long-rooted hawk-weed. May.

Dwarf carline-thiſtle. July.

Common coltsfoot; in watery days. March.

Common butter-bur; in moiſt meadows. March.

Ragwort, or ſeagrim. Nothing touches this plant; though a perennial, it comes up eaſily by hand, when young, or when the ground is moiſt. July.

Fleabane; in moiſt places. Auguſt.

Common daiſie. We do not find that any cattle willingly eat of this plant, which occupies ſo large a part of our paſtures.

Greater daiſie, or ox-eye. May.

Common yarrow, or milfoil. The roots of this creep abominably, eſpecially where rubbiſh, or dung has been laid. May.

Common knap-weed, or matfellon. July.

Orchiſes of various ſorts; as,

Butterfly orchis. May.	In moiſt meadows.
Male fool-ſtones. May.	
Female fool-ſtones. May.	
Male-handed orchis. May.	
Female-handed orchis. June.	
Red-handed orchis. June.	
Purple late-flowering orchis. June.	In dry paſtures, chiefly in chalk.
Little purple-flowered orchis. May.	
Man orchis. June.	
Frog ſatyrion. May.	
Triple ladies traces. Auguſt.	
Bee orchis. June.	

Carexes of various ſorts; in low meadows and fenny grounds. Theſe are all very harſh: they are, however, mowed to fodder cows with in winter.

Common nettle.

Adder's tongue; in moiſt meadows.

Female fern, or brakes; on dry barren land. It ſtrikes its roots far and wide, and is difficult to eradicate even with the plough.

Moſſes of various ſorts. Old paſtures are moſt infeſted with theſe. Ploughing is the only effectual way of deſtroying them.

We have added the time in which moſt of the foregoing plants begin to flower; becauſe about that time it is proper they ſhould be deſtroyed.

Though the reader will find an account of many of the weeds enumerated in the above catalogue, under their proper articles, yet we were perſuaded that a general deſcription of the perennial weeds would not be unacceptable here, as two much cannot be ſaid to enable the huſbandman to know theſe pernicious plants, and exterminate them as ſoon as poſſible.

Annual darnel-graſs is called white darnel by Gerard, and in the ſouthern countries crap; though, in Worceſterſhire, they call the buck-wheat by this name. It was a ridiculous old notion, that this weed, which has ever been ſtigmatized as one of the greateſt peſts of corn, is produced from bad ſeed of wheat. The French call it *yvraie*; becauſe, put into bread, or beer, it is ſuppoſed to cauſe drunkenneſs. It has always been reckoned bad for the eyes, and to occaſion vertigoes. This plant is very like the red darnel-graſs, which has been ſo much cultivated, under the name of ray-graſs, or vulgarly rie-graſs: but the ſpike is much larger and paler; and has beards, which the ray-graſs is entirely without. It is likewiſe annual: whereas the ray-graſs has an abiding root. Its ſeeds ripen with the corn.

Bearded oat-graſs, or wild oats, is very like the common oat in appearance, but generally over-tops it. The ſeeds are alſo of a duſky reddiſh colour, and hairy towards the bottom. The beards or awns are very long, ſtiff, and bent. As it ripens with the corn, or but little before it, the extirpation of it is not very eaſy.

Baſtard alkanet is called, alſo, baſtard gromill, or gromwell, and ſalfern. Nothing is more common among the corn, eſpecially among rye, than this weed. It may eaſily be known, by its red roots, which yield a red tincture, and are uſed by the country girls in Sweden, to ſmear their faces with. From the root uſually riſes a ſingle ſtem, about a foot high, rough, and branching out at the top. The flowers are ſmall and white, ſurrounded with five long, narrow, hairy leaves, and ſucceeded by four white rough ſeeds.

The dodder is ſo remarkable a plant, that it cannot be miſtaken by thoſe who know the name. It is entirely without leaves, and does not depend on the ground for nouriſhment; but when it is grown up, rots at the bottom, and lives upon the juices of other plants, about which it entwines itſelf, by means of ſmall threads of a red colour, which it throws out. The flowers are ſmall, and come out in roundiſh heads, or bunches, many of them together, here and there, from the ſtem.

Small corn parſley, though it is very common among corn, does not ſeem to be much known. It is a low branching plant. The branches grow thick together, and are knotted and crooked. The flowers grow thick together after the manner of parſley, &c. and are of a white colour inclining to yellow. The ſeeds are large in proportion to the plant, and are ſet about with little crooked briſtles, which make them adhere to the ſtockings in great plenty, when the ſeeds are ripe, which is about, or a little after harveſt.

The leſſer hemlock, called by Gerard, thin-leafed wild hemlock, is ſo well known under the name of fools parſley, as ſcarce to need a deſcription. However, as it is a matter of conſequence to diſtinguiſh poiſonous plants from thoſe which they reſemble, we may obſerve, that though the leaves reſemble parſley, yet they are much darker on their upper ſurface, but pale and ſhining underneath. The diviſions of the leaves are much ſharper, and they have no ſmell, nor ſcarcely any taſte. When the plant is in flower, it is eaſily known by the three long narrow green leaves, which hang down from the little ſtems that immediately ſupport the flowers.

Shepherd's needle, or Venus's comb, has its names from the remarkable ſhape of the ſeeds with their appendage, reſembling in this reſpect the cranes bills: theſe would be alone ſufficient to diſtinguiſh the plant. They ſucceed ſmall white flowers; and come out in a bunch, like needles, or the teeth of a comb, ſet cloſe together. The leaves are very finely cut.

Knot-graſs is ſo called from its knots or joints, of which its ſlender creeping branches are full. After harveſt, the lands, in many places, ſeem all coloured with the little red flowers of this plant. It is called, alſo, ſwine's-graſs; and, in the north, bird's tongue.

Black bindweed has a ſtem that lays hold on any neighbouring plants, and twines about them from right to left. Its leaves are ſmooth, and ſhaped pretty much like thoſe of the buck-wheat, which its ſeeds alſo reſemble, being triangular, but ſmaller. It frequently ramps up in hedges and gardens, and is alſo very common among corn.

Corn-crowfoot has an upright ſtalk. The leaves are of a pale green, and cut into long, narrow, acute ſegments. The flowers are much ſmaller, and paler than in the crowfoots of the paſtures; but the ſeed-veſſels are the moſt remarkable, for they are covered all over with prickles. This is extremely common among corn.

Charlock, called, alſo, chadlock, catlock, carlock, and wild rape, is, I ſuppoſe, too generally known to need a deſcription. The white and the yellow-flowered charlock, or wild radiſh, which are only varieties of each other, and not ſo common as the former, may eaſily be diſtinguiſhed from it, by the paleneſs of their flowers, and the form of their ſeed-veſſel, which is round, ſmooth, and jointed. Almoſt the whole plant is covered with bent pellucid hairs.

Yellow vetchling, or ſmall yellow fetch, has long, ſlender, divided ſtalks. The leaves are triangular, and grow by pairs cloſe to the ſtalk. Out of theſe leaves comes a tendril, by which the plant ſupports itſelf; and, on a long ſtalk, one ſmall pea flower, of a yellow colour, which is ſucceeded by a flat pod, about an inch in length, containing ſix or ſeven roundiſh ſeeds.

Corn-marigold, or golden corn-flower, is the buddle, or yellow buddle of Kent. Its leaves grow cloſe to the ſtem, in an alternate order. They are of a blue-green colour, and are cut about the edges. The flowers are like thoſe of the marigold; large, and of a beautiful yellow.

Yellow rattle is known by its leaves being finely indented about the edges; its flowers being yellow; and its ſeed-veſſel ſwelling into a dry, large, compreſſed bladder, divided into two cells, and containing ſeveral compreſſed ſeeds, ſurrounded with a membrane.

Red eye-bright, or eye-bright cow-wheat, has a ſtem riſing not more than a foot high; long narrow leaves, indented about the edges, and purple flowers growing in ſpikes. It flowers in July and Auguſt.

Viper's bugloſs. The ſtalks are rough, round, ſolid, erect, undivided, and marked with black ſpots; the leaves are very rough, long, narrowing to a point, and placed without any certain order. The large ſpecious flowers, of a beautiful blue colour, grow in long bending ſpikes. They conſiſt of one petal, divided into five roundiſh ſegments, of different ſizes, and reſemble a horn in their figure, expanding by degrees, from a narrow beginning. The flower-cup conſiſts of five narrow ſegments, and contains four rough ſeeds.

Melilot is well known by its trefoil leaves, which are indented, and, as it were, eaten about the edges; and by its long, thin ſpikes of ſmall, yellow flowers, which are ſucceeded by ſhort rough pods, containing two ſeeds.

Wild carrot, bird's-neſt, or bee's-neſt. Is very like the cultivated carrot, of which it is indeed ſuppoſed to be only a variety. The wild ſort, however, differs in his roots, being ſmall and ſticky. In both ſorts, after they have done flowering, the umbels contract themſelves into the ſhape of a bird's neſt.

Cow parſnep, wild parſnep, meadow parſnep, or madnep. This grows three feet high. The ſtalk is round, furrowed, and hollow. The leaves proceed from a large membrane, or ſheath. They grow on long hairy ſtalks, and are divided and downy. The flowers grow in large umbels, are white, and conſiſt of five irregular petals. Two oval, ſtreaked, compreſſed ſeeds, ſurrounded by a wing, ſucceed each flower.

Stinking hawkweed may be diſcovered by its very ſtrong ſmell like caſtor. As it is not a common weed, it is not neceſſary to be particular in the deſcription of it.

Muſk-thiſtle is known by its handſome purple nodding heads of flowers, which come out rather ſooner than moſt ſorts of thiſtle. The ſmell of them is agreeable.

Carline-thiſtle is very different from the other thiſtles. The hard, woody root, ſends up one round purpliſh ſtalk, beſet with prickly leaves in no order. This is terminated with ſeveral flowers, growing in a head. The ſmall ones, compoſing the whole, are of a duſky purple, and contained in a ſwelling ſcaly cup; the inner ſcales of which are very long, ſhining, coloured, ſpreading, and placed in a ring round the flowers. The ſtalks and heads remain all the year, with very little variation, upon the dry paſtures.

Perennial weeds in corn.

Field fox-tail, ſmall baſtard fox-tail, or mouſe-tail graſs, is known by its long, round, ſlender, ſmooth ſpike, of a duſky purple colour. The ſpikes are ſo very long and ſlender, that they uſually bend a little. This graſs is found in the moiſt furrows of arable land, and in any places where the water is ſuffered to ſtand.

Common wheat-graſs, or couch-graſs, is univerſally known, by its long white creeping roots. It grows very tall, eſpecially in hedges. The ſpike reſembles that of wheat, in the manner in which the ſeeds are diſpoſed.

Common field ſcabious is all over rough and hairy. The ſtalk is upright; a foot, or a foot and a half in height, ſpotted, and branching. The lower leaves are oval, and indented about the edge. Thoſe which grow on the ſtalk are divided, and of that ſort which botaniſts call pinnatifid. The flowers are blue, of the compound kind; conſiſting of a conſiderable number of ſmall flowers, each divided into four parts, and having one ſeed under them. The taſte of the plant is a diſagreeable bitter.

Small bindweed, called, alſo, with-wind and hedge-bells, though theſe names ſhould ſeem rather to belong to the great bindweed, which ramps in the hedges; whereas this overſpeads the arable lands. The common people, in their wrath, have given this pernicious weed the ſame opprobrious names with the dodder, viz. hell-weed, and devil's guts.

The ſtalks of this plant are weak, and twine about any thing. They come near, from left to right; and, when they find no ſupport, they trail along the ground. The leaves come out ſingle. They are three cornered, ſhaped ſomewhat like an arrow head, ſmooth, and placed on long foot-ſtalks. From the boſoms of the leaves comes out one flower on a very long foot-ſtalk. It is bell-ſhaped, of a beautiful colour, purple, red, white, or variegated; and is ſucceeded by a ſmall, roundiſh ſeed veſſel, containing four large, angular ſeeds. The whole plant is full of a milky juice.

Bladder-campion, white-corn campion, ſpattling poppy, white bottle, white ben, or frothy poppy. The ſtalks grow a foot and a half, or two feet high, round, ſmooth, jointed, branched towards the top; and at every joint is a pair of leaves, perfectly ſmooth. The flowers are white, and conſiſt of five bifid petals. The empalement, or outward covering, is puffed out into a roundiſh form; and is ſmooth, often varied with red, green, and white, and beautifully veined all over, like a fine net.

White campion, admitted into gardens, when it has a double flower, under the name of white batchelor's-buttons. It has a long and large root, of a ſharp bitteriſh taſte, ſending forth ſeveral ſtalks about two feet high; round, hairy, jointed, branching, of a red colour near the ground; a pair of leaves comes out at every joint, hairy, and ſharp-pointed. The flowers are like thoſe of the laſt: but the empalement, which is not puffed out like that, is oblong, with purpliſh ſtreaks down along it from top to bottom. The flowers of this are imperfect: the male or barren, and the female or fruitful, growing on diſtinct plants.

Small bramble, or dewberry-buſh, is diſtinguiſhed from the common bramble of the hedges, by the place of its growth, the trailing of its round branches, the ſmallneſs of its prickles, which are fewer in number, and chiefly on the ſtalks; the leaves growing only three together, being green underneath, and the ſide ones divided into two parts; and the blueneſs of its berries, which conſiſt of a very few large diviſions.

Corn-mint. We are told, on undoubted authority, that this herb will hinder milk from curdling; and that, when hungry cows have been put after harveſt into a field where this plant abounded, it has been ſcarcely poſſible to turn their milk for cheeſe.

Corn reſt-harrow, reſt-plough, cammock, petty whin, or ground furze. The hard, ſtubborn, creeping roots ſend forth many woody, round, ſlender, hairy branches, red towards the bottom. The leaves grow three together. The flowers of the pea kind, of a beautiful red colour, and are ſucceeded by a ſwelling, villous pod, containing a few roundiſh ſeeds.

Tree ſowthiſtle. The root is very creeping, full of milk, and with difficulty eradicated. The ſtalk is about two feet high, ſmooth at the bottom, but hairy where it begins to branch out. The leaves are like thoſe of the dandelion, deeply cut, ending in ſharp points, and having the edges ſet round with tender prickles. The flowers grow ſeveral together; and reſemble thoſe of the ſow-thiſtle, but are much larger, of a deeper yellow, and ſurrounded by a very rough, hairy, dark-coloured empalement. They have the ſmell of bitter almonds, and are ſucceeded by downy ſeeds.

Great knapweed, matfellon, or bulweed. This plant is about two feet high. The ſtalks are round, ſtreaked, and hoary. The bottom leaves are oblong and undivided; but thoſe, which grow on the ſtalk, are cut and divided. The flowers reſemble thoſe of the blue-bottle in ſhape, but are of a red colour. The ſeed is ſmall, oblong, reddiſh, and hairy in the upper part.

Corn horſe-tail grows in moiſt places. In April, naked ſtalks come up, which bear the flower and ſeed. Theſe are but of ſhort duration. In May, other ſtalks ariſe, hollow, jointed, about a foot high, and ſending forth all round, hollow jointed leaves, ſix or eight inches in length, ſubdividing into others at the joints.

Perennial weeds in paſtures.

Devil's bit is a kind of ſcabious. It differs from the common field ſcabious, in having undivided leaves, ſet thicker on the ſtalk; in the flowers not ſpreading out into a flat ſurface, but growing in a round form; and the ſmall flowers, which compoſe the whole, being all of a ſize and regular: and, laſtly, in the root looking, as if it were bit off at the end.

Great plantain, or waybread, is eaſily known by its broad leaves, ſpreading on the ground, and marked on the under ſurface with ſeven ſtrong nerves. From the centre of theſe ariſe ſeveral naked, round, hairy ſtalks, ſuſtaining a long, cylindrical ſpike of ſmall flowers, ſet thick together.

Rib-wort plantain has much longer leaves, marked only with five nerves. The ſtalks are higher, and not round, but cornered, and the ſpikes of flowers are ſhorter.

Yellow ladies bedſtraw, cheeſerenning, maid's hair, petty mugwet. Its ſlender ſtalks riſe to about a foot. The leaves come out in whorls, eight or nine together. They are long and narrow, and of a deep green. Towards the top of the ſtalk, two little branches uſually come out, ſuſtaining a conſiderable number of ſmall yellow flowers, conſiſting of one petal, divided into four parts, and ſucceeded by two ſmooth roundiſh ſeeds.

Round-leaved bell-flower. The bottom leaves are roundiſh: thoſe upon the ſtalk long, and narrow. The flowers are blue, bell-ſhaped, with the edge divided into five parts, and hang down.

Leſſer throatwort, or Canterbury bells. The ſtalk is cornered and undivided, about a foot high, and hairy. The flowers grow at the top of the ſtalk cloſe to it, ſeveral together. They are erect, of a beautiful purple colour, and divided to the middle into five acute ſegments.

Meadow ſaxifrage, Engliſh ſaxifrage, or ſtone-break. The root has a ſharpiſh, aromatic taſte. The ſtalks are round, ſtreaked, and reddiſh towards the bottom. The leaves are ſmooth, of a dark green, and divided twice into long, narrow, ſharp ſegments. The foot-ſtalks membranaceous at the baſe. The flowers grow in looſe umbels, and are of a pale yellow. The ſeeds are oval, ſtreaked, and red at the top.

Burnet ſaxifrage is of two kinds. The large is found in woods; and the ſmaller, in dry paſtures. Of this laſt there is a variety, differing only in the leaves, which are cut even to the root. The ſtalks are ſtreaked, and branching. The flowers grow in umbels cloſe together. They are ſmall, white, and conſiſt of five entire petals. Theſe are ſucceeded by two ſeeds of an oblong oval form. The root has a very hot taſte.

Crow garlick, or wild garlick. The leaves are round and ſmooth, reſembling much thoſe of ruſhes. From the midſt of theſe riſes a ſtalk, a foot or more in heighth, naked, ſlender, round, ſmooth, and hard; ſuſtaining many purple ſeeds, or little bulbs, about the ſize of grains of wheat collected into a round head.

White ſaxifrage, ſengreen, or ſtone-break, has kidney-ſhaped leaves ſpread upon the ground, and divided about the edges, not much unlike thoſe of ground-ivy, but ſofter and ſmaller, and of a faint yellowiſh green. Among theſe riſes a round, hairy, branching ſtalk, about ſix inches high, bearing ſpacious white flowers, conſiſting of five entire petals. This pretty little plant grows in dry paſtures, and may readily be known by its roots, which are made up of little knobs.

From a want of ſufficient diſtinction in names, a ſtrange confuſion has ariſen between the meadow ſaxifrage, Burnet ſaxifrage, Burnet, and white ſaxifrage. It is hoped theſe deſcriptions will contribute ſomething towards avoiding this confuſion for the future.

Agrimony has generally a ſingle, round, rough ſtalk, with leaves placed alternately upon it, which are winged with ſmall leaves, placed between the larger pairs. The yellow flowers grow alternately along the ſtalk, in a long row, after the manner of a ſpike, and are ſucceeded by rough ſeeds.

Dropwort is known by its winged leaves, the diviſions of which are all regular, and ſharply indented about the edges; by its white flowers, growing in a bunch like an umble: but, principally, by its roots, which conſiſt of a bunch of knobs hanging upon threads, from whence it has the names of filipendula, and dropwort. The flowers ſmell agreeably.

Meadow-ſweet, or queen of the meadows. The ſtalk is angular, ſmooth, ſtrong, branching, and of a reddiſh colour. The leaves grow alternately, are winged, and conſiſt of three or four pair of lobes, and a very large one at the end, divided into three parts, like a raſberry-leaf. They are indented about the edges, white underneath, and wrinkled, like the leaf of the elm. The flowers are ſimilar to thoſe of the dropwort. The whole plant has an agreeable ſmell.

Tormentil, or ſeptfoil. The root is large, of a reddiſh colour, and an aſtringent taſte. The ſtalks are weak, and lie on the ground at firſt; but afterwards riſe up. The leaves are hairy, grow cloſe to the ſtalk, and are divided into ſeven parts. The flowers are yellow, and conſiſt of four petals. There is another ſpecies, not ſo common, differing from this only in having its ſtalks lying intirely on the ground, and the leaves growing on foot-ſtalks.

The crowfoots are too common every where to need a deſcription. They are known under the names of kingkob, king cup, gold-cups, gold-knobs, butter-cups, and butter-flowers. The bulboſe crowfoot is diſtinguiſhed not only by its round root, but by the diviſions of the flower-cups being bent back, the ſtalk being erect, and that which ſuſtains the flowers being furrowed. The upright crowfoot has the diviſions of the empalement ſpreading out, as in the creeping ſort; but the flower-ſtalks are not furrowed, as in that and the bulboſe one. The leaves are divided, firſt, into three parts; and each of thoſe again into ſeveral. The upper leaves are long, narrow, and undivided. This plant grows much taller than the others. The flowers of all three are alike, and of a fine ſhining yellow.

Pilewort, figwort, or leſſer celandine. The root conſiſts of oblong knobs. The leaves are heart-ſhaped, cornered, and placed on foot-ſtalks. The flowers reſemble in general thoſe of the crowfoots, but differs ſomewhat from them in having the cup divided only into three parts, the petals being about eight in number, and narrower. This low plant runs very much at the root, and choaks all plants which are near it.

Bugle, middle confound, ſicklewort, or herb carpenter. It riſes about half a foot high, with a ſquare ſtalk. The leaves come out by pairs, of a purpliſh colour, and indented about the edges. The flowers grow in a ſpike, are blue, and have a very ſmall upper lip.

Self-heal, hook-heal, ſicklewort, carpenter's herb, or prunell. This differs from bugle, in the leaves being longer and narrower: and in the flowers growing in a thicker ſpike; their upper lip being larger, and their filaments being forked.

Common yellow toad-flax, or flax-weed. It creeps very much with its hard woody roots: which ſend up ſeveral ſmooth ſtalks, a foot, or a foot and a half high, covered with long, narrow leaves, placed without order. The flowers grow in cloſe ſpikes, on ſhort foot-ſtalks, at the top of the ſtalks. They are of a light yellow, ſhaped like a calf's mouth; and end in a ſpur behind.

Ladies-ſmock, cuckow-flower; in Norfolk, Canterbury-bells. The ſtalk is upright, round, and ſmooth. The leaves are winged, with the lobes of the lower ones roundiſh; and of thoſe upon the ſtalk oblong. The flowers are large, handſome, and white, or purpliſh; conſiſting of four obtuſe veined petals. The ſeeds are contained in erect, compreſſed pods, an inch, or an inch and a half long; divided into two cells: which, when ripe, burſt with a touch, and throw out their ſeeds to a conſiderable diſtance.

Crow-foot crane's-bill, or blue crane's-bill. The leaves are divided, almoſt to the middle, uſually into ſeven parts. The ſtalk commonly divides into two branches, and each of theſe into two more. From the corner of each diviſion, comes a flower-ſtalk; ſupporting two large blue flowers; conſiſting of five roundiſh, intire petals, ſucceeded by a long ſeed-veſſel, reſembling a crane's-bill. This bill-like ſeed-veſſel is thick and rough; but not ſo long, as in ſome of the other ſorts.

Reſt harrow, or cammock, of the paſtures, differs very little from the corn reſt-harrow deſcribed before. The branches of this are armed with long ſtiff prickles. The flowers are of a higher purple, and come out ſingle: whereas, in the other, they come out two together.

Dandelion, or piſs-a-bed, is well known in all paſtures, by its milkineſs, and its naked, hollow ſtalks, ſupporting one large, yellow, compound flower; which is ſucceeded by a round ball of downy ſeeds.

Rough dandelion, or dandelion hawkweed. The whole plant is rough, with forked hairs. The flower-cup does not bend back, as in the common dandelion: and this is a taller plant.

Yellow devil's-bit, ſo called, becauſe the end of the root ſeems as if it were bit off, is alſo known by the name of ſmall hare's hawkweed. The leaves are ſmooth, long, narrow, and cut into long, ſharp-pointed ſegments. The ſtalks are a foot and a half, or two feet high, and branching. On the tops of theſe, grow many flowers, ſmaller and paler than in the dandelion; ſupported on ſcaly flower-ſtalks.

Long-rooted hawkweed. This has a very long tap root. The ſtalks are a foot and a half high, or more; cornered, naked, and divided. The bottom leaves ſpread in a circle on the ground, and are jagged and rough. The flower-ſtalks are ſcaly. The flowers, and down of the ſeed, reſemble thoſe of the dandelion.

Dwarf, or ſmall purple carline thiſtle. This lowly plant ſpreads its prickly leaves a foot round, and ſuffers nothing to grow beneath them. Its purple flower comes out in the midſt of theſe, without any ſtalk, cloſe to the ground.

Colt's foot, ſole-foot, horſe-hoof, or bull-foot. In February, the ſcaly ſtalks ariſe, bearing one yellow compound flower; which is ſucceeded by a hairy white down. The leaves come out later. They are ſhaped ſomewhat like a horſe's hoof; and are downy underneath.

Butter-bur, or peſtilent-wart, reſembles colts-foot in many reſpects: but the flowers are purple, and grow in a thyrſe. The leaves come out after the flowers decay; and are like thoſe of the colt's foot in ſhape; but are three or four times as big.

Ragwort, ragweed, ſtaggerwort, ſtanerwort, St. James's wort, ſeggrum, or ſeagrim. The ſtalk is uſually ſingle, round, ſtreaked, ſolid, and of a purpliſh colour, in ſame parts. The leaves are very much jagged, ſmooth, and of a dark green. The flowers are yellow, radiated, and grow many together. When we affirmed, that this plant comes up eaſily by hand, when young, or the ground is moiſt; we ſpoke from experience. The fact, in few words, was this. Some cloſes were notoriouſly over-run with this weed. The owner, juſt before the time of flowering, and after ſome rain, turned in a man and woman upon them; ordering the woman to pull up all ſhe could by hand; and the man to root out the reſt, with his docking-iron. The rag-wort was not, indeed, left in a lane, for the downy ſeeds to ripen; and to be carried on again to the cloſes, by the wind: but the plant was thrown in heaps, and burnt, and the aſhes were ſpread upon the graſs. It was not, indeed, all deſtroyed at this firſt attempt; but the few plants, which came up, the following year, were ſoon pulled up by the woman; and ſcarce a plant has now appeared in theſe cloſes, for ſeveral years paſt.

Fleabane, middle fleabane, or fleawort. The ſtalk is round, bending, ſolid, and hoary. The leaves are oblong, ſharp-pointed, wrinkled, downy, and embrace the ſtalk, on which they grow, very thick, without regularity. The flowers are yellow, radiated, and incloſed in a flower-cup, made up of narrow ſcales like briſtles. Mr. Ray tells us, that, if the leaves or tops of fleabane be ſqueezed, they ſmell like ſoap. Gerard ſays, the herb-women call it herb Chriſtopher.

Greater daiſie, ox-eye, or maudlin-wort. The ſtalk is five-cornered, ſolid, and branching. The leaves are jagged; and embrace the ſtalk. The flowers are large, and radiated. The ray is white; and the diſk yellow: the ſeeds have no down.

Common yarrow, milfoil, or noſebleed. The ſtalks are ſlender, round, ſtreaked, ſtiff, and hairy. They are divided towards the top into ſeveral branches; and theſe again into flower-ſtalks; ſupporting ſmall white or purpliſh flowers; growing thick together in a kind of umbel. The leaves are cut very fine; and divide twice.

Common, or black knapweed, matfellon, black matfellon, or bulweed. The root is hard, thick and woody; and has a diſagreeable aſtringency. The ſtalks are round, rough, ſtreaked, ſtrong, and very tough. The leaves are irregularly placed, oblong, and of a dark green. From the wings of the leaves, ariſe ſtalks, ſupporting one, two, or three heads of flowers; which are purple, and incloſed in a ſcaly cup. The ſcales are black, and ſurrounded with fine hairs, like the eye-laſhes.

The orchiſes may be known by their roots; which are either a double bulb, reſembling a pair of teſticles; or a bunch of long fleſhy roots, like the fingers of the hand. The flowers, by growing in a ſpike, make a handſome appearance. The colour is red in moſt ſorts.

Adder's-tongue is hid among the graſs in low meadows. From a very low ſtalk, ariſes a ſingle, thick, ſmooth, oblong leaf; from the boſom of which, iſſues a kind of tongue, ending in a point, and indented on each ſide like a file.

WEEVIL, an inſect of the beetle kind, reſembling a ſmall May-bug, with a long ſharp pointed head, to the hinder part of which are fixed two antennæ. It is black, and therefore eaſily diſtinguiſhed in any corn: but its principal and favourite food is wheat, of which, either old or new, it devours great quantities; without, however, communicating any bad ſmell to it, as the moth does. Some call it the corn-louſe, becauſe it bites animals more ſtrongly than fleas do. This has made it to be looked upon as a carnivorous inſect; and many have pretended that it devours both the worm and the chryſalis of the falſe moth: an opinion which M. Duhamel does not think improbable, becauſe, in effect, very few of thoſe moths are ever found in corn where there are many weevils.

Upon thruſting one's hand into a heap of corn, one may eaſily perceive, by its heat, whether it contains many of theſe inſects, which generally lie pretty much collected; and the particular places where they are moſt numerous, feel much warmer than the reſt. This obſervation ſoon led M. Duhamel to think, that a conſiderable heat is probably neceſſary for the hatching of their eggs; and that, in this caſe, even if they ſhould live, they will not be able to breed, in his ventilating granaries.

To aſcertain this fact, he put ſome weevils into wheat (not ſtove-dried) in one of thoſe granaries, in May 1751. It was well ventilated from time to time, and opened in Auguſt 1752, when none of them were found. He did the ſame with wheat which had been ſtove-dried; and when the granary was emptied, a year and half or two years after, not a weevil could be ſeen.

He again put ſome weevils into a ventilating granary in which wheat of the year 1754 was laid up, without having been ſtove dried. This corn was taken out in May 1756, and ſifted over a fine ſcreen; which gave him an opportunity to obſerve whether the weevils had increaſed. Their number ſeemed to him nearly the ſame as that he had put in: and a farther reaſon which induced him to think they had not multiplied, was, that this grain, inſtead of being heated, as corn is well known to be whenever weevils breed in it, was ſo cool, that a country fellow employed for this work could hardly remain bare-footed among it.

In 1755, Dom Edward Provenchere, procurator of the Carthuſians of Liget, near Loches, in the province of Touraine, intending to make ſome experiments on the preſervation of corn, choſe for that purpoſe a large caſk, at one end of which a little above the common bottom, he put a floor of lattice work, and over that a canvas. This caſk was filled with wheat of the harveſt of 1754, of which it contained 1080 pounds. He then fixed to it a pair of middle ſized bellows, ſo ſituated that they might eaſily be worked; and nearly in the centre of this corn, he put as many weevils as weighed ſix drachms; which is pretty conſiderable for that quantity of grain.

The bellows were blown an hour every week. In the beginning of September 1756, when that operation had been neglected for ſome time, the corn began to heat: but it was ſoon cooled again by uſing the bellows. The 15th of October, on taking the corn out of this caſk, in which it had kept perfectly well, not above twenty weevils were found in it. Dom Edward ſays he ſaw that inſect come out of the vent-holes every time the bellows were blown. He perceived in many places ſeveral grains of corn linked together by threads, certainly formed by moths that were in his wheat (which had not been ſtove-dried), and, not dying immediately, had had time to ſpin their web.

Dom Edward filled another caſk with nine hundred pounds of barley, not ſtove-dried, and put into it ſix drachms of weevils. Though care was taken to ventilate this caſk as much as the former which was filled with wheat, that is to ſay, during an hour every week, yet this corn heated prodigiouſly: the bellows could not cool it, and the weevils multiplied in it exceedingly.

"This, ſays M. Duhamel, is the very thing that happened to me in my larger experiment on the ſame kind of grain. Barley probably contains a great deal of moiſture; and the queſtion is whether ſtove-drying can be able to preſerve it. The increaſe of the weevils here ſeems to prove, that this inſect cannot multiply in corn which retains a proper degree of coolneſs."

Though the above experiments ſeem to prove pretty clearly, at leaſt that the weevil cannot breed in corn which is kept properly cool, and that if any ſure way to deſtroy this inſect be ever diſcovered, it will be moſt likely to ſucceed by means of the ventilating granary; yet M. Duhamel, with his conſtant candour and unvaried zeal for the welfare of mankind, exhorts the naturaliſt, the philoſopher, the lover of the public good, not to rely too much on any thing that he has ſaid in this reſpect; to look upon the trials which he has related, as ſteps only which may help to lead to that deſired end; and to continue their endeavours to render to the world the important ſervice of ſhewing how this creature may be effectually exterminated, by any ſafe and practicable method.

"I have tried, continues he, in his lateſt writings upon agriculture, many of the receipts moſt vaunted in books of huſbandry, as remedies againſt the weevil, and have not found the leaſt benefit from any one of them. All that they have taught me, is that this animal will endure a great deal before it can be killed. It will live a long time without eating: cold will benumb it ſo as to make it appear to be dead; but I have put ſome of them, in that ſtate, into a warm place, and after keeping them there for ſome time, have found that they were perfectly alive: the great coolneſs of my granaries has ſeemed to prevent their increaſe; but it has not killed them. They bear eaſily a heat of from forty-five to fifty degrees of Réaumur's thermometer (from one hundred and fifteen to one hundred and twenty-four of Farenheit's). I kept corn in which there were many weevils, during half an hour, in a place heated to upwards of eighty degrees of Réaumur's thermometer (two hundred and ten of Farenheit's): ſome of them periſhed; but others remained alive. They, therefore, who would deſtroy them by ſuch a degree of heat, muſt let their corn be expoſed to it during ſeven or eight hours at leaſt.

"I grant that the ſmoke of ſulphur will kill any inſect; but that method is not practicable in granaries: for this vapour, which is very light, aſcends to the top of the granary, and ſcarcely acts at all upon the corn on the floor. It is true, that the corn may be ſo diſpoſed as to let this ſmoke paſs through it, and all the inſects in it will then be deſtroyed. But, at the ſame time, this ſmoke will give the corn a very diſagreeable and laſting ſmell, which depreciates it entirely. Conſequently this method will not do.

"It is confidently ſaid, that the weevils may be driven away by turning the corn with ſhovels rubbed with eſſence of turpentine. To try whether this eſſence really diſpleaſes them, I ordered two large caſes to be made: the inſide of one of them was rubbed with eſſence of turpentine; both of them were filled with corn in which there were many weevils; and the inſects remained as quiet in the one as in the other. It is true, that when corn infeſted with weevils is turned with a ſhovel, ſeveral of thoſe inſects quit the heap, and haſten towards the walls of the granary. This may have been imputed to the rubbing of the ſhovel with oil of ſpikenard or eſſence of turpentine: but the ſame thing happens when the ſhovel has not been rubbed with any drug whatever; and the fugitive weevils ſoon return to the heap of corn.

"When corn is ſifted in a ſieve (and the ſame is applicable to a ſcreen) fine enough to retain the grain; the weevils, then agitated, ſhrink up their legs, and are, in that poſture, generally ſo much ſmaller than the good corn, that very many of them drop through the ſieve. The greateſt part of them may therefore be deſtroyed by this method, which is a very good one: but, unfortunately, there will ſtill remain enough of them among the corn, to do conſiderable damage. This ſieve or ſcreen ſhould be of wire; and under it ſhould be placed an earthen or copper veſſel, pretty deep, to receive the inſects, and ſmooth on its inſide, to prevent their getting out eaſily.

"Of all the methods I have tried, that which has ſeemed to me to be the beſt, is to dry the corn in a ſtove, or oven, heated to eighty or ninety degrees of M. de Réaumur's thermometer (from two hundred and ten to two hundred and thirty of Farenheit's) and to let it remain there twelve hours. I exhort all thoſe who wiſh the welfare of the public, to ſtudy the means of deſtroying the weevil, and, in conſequence thereof, to make particular experiments: but I beſeech them not to publiſh their diſcoveries till they have made repeated trials of them, and that in different granaries: for I have ſometimes ſeen theſe inſects forſake a granary, when no cauſe could poſſibly be aſſigned for their ſo doing."

WELD, *or* DYER'S WEED, the name of a plant much uſed by the dyers to give a yellow colour to woollens, ſilks, cotton, and thread.

Its root, which is compoſed of a few ligneous fibres, does not pierce deep: from this root it puts forth leaves about four inches long and half an inch broad, of a lively green, ſoft to the touch, and ſpread circularly near the ground, with ſome gentle wavings at their edges, but obtuſe at their points. Its ſtem, which riſes from amidſt theſe leaves to the height of three feet, or even more if the ſoil and culture be very good, often branches out, and is garniſhed with leaves like thoſe below, though ſmaller in proportion as they approach the flowers, which grow in long looſe ſpikes at the end of the branches or ſtem. Theſe flowers, which appear at the latter end of June, are each of them compoſed of three ſmall irregular petals of a greeniſh yellow, to which ſucceeds a globular berry of the ſame colour, terminated by three points, and in which are incloſed ſmall brown ſpherical ſeeds. Theſe ſeeds ripen in September. The plant becomes entirely yellow when it is dry, and the whole of it, but eſpecially the berry, is uſed in dying. The ſlendereſt weld, and particularly if it inclines to a ruſſet colour, is accounted the beſt:

that which is larger, and of a dull green, is much leſs eſteemed.

This plant grows naturally along the ſides of high-ways, upon dry banks, and on old walls, in many parts of England, France, Spain, and other countries where the winters are not very ſevere: but the cultivated ſort is far preferable to the wild, both for the quantity and the goodneſs of the colour which it yields. It will thrive tolerably on almoſt any ſoil, provided it be dry and warm: but the richer the land is upon which it is ſown, the greater will be the produce; and in proportion to the care with which it is cultivated, the more vigorous and fit for dying will it be.

The ground for this, as for every other plant, ſhould be in fine tilth at the time of ſowing it; though here, unleſs it be very poor indeed, it will not require dung. The ſeed ſhould be that of the preceding year; for if it be older, great part of it will not grow. Both Mr. Worlidge and M. Du Hamel are of opinion that weld-ſeed ſhould, on account of its ſmallneſs, for it is but little bigger than that of purſlane, be mixed with aſhes, buck-wheat, oats, or ſome other ſimilar ingredient, in order the better to avoid ſowing it too thick; for the plants of weld thrive beſt when they are about ſix inches aſunder. For this reaſon, as was before obſerved in regard to all plants which require being hoed, it is beſt to ſow weld in rows. Some ſow it on barley, or oats after they have been ſown and harrowed, this requiring only a buſh to be drawn over it; for it ſhould not be covered deep. A gallon of weld-ſeed thus uſed in the broad-caſt way will be ſufficient to ſow an acre of land. It will not grow much during the firſt ſummer, when it is thus ſown; but it will thrive apace after the corn is taken off.

The beginning or middle of Auguſt is a proper ſeaſon for ſowing weld in this country. The only care that it requires whilſt growing, is to keep it clear of weeds which might choak it, or at leaſt weaken its growth.

The French, in general, ſow their weld in March, and pull it up in July or Auguſt of the enſuing year, when part of its ſeeds are ripe, and the plant is ſtill of a greeniſh yellow: they then dry it and threſh it upon cloths, to get the ripeſt of the ſeed, and after this they tie the ſtalks up in bundles, and ſell them to the dyers. But Mr. Miller rightly judges, that the beſt time to pull the weld for uſe is when it begins to flower, that is to ſay, about the latter end of June, becauſe, like all other vegetables, it is then in its greateſt vigour, and conſequently beſt fitted to yield the greateſt quantity of dye. For a produce of new ſeeds, it is much better to ſow a ſmall piece of land on purpoſe, or to ſet apart for this end a ſuitable portion of the field of which the plants are intended for uſe, rather than let the whole ſtand too long, that is to ſay, till part of the ſeeds are ripe; becauſe, by letting tbe plants ſtand till then, their quality is injured far beyond the value of the ſeeds that are got from them (the berries being, as was obſerved before, the part which yields the fineſt dye); and beſides, the ſeeds thus obtained will of courſe be a mixture of ripe and half-ripe ones, on the growing of which there cannot be a due reliance. The common way of drying theſe plants is to ſet them upright in ſmall handfuls in the field, and when they are dry, to tie them up in bundles. They muſt alſo be houſed dry; and care muſt be taken to ſtack them ſo looſely that there may be room for the air to paſs between them, to prevent their fermenting.

The plants which are intended for ſeed ſhould be pulled as ſoon as their ſeeds are ripe, and then be dried and beaten out for uſe: for if this is deferred, or if they are let ſtand too long, the ſeeds will ſcatter.

The method of cultivating this plant at Oiſſel, in Normandy, where great quantities of it are raiſed for exportation to Holland, independent of the conſumption in France, is thus related by M. Dambourney, in the Memoirs of the Royal Society of Agriculture at Rouen.

“ In the month of July, juſt after the kidney beans then in bloom have been hoed for the ſecond time, and earthed up, eſpecially if there be an appearance of approaching rain, weld-ſeed is ſown among them, very thin, as equally as poſſible. Careful huſbandmen bury this ſeed by dragging over it a ſmall buſh of thorns. Whilſt the weld riſes, the beans ripen and are gathered; after which the ground remains, of courſe, planted with weld only. This is hoed about Michaelmas, then left in that condition during the winter, and in the enſuing month of March, when the danger of froſts is judged to be over, it is hoed again, to extirpate ſuch weeds as may have come up in the mean time. Towards the end of June in this ſecond year, when the weld has done bloſſoming, when its berries form, and when the plant begins to turn yellow, advantage is taken of the firſt fair day after a rainy one, to pull it up. Two men will then pull up as much of it in one day, as four men can when the ground is dry and hard. It is carried off in large bundles: but theſe are untied before the weld is laid up for keeping, and the plants are ſpread out and ſet upright againſt walls or hedges well expoſed to the ſun, the heat of which completes their drying in two days. They are then laid upon a cloth, to prevent the loſs of the ſeed, which drops very eaſily out of the now open capſules; and finally, after being tied up again in bundles weighing about thirty pounds apiece, they are piled up looſely in a barn or other well covered place, where they complete their ripening, and generally ſhrink to leſs than half of their former weight.

“ Weld raiſed on rich ground is apt to be greaſy and too full of ſtalks: that which grows in ſandy places is of a better quality, and has only one main ſtem: but, in return, the produce here is much leſs than in the former caſe.

“ As ſoon as the weld has been pulled, ſheep are turned in upon the land, to eat up the graſs it may have produced: it is then plowed once; and after another plowing at the end of October, it is ſowed with wheat, or great rye, without uſing any other compoſt or dung. If the land is light and deſtined for ſpring-corn, turnips may be ſown upon the firſt plowing after the weld; for they will have time to grow big enough to be pulled before the plowing for oats or ſmall rye, which laſt crops it will be proper to help with a little ſhavings or raſpings of horn.

“ If it be intended to raiſe weld after peas, the ground ſhould be plowed, and the ſeed ſown very thin: to do which the more effectually, this ſeed, like that of turnips, ſhould be taken up only in pinches between the middle finger and the thumb, and the fore-finger ſhould remain extended, the better to help its ſpreading when it is dropped. This ſeed ſhould be ſown in rows ſufficiently diſtant for the plants to have full room to grow; and the beſt way is to leave an alley after every third row. When ſown, it is harrowed in, and the only farther care that the weld requires it to keep the plants free from weeds, by hoeing the ground at Michaelmas and in March, as before directed.

“ The weld which is ſown after peas does not injure the land it grows on; and therefore in this caſe, as after the kidney-beans before ſpoken of, wheat may be ſown in October, without any previous manure.”

WHEAT, the name of a well known plant, greatly cultivated in many parts of the world, eſpecially in England.

As a crop of wheat, is, in general, the principal riches of farmers whoſe farms conſiſt of arable land, we ſhall be very full in deſcribing every method yet practiſed with ſucceſs, for cultivating this uſeful ſpecies of grain; and in order to this, ſhall begin with the method of preparing the ſoil by ploughing, harrowing, and rolling.

Ploughing increaſes the food of plants, by opening the ſoil to receive the vegetable food from the air; and by enlarging the ſurface, and thereby expoſing a greater quantity of the ſoil to its influence.

Ploughing enlarges the paſture of plants, by opening the ſoil, if too ſolid, and making it firm, if too light.

Ploughing prepares the vegetable food for entering the roots of plants, by reducing vegetables to a ſtate of corruption, and diſſolving oils.

Ploughing deſtroys weeds, by making their ſeed vegetate, and then tearing up the young plants; and by expoſing their roots to the drought.

Ploughing removes wetneſs, by laying up land in proper ridges.

It may be ſaid, therefore, that ploughing is one of the moſt important operations in agriculture; and that the greateſt care is to be taken in the performance of it.

Though ploughing in general ſerves all the purpoſes mention d, yet commonly one of them only is chiefly in view; and according to the deſign in view the work is to be performed.

When the deſign of ploughing is to increaſe the food of plants, the ſurface cannot be made too uneven; for the more uneven that the ſurface is made, the greater quantity of the ſoil is expoſed to the influence of the air, and the greater quantity of food procured.

When the deſign of ploughing is to enlarge the paſture of plants, that kind is beſt that goes deepeſt, (provided the ſoil allows,) and moſt effectually breaks the mold; for the deeper that the plough goes, the greater quantity of ſoil is employed in vegetation; and the more effectually that the mold is broken, the larger is the paſture in the ſame quantity.

When the deſign of ploughing is to deſtroy root-weeds, the ſurface cannot be left too rough, nor the earth of the furrow raiſed in too large pieces; for the rougher that the ſurface is, and the larger the pieces of earth raiſed, the drought has the eaſier acceſs, and more effectually operates in the deſtruction of the roots.

When the deſign of ploughing is to deſtroy ſeed-weeds, the ſurface cannot be made too ſmooth, nor the mold too much broken: for the ſmoother that the ſurface is made, and more effectually that the mold is broken, the ſeeds are the more expoſed to the influence of the air, the ſap better preſerved, and their vegetation the more encouraged.

When the deſign of ploughing is to remove wetneſs, the land muſt be laid up in high and narrow ridges; for the greater number that there are of furrows, there are the greater number of drains; and the higher that the ridges are, the more eaſily the water finds its way to the furrows.

Thus we ſee how this operation of ploughing is to be performed, according to the chief deſign in view. It often happens, however, that land is in ſuch a condition as to require more than one of theſe advantages which ploughing is intended to promote. Theſe are ſometimes conſiſtent with each other, and the land may be ploughed in ſuch a manner as beſt to promote all of them. Thus land is ſometimes, at the ſame time, poor, and wet, and full of root-weeds: now, it may be ploughed in ſuch a manner as is moſt proper for increaſing its food, removing its wetneſs, and deſtroying its weeds: for, by one ploughing, its ſurface may be made uneven, which fits it for receiving an increaſe of food; it may be formed into narrow and ſteep ridges, which beſt removes its wetneſs; and the earth may be raiſed in large pieces, which beſt expoſes the roots of the weeds to be deſtroyed by the drought.

At other times the land is in ſuch a ſituation, that the advantages which it requires from ploughing are inconſiſtent with each other, and it cannot be ploughed in ſuch a manner as is moſt proper for promoting all of them. Thus land, at the ſame time, may be full both of ſeed-weeds and of root-weeds: now, it cannot be ploughed in ſuch a manner as is moſt proper to deſtroy both; for by one ploughing it cannot be raiſed in pieces and left rough, which is neceſſary to deſtroy root-weeds, and have the mold broke and be made ſmooth, which is neceſſary to deſtroy ſeed-weeds. This makes it neceſſary to have one of theſe things chiefly in view at firſt, and to conſider which of the two it is proper to begin with, and how the work may be performed in ſuch a manner, as the other may moſt eaſily ſucceed. Thus, in the preſent caſe, the land ſhould be ploughed, ſo as to be raiſed in pieces, and to be left rough; and in that condition it ſhould be allowed to lie, till the drought may be ſuppoſed to have deſtroyed the roots; and then it may be reduced, the pieces broke, and the ſurface made ſmooth, in order to deſtroy the ſeeds.

In ploughing there are ſome general rules to be obſerved, whatever is the deſign of it. Thus land is never to be ploughed when it is wet. When land is ploughed wet, the deſign of ploughing, whatever it may be, is fruſtrated; and this holds true in every kind of ſoil.

When ſtiff ſoil is ploughed wet, by drying too ſuddenly it becomes ſo hard, that it can receive no benefit from the air, and the paſture in it is entirely ſhut up: root-weeds ſtrike root again before the drought reaches them; and if there are any ſeed-weeds, the ſurface cruſts ſo ſoon, that they are prevented from vegetating.

When light ſoil is ploughed wet, though it may receive ſome benefit by expoſing a larger ſurface to the influence of the air, yet its pores, being full of water, will prevent its paſture from being enlarged; and the root-weeds that are in it, will not be deſtroyed; they will rather flouriſh, by being tranſplanted into a new paſture. In both kinds of ſoil the labour is very ſevere upon the cattle, and the land is greatly damaged by their going upon it, and treading it down with their feet.

Thus it is alſo to be obſerved, that whatever is the deſign of ploughing, the quantity of firm land taken off from the ſurface of the plough in going, ought not to exceed the wideneſs of the furrow which the plough makes below. If it does, the land is not clean ploughed; it is only ſcratched, and a quantity of the ſoil is left below untouched betwixt every furrow that the plough makes.

The quantity of firm land to be taken off by the plough, depends upon the deſign of ploughing, and the nature of the ſoil.

When the deſign of ploughing is to increaſe the food of plants, and deſtroy root-weeds, whether the ſoil is ſtiff or light, as great a quantity may be taken off as the plough can take conveniently; becauſe the greater that the quantity is which the plough takes off, the rougher and more uneven the ſurface is made, the more food is procured, and the root-weeds more effectually deſtroyed.

When the deſign of ploughing is to enlarge the paſture of plants, and deſtroy ſeed-weeds, though a large quantity may be taken off in light ſoil, that naturally falls in pieces when turned over, yet a ſmall quantity ought to be taken off in ſtiff land that is not ſo eaſily reduced; becauſe the ſmaller that the quantity is which the plough takes off, the ſoil is the more effectually broken, and the ſurface made the ſmoother; and the more effectually that the mold is broken, and the ſmoother that the ſurface is made, the paſture is the more enlarged, and the weeds more effectually deſtroyed. This is agreeable to the ordinary practice, introduced no doubt from experience; for we find that a much leſs quantity is taken off when land gets the ſeed-furrow, the chief deſign of which is to enlarge the paſture, than at any other ploughing.

In the directions which we have given about ploughing, we have had chiefly in our view land employed in tillage; it is neceſſary to add ſomething with reſpect to the ploughing lea, or opening up graſs ground.

The Engliſh writers on agriculture, when giving directions about the opening of graſs ground, always ſuppoſe that the land is to be ſummer-fallowed; and they recommend to plough as deep at firſt as the nature of the ſoil will allow. They aſſign this reaſon, That it is not poſſible to plough deeper afterwards. They likewiſe direct to turn the earth upſide down, or on its back, as we have called it. The reaſon they aſſign for this, is, that the ſward or turf may be the ſooner rotten.

Some perſons tried this method of breaking up graſs-ground in Scotland, but they found great difficulty in reducing it: and we have reaſon to believe that many find it ſo likewiſe in England; for Mr. Tull, in his chapter upon ploughs, tells us, That if the turf lie long without being turned, the graſs from the edges will ſpread and form a new turf, and that the roots often ſet up new heads, and the former heads are converted to roots. As Mr. Tull's deſign is to ſhow the neceſſity of the four-cultered plough, we need not doubt but he has a little exaggerated the matter; for, upon a narrow inſpection, it will be found, that if turf is turned upon its back, the graſs will grow only from the ſides. However, we may conclude, from what he ſays, that the land in England is not ſo eaſily reduced in this manner, as ſome pretend.

On the rich lands in Scotland, they follow a method the very reverſe of this which has been mentioned. They commonly ſow after one ploughing of graſs-ground, and plough as ſhallow and narrow as poſſible; and alſo ſet the turf as exactly as poſſible upon its edge. It is not our buſineſs in this place to conſider the propriety of ſowing after one furrow. We may only obſerve, that if the land is good, a good crop may be expected; and if there is a good crop, the turf will be completely rotten before next ſeaſon. What we have to conſider, is, which is the moſt proper method to break and reduce the turf. It is certain, that the thinner and narrower the turf is taken off, the more eaſily it is torn aſunder, and the more that it ſtands on its edge, the harrows in going acroſs take the firmer hold, and make the greater impreſſion.

If this kind of graſs-ground is ploughed before winter in the manner mentioned, ſhallow and narrow, and the turf ſet upon its edge, it may be expected, if we are favoured with a little froſt, that in the ſpring the turf will be in ſuch a condition, as to be eaſily torn aſunder by the harrows, and the land itſelf in a proper condition to be ſown with oats, or to be ſummer-fallowed, and ſown with wheat.

Their barren lands they break up in the ſame manner as in England. They plough deep, and turn the turf over on its back. It ſeems, that the plants which grow on theſe lands have tougher and ſtronger roots than thoſe that grow on rich lands. This makes it more difficult to break the turf. If the earths of the furrows are ſet on their edge, the harrows turn them back, inſtead of tearing them aſunder. This happens whether the land is ploughed deep or ſhallow. But when the earths are turned on their back, and the land ploughed deep, the harrows raiſe a kind of mold upon the back of the turf, by which the hollows betwixt the earths are filled up, and nouriſhment afforded for the ſeed, the greateſt part of which falls into theſe hollows.

There is another method propoſed for opening up graſs-ground, and that is by trench-ploughing. This manner of ploughing is performed by one plough following another in the ſame track. The plough that goes firſt, turns over the ſward or turf; and the one that follows, turns up ſome inches of ſoil upon it. By this method there is ſufficient nouriſhment provided for the crop, and the ſward is rotten before next ſeaſon.

This kind of ploughing needs not be confined to the opening up of graſs-ground; it may be uſed in any ſoil that is deep; for by it ſome new ſoil is turned up, and a greater quantity employed in vegetation.

It has already been obſerved, that ploughing in ridges is proper for removing wetneſs. Every furrow becomes a kind of drain: the rain that falls upon the ridge, makes its way to the furrows, and by means of them is conveyed away from the field.

Ploughing in ridges is alſo proper for enlarging the ſurface. It is certainly an advantage to have the ſurface enlarged. Thereby not only a greater quantity of ſoil is expoſed to the influence of the air, but alſo a great quantity of it actually employed in vegetation. There is no more ſoil added to the field by enlarging the ſurface; but ſome of the ſoil that lies buried, while a field is in its natural ſtate, is expoſed to the air, and brought within reach of the roots of plants, when it is laid up in ridges. Some of the plants which we cultivate in our fields, have what are called horizontal roots, that is, roots that creep along the ſurface, and go down but a ſhort way. Now, it is obviouſly an advantage to theſe plants, to have a quantity of the ſoil below, to which their roots cannot extend, brought within their reach, which is done by enlarging the ſurface.

The tap-rooted plants, that is, ſuch as puſh one principal root perpendicularly downwards, have alſo horizontal roots, by which they are nouriſhed; and therefore it muſt likewiſe be an advantage to them, to have the ſurface enlarged.

To illuſtrate this further, let us ſuppoſe, that the roots of plants upon a field extend themſelves through the whole ſoil within four inches of the ſurface. Now, it is obvious, that there is more ſoil within four inches of the ſurface, when the ſurface is enlarged by ridges, than when the land is lying quite flat.

From theſe things then it appears, that a field contains more food, and has a larger paſture when in ridges, than when laid down level.

It muſt be acknowledged, that ſome conſiderable perſons are of a different opinion; and as this is the caſe, it will not be improper to conſider what is advanced by them.

There are ſome who mention the perpendicular growth of plants, as an evidence, that a ſurface, however much extended, can ſupport no more plants than the horizontal baſe. Though the fact is allowed, that plants grow perpendicularly, and that it is impoſſible to place more of them upon the ſurface than upon the baſe; yet it does not follow, that a field, when its ſurface is enlarged, can nouriſh no more of them: and it is to be remembered it is not more room which we contend for, but more nouriſhment.

We may further obſerve, with reſpect to the growing of vegetables, that the enlarging the ſurface has this other advantage; it gives the plants more air, and thereby prevents them from falling down and lodging.

Mr du Hamel, to ſhow that the enlarging the ſurface by ridges is a real diſadvantage, obſerves, that ſuppoſing the ſlope in ridges is one foot in ſix, yet the ſurface will be to the horizontal baſe only as ſeventy-ſix to ſeventy-five, which, he ſays, is but a ſmall advantage, when compared to the loſs by the furrows.

In anſwer to this, it needs only be ſaid that there is no loſs by the furrows, unleſs when they are a real advantage to the reſt of the field. When land is dry, the corn is as good in the furrows as in any part of the ridge; and when the land is wet, the furrows ſerve for drains, and the loſs by them is more than made up by the advantage which the reſt of the field receives by being drained.

We may therefore conclude in the general, that the way of ploughing in ridges is preferable to the way of ploughing without ridges.

Having ſhown, that ridges are advantageous, as they remove wetneſs, and enlarge the ſurface, it is neceſſary now to conſider what kind of ridges are moſt proper for anſwering the ends propoſed.

As ridges remove wetneſs, when the ſoil is wet, the ridges ought to be narrow; for the greater number there are of ridges, there are the greater number of drains. When the ſoil is wet, the ridges ought alſo to be ſteep. For the ſteeper that the ridges are, the water more eaſily finds its way to the furrows.

When the ſoil is very dry, it is ſubmitted, if narrow ridges are not proper likewiſe. For by altering the ridges, and turning the furrows into the crowns, and the crowns into the furrows, a quantity of freſh ſoil is always employed in vegetation. When the crown of a ridge is turned into a furrow, it is obvious that ſome freſh ſoil is turned up, which was not employed in vegetation in its former ſituation; and the greater number there are of ridges, there is the greater quantity of freſh ſoil employed.

When the ſoil is juſt ſo wet as to occaſion loſs in the furrows, then the ridges ſhould be ſomewhat broader. For, in this caſe, the fewer there are of furrows, there is the leſs loſs.

It is proper to obſerve here, that a difference ſhould be made betwixt the ſituation of land in the winter, and its ſituation in the ſummer. It may be convenient ſometimes, when winter-grain is to be ſown, or when the land is to get winter-fallowing, to make the ridges very narrow; and, when ſummer-grain is to be ſown, to make them broader.

As it is an advantage to have the ſurface enlarged, the ridges ought to be made high in the middle, or crown. For the higher that the ridge is made, the more is the ſurface enlarged.

When the ſoil is ſhallow, the ridges, if broad, cannot be raiſed, without depriving the furrows of ſoil: and therefore, to enlarge the ſurface on ſuch land, the ridges muſt be made narrow. For this both enlarges the ſurface, and prevents the furrows from going below the ſoil.

When the ſoil is deep, the ridges may be made broader: for though the ridges are raiſed in the crown, yet ſtill there is ſoil left in the furrows. But then the ridges muſt not be made too broad: for it is evident, that narrow ridges give more ſurface than broad ridges, of the ſame degree of ſteepneſs; and do not cover the lower parts of the ridges ſo much from the influence of the ſun and winds.

It is neceſſary to obſerve, that though, in the general, it is recommended to raiſe the ridges in the crown, to enlarge the ſurface, and to allow the water more eaſily to find its way to the furrows; yet, in ſome low flat-lying land, it is proper to make the ridges as flat as poſſible, in order to raiſe the furrows. For the higher that the furrows are raiſed, there is, in ſome caſes, the greater command of the water, and it is the more eaſy to find a fall for conveying it away.

It is neceſſary to obſerve likewiſe, that flat ridges have this advantage over ſteep ridges; they can be ſown with greater exactneſs. It is obvious from the method of ſowing, that, in ſowing ſteep ridges, it is not poſſible to prevent a great proportion of the ſeed from falling into the furrows. It is obvious likewiſe, that this proportion is increaſed by harrowing. Whereas, in ſowing flat ridges, the ſeed is qually ſcattered, and the harrows do not remove it from its place.

From theſe obſervations, it is obvious, that ſoils in different ſituations require to be laid out in different kinds of ridges. It is abſurd, therefore, to aſſert, that, in every caſe, one kind of ridges is preferable to another; that narrow ridges are better than broad ridges, and flat ridges better than ſteep ridges. In ſome ſituations, one kind of ridges is moſt proper; and, in other ſituations, another kind is moſt proper. Every perſon ought, therefore, to conſider the nature of the ſoil he has to deal with, conſider the advantages and diſadvantages of each kind of ridges, and then determine which are moſt proper.

When there is nothing in the nature of the ſoil to determine what kind of ridges are moſt proper, then narrow ridges are to be preferred; for this reaſon, that a quantity of land in narrow ridges is ſooner ploughed than when in broad. It is obvious, that the two firſt furrows which the plough takes off from the ridge, are wider than any taken off afterwards, eſpecially if the plough begins in the furrow, as is frequently the caſe; ſo that the greater number there are of ridges, the field is the ſooner ploughed. Beſides, when ridges are broad, it is obvious, that the plough has more work, and muſt take longer time in turning, than when they are narrow. But then it is ſuppoſed that the ridges are ſtraight and equal. If they are not, the greater number there are of them, the greater is the trouble, and the more time is ſpent in ploughing. This, however, it muſt be owned, is of no great importance; becauſe it ſeldom happens, that the kind of ſoil does not determine what kind of ridges are moſt proper.

Having conſidered the kinds of ridges proper for land, according to its different ſituations; it is proper to inquire, whether there are any qualities which ridges ought to have, whatever is the ſituation of the land.

It will eaſily appear, that all ridges ought to be made ſtraight. Crooked ridges, it is obvious, are attended with ſeveral inconveniencies. In ploughing them, the cattle are not always going exactly in the ſame direction with the plough; ſhort turnings are often neceſſary, as fields are generally bounded by ſtraight lines, or lines not crooked in the ſame manner with the ridges; and, when there is a ſmall deſcent, the water, as it runs in the furrows, meets with reſiſtance.

It is obvious, that when the plough goes in a curve, as it does in ploughing crooked ridges, the draught is not in the ſame direction with the beam, but is either to the right or left of it; and this gives the plough either too much or too little land.

It is obvious likewiſe, that, when ridges are crooked in a manner different from the lines by which a field is bounded, in ploughing the ridges upon the ſides, one part of them muſt be finiſhed before ſome other parts are near done; and thus ſhort turnings are neceſſary, which hurt the land much by the treading of the horſes.

It is obvious likewiſe, that, as a crooked furrow is continually altering the direction of the water, and has a leſs deſcent than a ſtraight furrow, the water, as it runs along it, muſt meet with greater reſiſtance, and thus penetrates the ſoil, and makes it more difficult to convey it away.

Theſe inconveniencies are removed by making the ridges ſtraight. For, in ploughing ſtraight ridges, the cattle are always going in the ſame direction with the plough; no ſhort turnings are neceſſary, as fields can be made of an equal breadth in all places; and the furrows having a greater deſcent, the water meets with leſs reſiſtance, and is more eaſily conveyed away.

Straight ridges not only remove the inconveniencies with which crooked ridges are attended, but it is found that they are to be attended with no inconveniencies themſelves: they require indeed a little attention in the ploughman, which is itſelf an advantage; and therefore, upon all occaſions, are to be preferred.

As, in all kinds of ſoil, ridges ought to be ſtraight, ſo likewiſe they ought to be equal, equal one to another, and the ſame ridge equally broad in all places. Unequal ridges are attended with inconveniencies, as well as crooked ridges. It is difficult to ſow them with exactneſs; it is difficult to alter them, when neceſſary; and the plough muſt often turn in the middle of the ridge, which does great harm, by the treading of the horſes, or it muſt be driven empty to the end.

Theſe inconveniencies may be removed by making the ridges equal. Equal ridges may be ſown with greater exactneſs, and conſequently with leſs ſeed; it is eaſy to change them, one into two, or two into three, as occaſion requires; and the ſame furrow that finiſhes the ploughing of the ridge in one place, finiſhes it in all places; ſo that there is no neceſſity to turn the plough in the middle of the ridge, or to drive it forward the ſhorteſt ſpace, without turning up a furrow.

In many places of England and Scotland the ridges are ſtill crooked and unequal; and, in many places, they are much broader, and much higher raiſed in the crown, than the nature of the ſoil allows. Were the ridges altered, and the fields laid down in a proper manner, as the ſoil requires, it would be a great advantage. At the ſame time, it may be obſerved, that much harm is done, by proceeding in this matter with too much precipitancy. It is neceſſary, therefore, that we conſider it as an affair of ſome importance.

It is neceſſary to obſerve, in the firſt place, that ridges muſt not be raſhly altered; on the contrary, great caution is to be uſed.

If the ſoil is very dry, ridges may be altered without great danger, though high; and they may be made ſtraight without being levelled. For, though the old furrows are ſtill lower than the reſt of the field, yet this is attended with no bad conſequences in dry land; and by degrees, they are filled up in ploughing. But then, it is to be obſerved, that there is not much land in Scotland, on which the ridges, at preſent, are high raiſed, in its nature ſo dry, as to allow this to be done.

If the ſoil is wet, the ridges cannot be made ſtraight till the ground is level, without great danger. For the water will lodge in the hollows of the old furrows, from whence it will not be poſſible to force it. Some perſons that make their ridges ſtraight before they are ſufficiently levelled, draw water-furrows along the hollows of the old furrows, to carry off the water that is apt to lodge there. This is of ſome uſe, but does not fully anſwer the purpoſe. A quantity of looſe earth, in ploughing, is thrown into the old furrows. The water, as it falls, penetrates this looſe earth, and is retained by it, notwithſtanding the water-furrows. Beſides, theſe water-furrows muſt be neatly cleaned out with a ſpade, and made deeper in the places where they are intercepted by the crowns of the new ridges, otherwiſe they are of very little uſe.

Before ridges can properly be made ſtraight, it is neceſſary therefore that the land be made as level as poſſible.

But it muſt be obſerved, that it is as dangerous to level ridges raſhly as to alter them before they are levelled: for if ridges are levelled too faſt, and thereby a great depth of looſe earth thrown ſuddenly into the furrows, it will not be poſſible to convey away the water that falls upon them. The water as it falls will ſink to the bottom, and there will lodge and chill the ſoil; and the earth thrown into the furrows being looſe, the cattle in ploughing muſt ſink to the bottom likewiſe, by which the land is very much patched.

It is recommended therefore to every perſon, ſeriouſly, to conſider the nature of the ſoil he has to deal with, before he proceeds to the altering old ridges; and, if the ſoil is wet, to level the ridges very gradually. When the ſoil is deep, and inclining to be wet, and a ſufficient ſlope for carrying off the water, it is probable, that the loſs ariſing from the levelling ſteep and broad ridges ſuddenly, may exceed the profit of many years ariſing from the ridges being properly laid down; and therefore, if a view to incloſing makes it neceſſary to ſtraight the ridges, the levelling them ſhould be the work of ſeveral years. Even ſuppoſing that the ſoil is ſhallow, and the ridges raiſed ſo high, that there is nothing but graſs left in the furrows, yet ſtill it is improper to level the ridges too faſt, though levelling in this caſe is neceſſary.

In levelling ridges a great hollow is made in the crowns. This is occaſioned by frequent ſucceſſive cleavings, which is the method commonly uſed for levelling ridges. It is obvious, that by the firſt cleaving a hollow is made in the crown of the ridge equal to the depth and breadth of the furrow which the plough makes; whereas the parts on each ſide of the ridge are but little levelled, and at each ſucceſſive cleaving this hollow is made greater. Such a quantity of new earth immediately turned up, is not fit for vegetation. Beſides, this hollow becomes ſo great, and the parts of the ridge on each ſide of it become ſo ſteep, that it is impoſſible to plough them in a proper manner.

In this caſe, when levelling is ſtill thought proper, ſome furrows from each ſide muſt be thrown back by the plough into this hollow, by which a new ſmall ridge is formed upon the crown of the old one, and then the remaining parts of the ridge may be levelled as before. Some perſons, inſtead of this, plough acroſs the ridges. This method ſerves the ſame purpoſes; it both throws ſome earth into the hollows, and levels the ridges; for the plough in going carries off ſome earth from every height, and leaves ſome in every hollow. But then land muſt not be left in this ſituation during the wet ſeaſon, unleſs water-furrows are drawn along the furrows, and alſo in ſome caſes along the crowns; for unleſs this is done, the water that falls upon the field cannot be conveyed away. At the next ploughing, the whole old ridges may be levelled in the ſame manner as at the firſt ploughing; or, if thought more proper, may be divided into two equal ridges, ploughed in ſuch a manner that the furrow betwixt them may be exactly in the crown of the old ridge, and the other furrows exactly in the furrows of the old ridge. By this operation the old ridge is raiſed from the furrows, and levelled from the crown.

When a perſon is upon a ſcheme of levelling, this method of dividing the ridges into two will be found very proper, either when winter-grain is to be ſown, or when the barley-land gets the winter-ploughing.

Though land may be in ſuch a ſituation as to allow the ridges to be levelled with ſafety, yet unleſs it is remarkably dry, and in no caſe in danger of being damaged by too much water, the ridges ſhould not be altered, excepting when the land is ſummer-fallowed; and in that caſe, beſides the ploughing that alters the ridges, there ought to be another before the wet ſeaſon comes on, that ſo the bottom may be ſufficiently firm to reſiſt the water.

We have obſerved, that ridges ſerve to remove wetneſs, and to expoſe the ſoil to the influence of the air, and we have ſhown what kind is moſt proper for theſe purpoſes. But this is not enough; it is neceſſary likewiſe to conſider in what manner ridges ought to be placed. This is a matter of ſome conſequence: for, according to the poſition of ridges, water may be either conveyed away or retained; and ſome aſſert likewiſe, that by this the ſoil may be better expoſed to the influence of the ſun and wind. Theſe things therefore muſt be kept in view in the placing of ridges.

When the land is wet, as is often the caſe, it is certain that ridges ought to be placed with a view to the conveying away the water: but when land is dry, as is ſometimes the caſe, then ridges ſhould be placed with a view to the retaining the water.

The moſt common way of placing ridges where there is a ſlope, is along the declivity in a ſtraight line from the top to the bottom; and land is commonly laid out with a view to this. Where the declivity is gentle, this is, no doubt, a very proper way of placing the ridges; but if the declivity is great, this way of placing the ridges allows the ſoil to be waſhed away by the rain. It is obvious, that water, in running off of land, carries a part of the ſoil along with it, and the quantity is great, in proportion to the violence with which it runs. In climates where there are heavy ſhowers of rain, the damage done by this is not inconſiderable. Therefore, in this caſe, placing ridges acroſs the declivity is the moſt proper way; for when ridges are placed acroſs, the water meets with many interruptions in its courſe, and does not run off with ſuch violence as when placed along from top to bottom, and therefore does not carry off ſuch a quantity of the ſoil along with it.

Inſtead of this ſome perſons make the ridges very narrow. This ſerves the ſame purpoſe; for in proportion to the number of furrows, there is the leſs water in each furrow, and conſequently it runs with leſs violence. However, placing the ridges in this manner is not ſo proper for this purpoſe as placing them acroſs the declivity, and, beſides, is not ſo proper for retaining the water in a dry ſeaſon.

When land is very dry, and in no danger of being damaged by the ſtagnation of water, the ridges ought to be placed acroſs the declivity, as near the level as poſſible; for this retains both the water and the ſoil. It is obvious, that when ridges are placed in this manner, the water cannot get off by running along the ſurface, by which the ſoil is in greateſt danger of being carried away. As the furrows ſtop it in its courſe down the hill, it can get off in no other way than by penetrating the ſoil. By this a part of it is retained; what of it gets off is clear, and carries no ſoil along with it.

When land is dry at the head of the ridges, and wet at the foot, and no proper fall for carrying off the water, as is frequently the caſe, the ridges ſhould be placed in the ſame manner, directly acroſs the declivity. For, in this caſe, every furrow in ſome meaſure retains the water that falls upon the ridge above, and thereby prevents it from ſinking towards the bottom of the field, and lodging there. By this way of placing the ridges, the dry part of the field is rendered wetter, and the wet part of the field is rendered drier than otherwiſe they would be.

This is likewiſe a very proper way of placing the ridges, even when the declivity is but ſmall, if the land is in the ſituation mentioned, dry at the head, and wet at the foot. It muſt be owned, however, that this will not entirely anſwer the end propoſed: for the water will penetrate the ſoil; and when it is reſiſted by till or clay, will find its way along theſe to the bottom of the field. But this will not be ſo ſudden, as in the other way of placing the ridges; and the ſoil at the head, which is naturally dry, will receive more benefit from the rain as it falls.

When land is wet, and the water may be conveyed away from the bottom of the field, the ridges ſhould be placed acroſs likewiſe; not directly, but with a ſmall ſlope to a drain or furrow on the ſide of the field from top to bottom, by which the whole water is conveyed away. In this caſe every furrow becomes a drain to the ridge below, and prevents the water from running over it.

When land is wet from the breaking out of ſmall ſprings, this way of placing the ridges is alſo very proper. The furrows convey away the water as it riſes, and prevent it from doing any damage.

It is neceſſary to obſerve, that ridges placed in this manner, to ſerve theſe purpoſes, ſhould not be altered; for when the furrow is kept in one place, it is a more proper drain than when altered. When the furrows are kept in one place, the bottom is always firm, and the water runs eaſily along it; whereas, if changed, it may fall upon places of the field, where the ſurface, being raiſed by former ploughings, will prevent them from reaching the firm bottom. Beſides, if the ſprings break out in the furrows, by changing their place, they may break out in other parts of the ridge.

It is neceſſary to obſerve likewiſe, that ridges placed in this manner ſhould not be raiſed in the crown, but kept quite flat; that ſo, by the natural deſcent of the ground, the whole water that fall upon the ridge may be conveyed into the furrow below.

It was before obſerved, that ſome perſons aſſert, that, by a proper poſition of ridges, the ſoil is better expoſed to the influence of the ſun and air. Theſe perſons recommend the paying a regard to this. But it cannot be done excepting when the land is quite flat, and when the placing of the ridges makes no difference as to its wetneſs. However, as this is repreſented by thoſe perſons as important, ſome attention ſhall be given to what they ſay.

Some adviſe the placing the ridges ſouth and north; and the reaſon which they aſſign for this, is, that thereby the ſun may have an equal influence upon all parts of the ridge.

Others, again, adviſe the placing the ridges eaſt and weſt; and the reaſon which they aſſign, is, that they may ſhelter each other from the cold north wind.

Which of theſe advantages is the greateſt, is uncertain. It is even uncertain whether they can be called advantages at all.

It may be diſputed, whether, in the winter-ſeaſon, cold or heat is moſt beneficial to land. That heat is beneficial and cold deſtructive to plants, is certain. But cold poſſibly may be as proper as heat for preparing land for the nouriſhment of plants. It is allowed, that the coldneſs of the north wind, is in ſome meaſure owing to the quantity of ſalts that it carries along with it. Theſe ſalts are beneficial to land; and therefore an expoſure to the north ſeems to be rather a benefit than a diſadvantage. This is confirmed from obſervation. The lands on the north ſide of riſing grounds are, generally ſpeaking, more fertile than thoſe on the ſouth-ſide. It is certain, that the richeſt lands in Scotland have this ſituation, and are expoſed to the north.

It may be diſputed likewiſe, whether the north or the ſouth ſide of an eaſt and weſt ridge has moſt benefit from the ſun in ſummer. It is not to be denied, that the rays of the ſun fall more directly on the ſouth ſide of the ridge; but then let it be obſerved, that the north ſide has the benefit of the ſun's rays in the mornings and evenings, when the ſun is ſo low, that the ſouth ſide is under the ſhade; which may poſſibly balance the loſs ſuſtained by the greater obliquity of the ſun's rays about mid-day.

Theſe things have been mentioned, to ſhow, that it is uncertain, which way of placing ridges expoſes the land beſt to the influence of the ſun and air; and therefore, that, in placing them, it is needleſs to have any view in this. When the placing of ridges makes no difference as to the wetneſs of land, then we are chiefly to have in view the conveniency of ploughing and laying out the land in proper breaks.

There are three different ways of ploughing ridges: gathering, caſting, and cleaving.

Gathering keeps the crown and furrows of the ridge in the ſame place in which they were before. The plough begins in the crown, and ploughs out the ridge, turning the earth towards the crown, where it entered. Every ridge is ploughed by itſelf; or, inſtead of this, the halves of two contiguous ridges may be ploughed together. By this method of ploughing, the ridge is higher raiſed than before. It is obvious, that, as the earth on each ſide is turned upon the crown, and thrown up out of the furrows, the ridge is raiſed, both by making the crown higher, and the furrows lower.

Caſting keeps the crowns and furrows likewiſe in the ſame place, in which they were before. The ridges are ploughed in pairs. The plough may enter in the furrow betwixt the ridges, and plough out the ridges, turning the earth towards the furrow, where it entered. Or the plough may enter in the furrow on the right ſide of the two ridges, then turn to the one on the left, and plough out the ridges, turning the earth to theſe furrows, and from the furrow that is betwixt them. By this method of ploughing, the ridges are kept of the ſame height in the crown, and one of the furrows made a little higher, and the other a little lower than before, The earth is taken from one furrow, and thrown into the other, and this is done alternately through the field. If this is reverſed at next ploughing, that is, the earth turned into the furrows from which it was taken at the former ploughing, thereby the ridges are preſerved in the ſame ſituation.

Cleaving is the reverſe of gathering. The plough enters in the furrow on the right ſide of the ridge, turns to the furrow on the left ſide, and ploughs out the ridge, turning the earth from the crown towards the furrows. Every ridge is ploughed by itſelf; or, inſtead of this, the halves of two contiguous ridges may be ploughed together. If the ridge is raiſed in the crown, by this method of ploughing it is made flatter. It is obvious, that, by this method of ploughing, earth is thrown into the furrows, by which they are made higher; and that earth is taken from the crowns, by which they are made lower. If the ridge is already flat, by this method it is changed, and the crown turned into the furrow.

When a field is laid out in the manner judged moſt proper, with reſpect to the breadth and height of the ridges, it ſhould be ploughed in one or other of theſe ways mentioned, according to its ſituation. If the ridges are broad and high, caſting will be found to be the moſt proper method of ploughing. For this is the only way by which they can be ploughed, and yet kept in the ſame ſituation: cleaving will make them flatter; and gathering will raiſe them higher. If they are flat and narrow, cleaving will be found to be the beſt method. Cleaving flat ridges, and thereby turning the crowns into furrows, and the furrows into crowns, has theſe peculiar advantages: a field is much ſooner ploughed in this way, than in any other; and a quantity of freſh earth, at every ploughing, is expoſed to the air, and employed in vegetation: and the ridges being kept level, are ſown with exactneſs. In no caſe gathering is proper, unleſs when the proper ſituation of the ridge renders it rather too wet for winter grain.

It may not be improper, in this place, to conſider a method of ploughing, uſed in ſome places, called ribbing. This method of ploughing is performed by making furrows about two feet diſtant from each other: one half of the ſurface is untouched by the plough, and the other half, which the plough turns up in making the furrows, is thrown on the top of what remains faſt. The land may be ploughed in this manner, either without regard to ridges; or the plough may be made to enter and turn, as it does in gathering, caſting, or cleaving; that is, a ridge may be ribbed in the way of gathering or cleaving; and two ridges may be ribbed in the way of caſting. This kind of ploughing is ſeldom practiſed but in the beginning of winter, and upon land to be ſown with barley, after two more clean ploughings. It does not prevail ſo much as formerly, and is very much condemned by our modern improvers. But, however much it may be condemned, it certainly has its uſes. It keeps the land dry; the rain that falls is confined to the furrows, from whence the looſe earth is taken, and eaſily finds its way off. It facilitates the rotting of the ſtubble, by covering it and keeping it dry; it makes the froſt penetrate a greater quantity of the ſoil; and it alſo expoſes a larger ſurface to the influence of the air. Theſe things make this kind of ploughing, in ſome caſes, preferable to a clean ploughing.

There is alſo another method of ploughing called bouting. It is performed by throwing the earths of two furrows towards each other upon ſome faſt land. This is certainly an improvement upon ribbing, and better anſwers all the purpoſes of it.

By this method ribs are placed where furrows were before, and furrows where ribs were before; and the ſurface is entirely changed, what was above turned down, and what was below turned up. Theſe two ploughings may be performed with the ſame ſtrength, and in the ſame time with one clean ploughing; and, it is probable, that, upon trial, in ſome caſes, will be found more beneficial.

As a further improvement of this method of ploughing, it is propoſed to rib the land, and, at the ſame time, to plough it clean. This is done by throwing the earths of three or four furrows together in ſuch a manner, as to leave no faſt land below; and is the ſame thing with ploughing the land in ridges about three feet broad, from the middle of one furrow to the middle of the other. This ſerves all the purpoſes of the other kinds of ribbing, and, beſides, has theſe further advantages; the land being clean ploughed, weeds are more effectually deſtroyed, and the ſoil is better opened for receiving benefit from the froſt and air. This method may likewiſe be reverſed by another ploughing. The ſurface may be entirely changed, and the ribs turned into furrows, and the furrows into ribs.

Theſe different methods of ploughing, the laſt two excepted, are known to every common ploughman, and they ſhould be attended to by every improver, as of importance; without a proper knowledge of them he cannot give directions to his ſervants, nor prevent them from falling into blunders in the execution, which they are but too apt to do. The ignorance of a maſter in things which his ſervants are acquainted with, is attended with bad conſequences; it gives them an indifferent opinion of his knowledge of farming, and makes them deſpiſe every new thing which he propoſes, as abſurd and whimſical.

It was obſerved, that ploughmen are apt to commit blunders in ploughing. Thus in gathering ridges, if care is not taken in beginning the ploughing of the ridge, ſome firm land will be left in the crown, and the crown itſelf ſo much raiſed above the reſt of the ridge, that no ſeed will lie upon it. It is ſometimes obſerved, that juſt on the crown of a ridge, where the ſoil is deepeſt, there is leſs corn, and more root-weeds, than in any other part of the ridge. This is certainly occaſioned by allowing firm land to remain there in ploughing, and by raiſing the crown like a peak above the reſt of the ridge. The ploughman, inſtead of turning back the earth of the firſt furrow, and the firm land below it, keeps at ſuch a diſtance, as to lay the earth of the ſecond furrow up to it, or on the top of it. This leaves firm land betwixt the furrows, and raiſes the crown of the ridge to a peak. But if he is directed to draw the furrows ſo near, as to turn back the earth of the firſt in making the ſecond, no firm land will be left, and the earth, that by the other method is thrown upon the crown, will be ſcattered.

This blunder is oftener committed when flat ridges are cleaved. In cleaving, if the ridges are ploughed out turning the plough always to the left, it is impoſſible to prevent the two furrows, laid together in the crown of the new ridge, from being at too great a diſtance, and raiſed higher than the reſt of the ridge. When ridges are cleaved in this manner, the earth of the firſt furrow that the plough makes, is turned over upon firm land, and backed by the earths of the other furrows in their courſe. This makes it impoſſible to get at this firm land in ploughing the next ridge, without turning up the firm land itſelf, and the earth of the furrow laid over it, upon the top of the earth of the ſecond furrow, by which the crown of the ridge would be raiſed to a high ſharp peak. Now, to prevent this, the ploughman, in ploughing the next ridge, keeps at a proper diſtance, and does not touch the firm land, over which the earth of the firſt furrow is laid. But it may be obſerved, that he muſt either keep at ſuch a diſtance as to leave firm land in the crown of the new ridge equal to the breadth of two furrows, or he muſt turn the earth of his furrow upon the top of the earth of that firſt furrow. By this the crown of the ridge is ſtill high raiſed, and ſome firm land ſtill left.

But ridges of this kind may be cleaved without leaving any unploughed land, or without raiſing the crown much above the reſt of the ridge. The method of doing it is this: after the plough has made the firſt furrow, inſtead of turning to the left, and making a furrow on the other ſide of the ridge, it turns to the right, and throws back the earth of its firſt furrow along with the firm land below it, and after going round again in the ſame courſe, turns to the other ſide of the ridge, and goes twice round in the ſame manner, after which the ridge betwixt the two fierings, as they are called, is ploughed out, as at firſt propoſed. When the ploughing of the ridge is finiſhed, a new fiering is made in the next furrow, by the plough going twice round, as before directed, and then the ridge betwixt the laſt-made fiering and the ploughed land is ploughed out in the ſame manner as before; and in the ſame way the fierings are made till the whole field is ploughed. By this method there is no firm land left below the earth of the furrow; and the earth that is turned towards the crown being ſcattered, and not laid all in one place, the crown itſelf is not much raiſed above the reſt of the ridge.

It may be obſerved likewiſe, that in caſting ridges, if care is not taken, the furrow towards which the earth is thrown will be ſo filled up as to be improper for a drain. The plough enters the ridge near the furrow, and throws the earth towards it, turns to the right, and throws the earth from the oppoſite ſide towards it likewiſe; and then goes in the tract of the old furrow, betwixt the earths of the furrows made on each ſide. This furrow, towards which the earth is thrown, is ſometimes ſo filled up as to render it improper for a drain. We have ſhown how the earth around it is ploughed. The furrow which the plough makes going in the track of the old furrow, betwixt the earths of the furrows on each ſide, is called a gore-furrow. On the left ſide, the plough having no mold-board, the looſe earth falls back into the furrow behind the plough, and fills it up, or at leaſt makes it unfit for a drain, which in wet land is a great diſadvantage.

But this may be prevented by proper care; the furrow may be made clean, and fit for a drain. The method of doing it is this: the plough enters about two feet from the furrow, and inſtead of turning to the other ſide, returns on the ſame ſide, turning back the earth, and then goes round again in the ſame courſe; after this turns to the other ſide of the furrow, and does the ſame, goes twice round. By this the gore-furrow is made quite clean, and, like the crowns of ridges, formed at about two feet diſtance on each ſide.

Some other things of a like nature might be mentioned. Theſe have been inſiſted upon, to ſhow, that it is neceſſary to attend to every circumſtance of ploughing, that ſo this important work may be performed in the moſt proper manner.

The chief deſign of harrowing land is, to ſmooth the ſurface. By this weeds are deſtroyed, and ſeed, if ſown, is covered.

Root-weeds, that are looſed by the plough, are ſometimes torn up by the harrow, and thus are deſtroyed. When this is the deſign of harrowing, the harrows ſhould go acroſs the ridges, or rather acroſs the way that the plough has gone. Becauſe, by going acroſs the earths of the furrows, the teeth of the harrow are apter to catch hold of the roots, than if it ſhould go in the ſame way with the plough.

Though the harrow may bring ſome part of the roots above ground, yet commonly ſome other parts continue below, which will grow if undiſturbed. This makes it neceſſary for perſons to follow the harrows, and gather all the roots which they obſerve brought up, and carry them off of the field, or burn them.

If harrowing does not actually tear up the roots, it encourages their vegetation, by filling up the hollows, and thereby defending them againſt their greateſt enemy, the drought. On this account harrowing is improper for deſtroying root-weeds, excepting after a ſpring-ploughing, when the land is ſoon to be ploughed again for ſeed. For at this ſeaſon the drought is ſeldom violent, and it has not time to operate in the deſtruction of the roots; and therefore whatever the harrows bring out is ſo much deſtroyed.

The ſame things that make harrowing improper for deſtroying root-weeds, make it very proper for deſtroying ſeed-weeds. The ſmoother that the ſurface is made, and the more effectually that the mold is broke, the ſeeds near the ſurface are the more expoſed to the air, and the ſap, which is in the land, the more effectually retained. Both theſe are neceſſary to promote the vegetation of the ſeeds; and they muſt vegetate before they can be deſtroyed. But harrowing not only promotes the vegetation of the ſeeds of weeds, but alſo deſtroys the young plants when ſprung up; ſo that one ploughing, if the ſeaſon is favourable, and ſoil allows, may be attended with ſeveral harrowings, and thereby ſeveral crops of weeds deſtroyed.

If land riſes in hard clods, the harrow makes but little impreſſion; at leaſt before the clods are broken, the land is made ſo firm by the treading of the horſes, and the weight of the harrows, as to render the work uſeleſs, and ſometimes deſtructive. Great care ſhould therefore be taken to prevent land from being brought to this ſituation. If land once riſe in hard clods, it is vain to expect to break them with the harrow, ſo as to cover the ſeed. Unleſs the ſeaſon is very wet, it will remain in this ſituation through the ſummer, and afford but little nouriſhment for the crop. Sometimes it will remain in this ſituation after men have attempted to break the clods with malls.

If the ſoil is light and ſpungy, it can ſcarcely get too much harrowing; for the more that it is harrowed, it becomes the firmer. But if the ſoil is ſtiff, the leſs harrowing it gets the better, if the purpoſes propoſed are anſwered. The effects of harrowing are in this caſe contrary to thoſe of ploughing. Ploughing renders ſtiff ſoil more free and open, but harrowing renders it ſtill more firm and ſolid.

The ordinary way of harrowing after ſeed is ſown, is firſt along the ridges, then acroſs, and then along again. If ridges are flat, they may be harrowed either along or acroſs; and the work may be begun or ended either way. But if the ridges are ſteep, it is improper to begin by harrowing acroſs, becauſe thereby too much of the ſeed will be drawn into the furrows. If the ridges are very ſteep, for the ſame reaſon, it is improper to harrow acroſs at all. For another reaſon it is thought improper to harrow acroſs ridges when the land has been ploughed immediately out of lea or graſs. In ploughing this kind of land, the ſward is for the moſt part turned over whole; ſo that when the harrow goes acroſs, inſtead of tearing the ſward, it is apt to turn it back into the furrow from whence it was taken. When ridges are gathered or caſt, this will probably happen. In caſting, the earths of the furrows on one ſide of the ridge are turned towards the crown; and, in gathering, the earths of the furrows on both ſides are turned the ſame way; and therefore the harrows, when drawn from the crown to the furrow, are apt to take hold of the unbroken ſward, and turn it back But this does not ſo readily happen when the ridge is cloven. Becauſe in cleaving, the earths of the furrows on both ſides of the ridge being turned from the crown, the harrows, in going up from the furrow, are not in ſuch danger of turning them back. In ploughing lea, the earths of the furrows are ſometimes placed as exactly as poſſible upon their edge, that ſo they may be the more eaſily torn by the harrows. When theſe are turned to the crown, they do not ſupport each other; and are therefore eaſily turned back by the harrow, in going from the crowns to the furrows: but when the earths are turned to the furrows, ſo they ſupport each other by their weight; and therefore are not ſo eaſily turned back by the harrows in going up from the furrows to the crowns.

Rolling of land is practiſed with ſucceſs, both on land lying in graſs and on land in tillage. It is of advantage to land in graſs, by preſſing down mole-hills and mole-runs. Some ſay, that it alſo deſtroys fog.

When land is laid down in graſs for hay, rolling is of uſe in ſmoothing the ſurface; and, when laid down in graſs for paſture, it makes the graſs ſtool, or tiller, and grow thicker.

There is a kind of land, which, when clover is ſown upon it, throws out the young plants after froſt. Rolling, in the beginning of winter, and immediately after the froſt is gone, it is ſaid, will, in ſome meaſure, prevent this. The firſt rolling prevents the froſt from penetrating ſo deep, as otherwiſe it would do; and the ſecond makes the land firm, after having been looſed by the change from froſt to open weather.

Rolling may alſo be uſed with advantage upon land in tillage. When the land is naturally ſtiff, and may be reduced by the harrow, rolling is very improper: for it makes this kind of land ſtill firmer than the harrow does. But if the land riſes in clods, which the harrow does not reduce, rolling is very proper; for it ſmooths the ſurface, and breaks the clods, more effectually than harrowing.

When the land is light and ſpungy, the roller ſhould always be applied after ſeed is ſown; for it is ſcarcely poſſible to make this land too firm.

It was obſerved, that, to deſtroy root-weeds, land ſhould be made rough, and raiſed in as large pieces as poſſible; and that it ſhould be allowed to lie for ſome time in that ſituation. Rolling, after this, is of great uſe; for, without it, if the weather continues dry, it will not be poſſible to make the land fit for receiving another ploughing.

If the land is ſoft below, and ſome hard clods upon the ſurface, which the harrow does not break, rolling may be uſed with ſome advantage: for, beſides ſmoothing the ſurface, it will bruiſe ſome of the clods; and ſuch of them as are preſſed down, will be diſſolved by the natural fermentation of the ſoil, if in good heart.

Sometimes in ſtiff land, ploughed dry, after a former wet ploughing, or when, by any accident, it has been much trod upon, the whole riſes in hard clods, which the harrows cannot break, ſo as to cover the ſeed. In this caſe rolling is of great uſe. It bruiſes ſome of the clods; and, when followed by the break-harrow, theſe clods are raiſed up and broken. Though rolling ſhould do no ſervice but ſmooth the ſurface, yet, on that account, it ſhould be practiſed. For when the ſurface is ſmooth, the corn may be cut down more expeditiouſly than when it is rough and uneven. When graſs-ſeeds are ſown for hay, it is abſolutely neceſſary to ſmooth the ſurface: the roller is moſt proper for this. Some uſe it before, and ſome after ſowing. When it is uſed before ſowing, the ſeed is more equally ſcattered.

Graſs-ſeeds muſt be ſown in ſuch a manner, as to lie near the ſurface; otherwiſe they will not vegetate. The making the land firm by rolling is therefore an advantage, as, by it, the ſap is better preſerved; and this does not ſo much damage to graſs as to corn, for the ſeveral kinds of it are commonly better foragers.

But however all the operations of ploughing, harrowing, and rolling are performed, ſomething will be ſtill wanting to promote vegetation, and this want is effectually ſupplied by certain ſubſtances called manures. To apply theſe ſubſtances in ſuch a manner, as moſt effectually to promote vegetation, it is of importance to know their natures, and the ways in which they operate. This is the more neceſſary, as, without it, we cannot know how to apply them in the moſt proper manner to the different ſoils.

Manures operate, by communicating to the ſoil with which they are mixed, the vegetable food which they contain; by communicating to it a power of attracting this food in greater plenty from the air; by enlarging the vegetable paſture which it contains; and by diſſolving the vegetable food which it is already poſſeſſed of, and fitting it for entering the roots of plants.

Manures are very different in their natures. Some of them operate in all the ways mentioned; and there are none of them that do not operate in more ways than one.

Great miſtakes have ariſen from ſuppoſing that manures operate only in one way. None have been attended with greater loſs, than ſuppoſing that they ſerve only to divide the ſoil, and that tillage may be ſubſtituted in their place. This is Mr. Tull's opinion, and is, indeed, the fundamental principle of his horſe-hoeing huſbandry.

Before one changes the ordinary practice of agriculture, in ſo important a point as baniſhing manures from his fields, the good effects of which are ſo obvious; he muſt be certain, that the principle which determines him to ſo important a change, is itſelf well-founded.

Mr. Tull has endeavoured to prove, that earth is the food of plants; and hence infers, that to divide the earth into minute particles, by which it is fitted for entering their roots, is all that is neceſſary in agriculture: and this, he aſſerts, may be done by tillage, without manures.

When treating of the food of plants, we have attempted to ſhow, that other principles, beſides earth, are in the compoſition of this food: and, if this is true, the want of manures, which provide theſe other principles, cannot be ſupplied by tillage.

But ſuppoſing we allow, with Mr. Tull, that earth is the food of plants, yet ſtill it does not follow, that tillage may ſupply the place of manures. It is certain, that every particle of earth which we obſerve, is not of the kind that is the food of plants. Every ſoil is a compoſition of different earths; ſeveral of which, it is obvious, are not of this kind.

The great difference in ſoils equally pulveriſed, is a plain and convincing evidence of this. Now, let it be obſerved, that the earth contained in dung is of this kind; it has already been food to plants, and therefore though all that is contained in the greateſt quantity of dung laid on at one time, is but ſmall in proportion to the quantity of ſoil employed in vegetation, as Mr. Tull juſtly obſerves; yet it may be conſiderable in proportion to the quantity that is really the food or pabulum of plants. If the quantity of earth contained in the quantity of dung commonly laid on at one time, is compared with the quantity of earth contained in the richeſt crop, it will be found ſeveral times larger; and therefore, by the laying on of this dung, food is provided for ſeveral good crops.

Beſides, let it be obſerved, that the mechanical action of the plough cannot increaſe the number of the particles by which plants are nouriſhed; they are ſo ſmall as not to be obſerved in water. Mr. Tull ſuppoſes, that they are as ſmall as thoſe upon which the colour of bodies depends. Now, though pounding earth in a mortar may perhaps do ſomething to increaſe them, yet the action of the plough can never be ſuppoſed to do it. The plough can do no more than open the ſoil, or enlarge the paſture of plants, and allow them to extend their roots in ſearch of their food, but does not increaſe the quantity of it; and therefore tillage cannot ſupply the place of dung, which not only opens the ſoil by its fermentation, but alſo increaſes the vegetable food by the earth which it contains.

It may be further obſerved, that the fermentation raiſed by dung continues for a conſiderable time; ſo that though, by ploughing, the ſoil may be as completely divided as by the fermentation of dung, yet it will not continue ſo: for after ſeed is ſown, the artificial paſture raiſed by ploughing is continually decreaſing while the crop is growing; whereas the artificial paſture, raiſed by the fermentation of dung, is continued by the continuance of this fermentation; and therefore, though in the horſe-hoeing huſbandry the want of dung may be ſupplied by hoeing, yet, as Mr. Tull indeed obſerves, dung is ſtill neceſſary in the old huſbandry.

If perſons attentively conſider the effects of manures, it will appear that they operate in all the ways mentioned.

Manures are found to enrich the beſt pulveriſed ſoil, and to do this again and again, after it is exhauſted by crops. It is almoſt an univerſal practice in Scotland, to lay dung upon land that is kept conſtantly in tillage once in three, four, or five years. It is obſerved, that after the dung is laid on the land becomes rich, and that the crops turn gradually worſe and worſe, till the whole virtues of the dung are exhauſted; and it is alſo obſerved, that immediately upon the dung being again applied, the land becomes rich as before. It is natural to conclude from this, that dung promotes vegetation by increaſing the quantity of the vegetable food.

It is found, that ſome manures loſe part of their virtues by being long expoſed to the air. After dung is ſufficiently rotten, the longer that it lies it becomes of leſs value, and does not enrich ſo large a quantity of land as when uſed in proper time. The dung of cows dried upon their paſture, gathered, and laid upon other land, is ſcarcely to be diſcerned in its effects on the crops produced: the ſame quantity applied, whether carried from the byre, or by folding the cattle, enriches the land. From this it is obvious, that this kind of manure contains the vegetable food in itſelf, and does not receive it from the air.

It is found, that ſome manures operate the ſooner, and with the greater violence, the longer that they are expoſed to the air before they are uſed. Lime and marles are of this kind; the longer they lie expoſed, they operate the ſooner; and it is obſerved, that they have a ſtrong power of attracting the virtues of the atmoſphere. From theſe things it is reaſonable to infer, that theſe manures operate, by communicating to the ſoil with which they are mixed, a power of attracting the vegetable food from the air.

It is obſerved, that ſome manures exhauſt land of its vegetable food, and do not reſtore it again when immediately applied. This is found to be the caſe with lime. Land thoroughly limed has been found to carry many very good crops: by degrees however the virtues of it have been exhauſted, and the land reduced to a worſe ſituation than before the lime was laid on. In this ſituation lime has been applied a ſecond time, but its effects found to be far inferior to what they were when firſt applied. This is ſufficient to convince us, that this manure operates by diſſolving the vegetable food which it meets with in the ſoil, and fitting it for entering the roots of plants.

It is certain, that all kinds of manures open the ſoil. Any perſon will be convinced of the truth of this, who will take the trouble to compare a piece of land, on which dung, or any other manure has been laid, with a piece contiguous that has not been manured; he will find the one much ſofter, much more free and open than the other. It muſt be allowed, therefore, that all manures operate by enlarging the vegetable paſture.

Manures are commonly divided into claſſes. Some divide them into natural and artificial; others divide them into the foſſil, the vegetable, and the animal; and treat of them in order, as belonging to each of theſe claſſes.

The manures belonging to ſome of theſe claſſes, differ both in their nature and operation from thoſe in the other claſſes. Some of them likewiſe differ from others in the ſame claſs. The dividing them into claſſes, therefore, ſerves no purpoſe. All that is neceſſary is, to treat of the different particulars which the farmer can command, without conſidering to what claſs they belong.

The manures generally procured are dung, marles, aſhes, ſoot, ſea-weed, ſhells, ſown vegetables, and water.

There are ſeveral other things that are very rich manures, ſuch as rags, leather, &c. But as theſe are to be procured only in ſmall quantities, it is needleſs to treat of them ſeparately.

Dung is commonly uſed to ſignify not only the excrement of animals, but alſo all rotten vegetables, when uſed as manures.

Dung is the food by which animals are nouriſhed, reduced to a corrupted ſtate. The ſtomach diſſolves the food of the animal, and reduces it to a ſtate of putrefaction much ſooner than is done by the air. It is by being in this ſtate of putrefaction that the juices fit for the nouriſhment of the body are conveyed by the guts into the blood. While bodies are in a ſound ſtate, their parts adhere firmly together, and they are incapable of being turned into the parts of other bodies. To render them capable of this, they muſt be reduced to their firſt principles. This is done by corruption. It is obſerved, that by corruption all the parts of bodies are relaxed, and the ſalts, oils, and other juices which they contain, from being fixed, are made volatile. It is by being reduced to this ſtate in the ſtomach, that the things which the animal feeds upon become nouriſhment to it, and are turned into parts of its body.

All the juices contained by the things which animals feed upon, are not exhauſted by the guts; many of them, along with the earthy part of the food, are thrown out. There is no doubt that ſome of the earthy part of the food goes alſo to the nouriſhment of the animal; but as the earth is rendered volatile by the ſalts and oils, there muſt be but a ſmall quantity of it in proportion to the quantity of theſe exhauſted by the animal; and therefore in the dung there muſt be a great quantity of earth in proportion to the other principles. However, as the dung contains all the principles of the food, we may conſider the dung of thoſe animals that feed on vegetables as vegetables in a putrefied ſtate.

Of the ſame nature is the dung of animals that feed upon other animals. Vegetables are the original food. All animals either feed on pure vegetables, or on other animals that feed on vegetables. Animals that feed on vegetables are made up of the ſame things with vegetables, only under a different form; and therefore the dung of animals that feed upon theſe, is ſtill to be conſidered as vegetables in a putrefied ſtate.

Chemiſts inform us, that dung is compounded of the ſame principles of which vegetables are compounded, of water, air, oils, ſalts, and earth. The earth which it contains is of the abſorbent kind, and attracts the other principles. They alſo inform us, that dung attracts and ferments with acids, and by this fermentation produces ſalts. A quality of ſalt, as was before obſerved, is to attract and diſſolve oils, and make them capable of being mixed with water.

If theſe qualities of dung are conſidered, it will appear that it promotes vegetation in all the different methods before mentioned.

It promotes vegetation by increaſing the vegetable food. It is compounded of the ſame principles of which the vegetable food itſelf is compounded, as we endeavoured to ſhew, when treating of the food of plants. This is alſo confirmed by the experience of all places and all ages; and it is what no perſon will doubt of, who conſiders that it has the ſame effects upon land of all kinds, and in all ſituations.

It promotes vegetation by enlarging the paſture of plants, it attracts acids from the air and ſoil; and by raiſing a fermentation with them, thereby ſeparates the particles of the ſoil with which it is mixed. Every farmer knows the truth of this from experience. The land upon which dung is laid, though naturally ſtiff, becomes ſoft and mellow, and is more eaſily ploughed than before.

Dung, we have ſaid, enlarges the paſture of plants, by attracting acids, and fermenting with them. Theſe acids are in the ſoil and air. They are in the ſoil; for the ſoil produces acid plants. Chemiſts tell us, that the neutral ſalt found in ſoil is compounded of an alkaline ſalt, ſuch as is found in vegetables, and an acid ſpirit. All alkalis are ſtrong attractors of acids, ſo that, in the proceſs of an experiment upon ſoil, perhaps it may be difficult to keep them ſeparate, though they may exiſt ſeparate in it. The acid plants prevent theſe from mixing; or, perhaps, have a ſtronger power in their veſſels to ſeparate them, than other plants have.

But though there may be no acids in ſoil, excepting in the compound of neutral ſalts; yet there is no doubt, but they are in the air. Chemiſts find this by innumerable experiments. Aſhes, when expoſed to the air, produce neutral ſalts; the application of acids has the ſame effects. Any perſon may obſerve a ſalt adhering to the lime of old walls; this ſalt is not in the lime, it is produced by the air. The ſame ſalt is produced by acids. Other experiments might be mentioned, but theſe are ſufficient.

Dung promotes vegetation, by communicating to the ſoil a power of attracting the vegetable food from the air. The earth which it contains, is of the abſorbent kind, and attracts all the other principles of the vegetable food; and the ſalts which it contains and produces, attract oils.

It likewiſe promotes vegetation, by preparing the vegetable food for the nouriſhment of plants. By the ſalts which it contains and produces, it not only attracts oils, but alſo diſſolves them, and makes them capable of being mixed with water. It is probable, that oil is a principal part of the food of every plant which we cultivate in our fields, at leaſt is the ingredient of which it is eaſieſt to exhauſt the ſoil, and which it is moſt difficult to reſtore to it again. In proportion to the quantity of oil contained in any plant, in proportion it robs the ſoil by which it is nouriſhed of its vegetable food. But the nature of oil muſt be changed before it can enter the roots of plants. This change is made by ſalts; they diſſolve it, and make it to mix with water.

Though dung promotes vegetation in all theſe ways mentioned; yet, as there are other bodies, that are much ſtronger attractors of acids, by which many of its effects are produced; it is probable, that it principally operates by increaſing the food of plants. Its effects in diſſolving the vegetable food in the ſoil, muſt be very trifling. The ſalts which it contains and produces, having its own oils to work upon, and being along with them conveyed into the roots of plants, cannot operate with any violence upon the oils which the ſoil contains. This is confirmed by experience. When the virtues of dung are exhauſted, the ſoil is no poorer than before it was laid on.

Some new improvers are pleaſed to ridicule the old farmers, becauſe they are ſo fond of dung; but none will do this who attentively conſider the virtues of it. Such other manures as can be obtained, are to be uſed; and tillage is carefully to be attended to: but none of theſe are to ſuperſede the uſe of dung, which can be employed to ſo great advantage.

Though dung in general has all the qualities mentioned, yet there are ſome kinds of it poſſeſſed of ſome of theſe qualities in a higher degree than others. There are as many kinds of dung as there are of animals, and in ſome reſpects they all differ one from another.

The difference betwixt one kind of dung and another, is commonly ſuppoſed to ariſe from the different food of the animals. Green herbage, ſtraw, or hay, do not contain ſo much vegetable food in the ſame quantity as grain does. Hence it is ſuppoſed, that the dung of cows is not ſo rich as that of horſes, nor the dung of horſes ſo rich as that of fowls.

But this difference muſt partly ariſe likewiſe from the nature of the animals, if it is true, that the dung of horſes, cows, ſheep, hogs, and geeſe, all differ one from another, though fed upon the ſame paſture. Some animals digeſt their food more quickly than others. This makes a difference in the dung produced by the ſame food. Some things are digeſted, and turned into a ſtate of corruption by ſome animals, that paſs through others ſound and undiſſolved. The matter then in the ſtomach that digeſts the food, muſt be different in the different animals. The dung muſt partake ſomething of the nature of this, which makes another difference in the dung produced by the ſame food.

Some writers in agriculture treat of the dung of the different animals ſeparately. But it is needleſs to do this; for it requires more pains and expence to keep them ſeparate, and uſe each of them by itſelf, than all the advantages ariſing from this way, above the ordinary way, can poſſibly amount to.

The dung of fowls, particularly of pigeons, is an exception to this. It is commonly uſed without any mixture, and it can be kept ſeparate from other dung without any trouble or expence. It is obſerved, with reſpect to it, that the effects of it are more violent, and ſooner over, than the effects of common dung. The effects of ſome other kinds of dung would perhaps be the ſame, if they were uſed without any mixture. The pigeons dung, being thoroughly corrupted, ſoon diſſolves, and becomes vegetable food. But the ſtraw, with which the other kinds of dung are commonly mixed, not being ſo thoroughly corrupted, prevents the effects of them from being ſo violent, and ſo ſoon over.

The way in which pigeons dung operates, points out the manner in which it ſhould be applied. As it is very rich, and its qualities ſoon exhauſted, a very ſmall quantity ſhould be applied, in proportion to the quantity of other dung. If care is not taken of this, the crop will be deſtroyed by being too luxuriant. Perhaps, mixing it with ſome other things may have good effects. The ſtrawing ſmall chaff of any kind, from time to time, on the bottom of the pigeon-houſe, is very proper. The chaff ſucks up the moiſture, and makes it eaſy to reduce the dung to powder, which is an advantage: for thereby the dung is ſcattered more equally, and manures a greater quantity of land.

It is a cuſtom, in ſome places, to fold ſheep and cattle, for the ſake of their dung; which, in this way, is uſed without any mixture. Some writers on huſbandry give particular directions how to do this in the moſt advantageous manner. But it is needleſs to conſider theſe. The farmer muſt conſult the advantage of his ſheep and cattle, and not the advantage of the land by the dung; and, therefore, muſt fold them in the moſt convenient manner. A ſcore of ſheep, with the beſt management in folding, will not produce much more than ten ſhillings worth of dung, in the ſeaſon, above the expence of folding; a ſum ſoon loſt by an injudicious management of them.

Dung is commonly mixed with vegetables, and allowed to lie for ſome time before it is uſed.

Straw is thrown below the cattle, and this is carried out along with the dung, and thrown upon the dunghill. On the dunghill is alſo thrown all the ſtraw that is left after ſerving other purpoſes, and all the refuſe of vegetables and animals, uſed in the farmer's family.

In the management of dunghills, two things are always to be kept in view: the promoting putrefaction; and the preventing the vegetable food from flying off into the air, or being conveyed away by water. The ſtraw and other parts of uncorrupted vegetables, of which the dunghill is compounded, make it neceſſary to keep the firſt in view; and the ſalts and oils, which by corruption are rendered volatile, and the water, which extracts the virtues of dung, make it neceſſary to keep the laſt in view.

To promote putrefaction, the ſituation of the dunghill ſhould be dry, and the dung laid together as thick as is convenient. Putrefaction, indeed, cannot be promoted without water: but the quantity that falls in rain, with the natural ſap of the dung, is ſufficient for this purpoſe. Too much water prevents that fermentation, which carries on the proceſs of putrefaction moſt quickly. This is confirmed by experience. If there is any part of a dunghill ſoaked with water, it is obſerved that the ſtraw is quite ſound, while, in other parts that are dry, it is completely rotten.

To promote putrefaction, the dung ſhould be laid thick together; thereby the heat is the ſooner generated, that produces the putrefaction; and thereby the natural ſap is the better preſerved, which prevents the dung from being burned.

When the natural ſap of the dung is exhaled, and the dung afterwards covered, the heat is in danger of riſing to ſuch a height, as to burn the dung. This muſt be carefully guarded againſt: for, when the dung is burned, its ſtrength is exhauſted, and it is rendered almoſt uſeleſs. Dung, in this ſituation, is dry and white; the ploughmen call it fire-fanged. When thus burnt, it is found, from experience, that it has loſt almoſt all its virtues. To prevent the dung from being reduced to this ſituation, when it is carried out of the ſtable or byre, particularly if there is much ſtraw in it, it muſt not be laid in heaps, which makes it dry too faſt, but carefully ſpread thick upon the top of the dunghill. This prevents the ſap from being carried off by the wind, and thereby prevents the heat from being raiſed to ſuch a height as to burn the dung.

It may be obſerved, that, when graſs is cut green, and immediately thrown into a heap, it heats, and this heat ſoon reduces the graſs to a ſtate of putrefaction. But, if the graſs is for ſome time expoſed to the air, and then put together without being ſufficiently dry, it heats alſo; but, inſtead of being reduced to a ſtate of putrefaction, is burned. So it is with dung: if, when carried out, it is laid in ſmall heaps, being thereby too much expoſed to the air, it loſes its ſap; and, being afterwards covered, the heat is raiſed to ſuch a height, as to burn it: but, if it is ſpread thick upon the top of the dunghill, it retains the ſap, and putrefies.

A diſtinction is here made betwixt dung putrefied and burned; and this diſtinction is repreſented as important. We know not if the chemiſts make any ſuch diſtinction. A late author ſays, that the greater part of what remains of dung, after the putrefaction is completed, ſeems to be earth, and a fixed alkali. Theſe things, we apprehend, make up the greater part of what remains, when dung is what we have called burned; but when it is only putrefied, it contains alſo ſalts and oils. But though chemiſts ſhould make no ſuch diſtinction, it is abſolutely neceſſary that the farmer do it: for, when the dunghill is allowed to heat to ſuch a degree, as to burn the dung, the value of it is thereby greatly leſſened.

To prevent the vegetable food from being conveyed away, no foreign water, excepting what falls in rain, muſt be allowed to run into the dunghill; and the ſituation of the dunghill, if poſſible, ſhould be high at the ſides, and hollow in the middle. When foreign water is allowed to run into the dunghill, the fermentation is not only ſtopped, but, as it is often neceſſary to allow the water a paſſage from it, thereby much of the vegetable food is conveyed away. When the bottom of the dunghill is quite level, the rain, which ſometimes falls in heavy ſhowers, eaſily finds its way off; but this is prevented by making it high at the ſides, and hollow in the middle.

The only way to prevent the vegetable food from being exhaled by the ſun, or carried off by the wind, is to cover the dunghill. The covering the dung would certainly be an advantage, if it could be eaſily executed. If it was not for the additions that are daily made to it, earth would be very proper for this purpoſe. Some perſons aſſert, that, by covering the dunghill, it would loſe the influence of the air; and it is the air alone, they ſay, that makes it fit nouriſhment for vegetables; and, therefore, recommend the expoſing it, particularly to the north and north-eaſt; becauſe the wind from theſe points brings along with it more aëreal nouriſhment than from the others. If the dunghill contained no vegetable food, but what it received from the air, this direction would be very proper: but, as the dunghill contains in itſelf all the ingredients of the vegetable food, and as its juices, the more it is putrefied, become the more volatile, the vegetable food in it by being expoſed to the air, inſtead of being increaſed, would be diminiſhed. The covering the dunghill, therefore, would be an advantage. But the difficulty lies in executing this.

Some propoſe to dig a large pit, lay the bottom with flags, build up the ſides with ſtones, and cover it with a roof. This, it muſt be owned, will retain the juices, and promote corruption, as well as prevent the vegetable food from being exhaled. But then it muſt be ſo expenſive, that few will be engaged to make trial, unleſs the benefits are more obvious than the aſſertions of the contrivers make them: and, beſides the expence, it muſt likewiſe be attended with inconveniencies. In ſome ſituations, it will be very difficult to prevent too much water from getting into it; and as difficult to get the dung itſelf carried out.

The method which we propoſed for preventing the dung from over-heating, will alſo, in a great meaſure, ſerve this purpoſe. The dung, when it comes from the ſtable or byre, is mixed with ſtraw, which abſorbs the juices, and prevents them from flying off, till the ſtraw itſelf begins to putrefy. When, in this ſituation, it is laid thick upon the top of the dunghill, a ſmall ſurface only being expoſed to the air, and being covered before the ſtraw begins to putrefy, the juices, in a great meaſure, are preſerved. A perſon, by the ſmell, is ſenſible that the juices of the dung are not ſo volatile, when firſt laid upon the dunghill, as after they have been covered for ſome time, and then expoſed to the air.

Dung, expoſed to the ſun and wind, or waſhed by rain, loſes its vegetable food; it ought, therefore, to be ploughed in as ſoon as is poſſible, after it is laid upon land. Some perſons aſſert, that they have found from experience, that dung is nothing worſe, though it lie a conſiderable time ſpread upon land, in dry weather, before it is ploughed in. This, if true, is contrary to what has been ſuppoſed, that the vegetable food is exhaled by the ſun, and carried off by the wind. It is probable, that, after dung is ſpread upon land, its fermentation ceaſes, and the ſalts and oils remaining in it may become fixed, and may continue ſo till a new fermentation is raiſed by mixing the dung with the ſoil; and that, by attracting acids from the air, more ſalts may be formed. By this its effects will be more ſudden and violent, but ſooner over.

It may be proper alſo to obſerve, that as the juices contained in the dung are waſhed downwards by the rain, it ſhould be ploughed in with a very ſhallow furrow; excepting when the dung is not ſufficiently rotten. In this caſe it requires a deep furrow to cover it.

The better that dung is mixed with ſoil, the purpoſes of vegetation are the better anſwered; all parts of the ſoil receive equal benefit, the vegetable food is equally diſtributed, and in all parts the fermentation equally promoted. When dung then is laid on land, it ought to be ſpread as equally as poſſible. This likewiſe prevents the breeding of vermin, which happens in ſome ſoils, when the dung is left in too large pieces.

Some are of opinion that lime is only a ſtimulus, that is, that it promotes vegetation, only by making the ſoil with which it is mixed, exert itſelf. Others, that it promotes vegetation by enriching the land, and adding to the quantity of vegetable food.

They firſt ſupport their opinion by obſerving, that the crops which lime enables land to produce, exhauſt it in a remarkable manner. It is a certain fact, that land thoroughly limed, may be reduced to a much poorer condition by cropping than land can be reduced to, that is not limed. It is poſſible to reduce limed land almoſt to a *caput mortuum*; and the better and the oftener the land is ploughed, this is done the ſooner.

The other opinion is ſupported by obſerving, that, in ſome places, lime is applied regularly once in four or five years; that the land ſeldom gets any other manure; that it is kept almoſt conſtantly in tillage; and, with the aſſiſtance of fallowing, carries very good crops.

From theſe obſervations, one is led to conclude, that lime acts both ways; not only makes land exert itſelf in the nouriſhment of vegetables, but alſo enriches it, and adds to the vegetable food.

An inquiry into the qualities of lime will probably illuſtrate this.

Chemiſts tell us, that lime has the following qualities.

It is a great diſſolver of all animal and vegetable ſubſtances: it is a very heavy body: it is an attractor of acids; with theſe it raiſes a fermentation, and produces ſalt; and it communicates its virtues to water.

When theſe things are conſidered, it will appear, that lime promotes vegetation in theſe ways following.

It communicates to the ſoil a power of attracting the vegetable food from the air. It attracts the acids from the air and ſoil; theſe it converts into a neutral ſalt, by which oils are attracted from the air. This operation of lime is confirmed by the experience of thoſe who uſe it as a manure once in four or five years.

Lime enlarges the vegetable paſture. By its weight it penetrates the ſoil; and, by its fermentation with acids, it ſeparates its particles.

This operation of lime is obvious to every perſon that views with attention any land that is thoroughly limed. It appears ſoft and mellow, and obviouſly in a ſtate of fermentation.

Lime diſſolves the vegetable food, and fits it for entering the roots of plants. It diſſolves all the animal and vegetable ſubſtances which it meets with in the ſoil, and converts them to vegetable food; and, by the ſalts which it produces, it diſſolves all oily ſubſtances in the ſoil; and conveys them into the roots of plants. We find from experience, that lime clears land of root-weeds. This it does by its diſſolving power. Root-weeds, when torn up by the plough, have their growth checked, and are for ſome time in a languiſhing condition: if lime is applied to their roots while in this ſituation, by its diſſolving power, it is apt to deſtroy them.

That it is owing to the ſalt which lime produces by its attracting and fermenting with acids, that it chiefly owes its power of promoting vegetation, is confirmed by this obſervation. The lime of old walls which has been long expoſed to the air, and where this ſalt is already formed, is much more ſudden in its operations, when laid upon land, than quick-lime.

It has been obſerved, that lime promotes vegetation by communicating to the ſoil a power of attracting the vegetable food from the air, by enlarging the vegetable paſture, and by diſſolving the vegetable food, and fitting it for entering the roots of plants. It is probable, that the two laſt are the ways by which it chiefly operates.

By this it exhauſts the land of its vegetable food. For it cannot be ſuppoſed to attract from the air a ſufficient quantity of food for the nouriſhment of the crops which it enables the land on which it is laid to carry ; and it contains none of this food in itſelf. This is confirmed by experience. If land upon which lime has been laid, is exhauſted by crops, the application of lime a ſecond time has not the ſame effect as before ; unleſs the vegetable food is ſupplied by dung, or the land allowed to reſt for ſome years, and have the vegetable food ſupplied by the air.

Thus it appears, that lime from its nature muſt act both as a ſtimulus and a manure ; while it makes the earth exert itſelf in the nouriſhment of vegetables, in ſome meaſure alſo enriches it, and adds to the vegetable food.

In ſome lands, the diſſolving the vegetable food, and fitting it for entering the roots of plants, may be moſt beneficial : in others, the communicating the power of attracting the vegetable food from the air, may be moſt beneficial. It will not be improper, therefore, to point out how lime is to be applied, that ſo it may chiefly anſwer the one or the other of theſe purpoſes.

In uncultivated land, in which there is a large quantity of vegetable ſubſtance, lime ought to be uſed chiefly as a ſtimulus : and when improved land needs a recruit of vegetable food, it ought chiefly to be uſed as a manure.

When lime is intended for a ſtimulus, a large quantity ſhould be applied at once. For it takes a conſiderable quantity to diſſolve roots, and the other vegetable ſubſtances in the land, and to produce a high degree of fermentation.

When lime is intended for a manure, a ſmall quantity applied at a time is ſufficient. It is probable, that it requires only a ſmall quantity of lime to impregnate a large quantity of earth, and to communicate to it an abſorbent quality, in as high a degree as it is capable of receiving : and it is certain, that it is in proportion to the abſorbent quality which it communicates, that the ſoil is enriched by it. This is not mere conjecture. It is certain, that a ſmall quantity of lime will impregnate a large quantity of water, and communicate to it all its virtues, and theſe in as high a degree too as it is capable of receiving : it is not improbable, that it may operate in the ſame manner upon earth. If a ſmall quantity of lime communicates an abſorbent quality to a large quantity of earth, but has not ſuch influence in diſſolving vegetable ſubſtances, or in producing fermentation, it follows, that the ſmaller the quantity is which is applied, it will operate the more as a manure ; and the greater the quantity applied it will operate the more as a ſtimulus.

It is proper to obſerve likewiſe, that when lime is applied in ſmall quantities as a manure, it is neceſſary to repeat the application frequently ; for it is probable, that the ſoil by action loſes the abſorbent quality, which the lime communicates.

Theſe things which we have obſerved concerning the operation of lime in ſmaller and larger quantities, are, in ſome meaſure, confirmed by experience. They are agreeable to the practice in thoſe parts where lime is moſt uſed. When barren land is to be improved, it is laid on in large quantities ; and when it is applied to land already improved, it is laid on in ſmall quantities, and frequently once in three or four years.

As lime operates by attracting acids from the air, the longer that it lies expoſed to the air before it is ploughed in, it will exert itſelf the more quickly, and with the greater violence. Some alledge, that this ſhould not be done in ſummer. For they ſay, that the ſun acts contrary to the air : as the air ſupplies the ſalt, the ſun exhales it, and communicates it again to the air.

As lime, when laid on in large quantities, exhauſts land of its vegetable food, it is neceſſary to ſupply this food by dung, or ſuch other manures as have it in greateſt plenty ; or the land ſhould be managed in ſuch a manner, as to prevent, as much as poſſible, the vegetable food from being exhauſted. Laying off land, after a very few crops of corn, into graſs for paſture, is the moſt proper way of doing this. Land, when paſtured, has not its vegetable food ſo much exhauſted, as when it carries corn. The quantity of vegetable food carried off in fleſh, by the cattle, or conveyed to the air by their perſpiration, bears but a ſmall proportion to the quantity carried off by a crop of corn and ſtraw.

It is neceſſary further to obſerve, that, as lime communicates its virtues to water, land inclining to be wet, and from which the water has free acceſs away, is not proper for it : for the water, in running off, carries along with it the virtues of the lime.

There are a variety of marles, which are commonly reduced to three ſorts : the clay, the ſtone, and the ſhell.

The firſt has its name from its ſimilitude, in appearance, to clay ; the ſecond from its hardneſs, and ſimilitude to ſtone ; and the third from the ſhells, with which it is mixed, or rather of which it is compounded.

The clay and ſtone marles are of the ſame nature ; the ſhell marle is very different from both. This makes it neceſſary to treat of them ſeparately.

Marle of the ſtone and clay kinds promotes vegetation in a ſurpriſing manner. It is probable, however, that it contains in itſelf few of the principles of which the vegetable food is compounded. Plants are not able to find their food in it. When in a bed below the ſurface, it reſiſts the entrance of water, like till or clay. When near the ſurface, and turned up by the plough in great quantities, the ſoil is little better than till, almoſt quite barren. The method of its operation will be beſt known by inquiring into its qualities.

It is obſerved, that both the clay and ſtone marles have the following qualities.

When long expoſed to the air, or put into water, they fall down into a powder : they are very heavy bodies : the earth of which they are compounded, is of the abſorbent kind : they are attractors of acids ; with them they raiſe a fermentation, and produce ſalts.

The only difference betwixt them is this : the clay marle is ſooner diſſolved than the ſtone marle ; and commonly has a ſtronger power of deſtroying acids, and producing ſalts. Dr. Home ſays, that the clay marle, which he tried, deſtroyed a third more of acids than the ſtone marle.

Theſe marles ſeem to have much the ſame qualities with lime ; and, therefore, muſt operate in the ſame manner.

They communicate to the ſoil a power of attracting the vegetable food from the air, they enlarge the vegetable paſture ; and they diſſolve the vegetable food that is in the ſoil, and prepare it for entering the roots of plants.

Theſe marles communicate to the ſoil a power of attracting the vegetable food from the air. The abſorbent earth which they contain, and the ſalts which they produce, are ſtrong attractors of oils.

It is obſerved, that they attract oils ſo ſtrongly, that they are uſed by ſome to extract greaſy ſpots from cloaths. When laid upon land, they will therefore attract oil from the air, which is the ingredient of the vegetable food moſt wanted.

Theſe marles enlarge the paſture of plants. They ferment with acids, and fall down into powder, when expoſed to the air, or put into water. Theſe things make them operate in ſeparating the particles of the ſoil, with which they are mixed.

Theſe marles alſo prepare the vegetable food for being nouriſhment to plants. The ſalts which they produce, not only attract oils from the air, but alſo from the ſoil ; diſſolve theſe oils, and render them capable of being mixed with water ; and of being conveyed by it into the roots of plants.

According to ſome, theſe marles contain ſome oily matter. This, if true, would make them operate in a manner different from lime. But this is uncertain. The earth of which theſe marles are compounded, is of the abſorbent kind; it cannot be long expoſed to the air, without attracting oils; and, therefore, though they contain none in their original compoſition, yet ſome marks of them may appear upon trial.

Theſe marles are long in diſſolving. Large pieces of the ſtone marle are ſeen ſometimes undiſſolved, ſix or ſeven years after it has been laid upon land. This makes it neceſſary to apply a very large quantity of them, otherwiſe their effects will not be known.

As the quantity of marles applied is very great in proportion to the quantity of lime, land, when manured with marle, muſt have a ſtronger power of attracting the vegetable food from the air; and therefore the marle ſhould be preferred, when it can be as eaſily obtained.

As the earth of theſe marles is of the abſorbent kind; as a great quantity of it is applied at one time; and as it is long in diſſolving, it muſt be many years before its operation ceaſes; and, if the land is barren, the nature of it will be changed, and ever after, by the ſame kind of dreſſings it received before, will continue to carry better crops. In this reſpect alſo it is preferable to lime. This advantage, however, depends, in a great meaſure, upon the nature of the ſoil. If the ſoil is ſoft and ſpungy, and has not a firm bottom, the marle, by its weight, will, by degrees, penetrate, like lime, beyond the reach of the plough; and, therefore, muſt leave the ſoil no better than it found it.

Although, in ſome reſpects, theſe marles ſeem preferable to lime, yet we are to conſider, that their principal operation is the ſame with that of lime; which is enlarging the paſture of plants, and fitting the vegetable food for entering their roots. When land, therefore, manured with them, is exhauſted by crops, it cannot receive much benefit from them a ſecond time, if immediately applied. This is confirmed, it is ſaid, by experience. It is obſerved, that marle, when applied a ſecond time to land exhauſted by crops, has not the ſame effect as when firſt applied.

As marle operates in the ſame manner as lime, it follows likewiſe, that limed land exhauſted by crops, can receive little benefit from the application of marle; and that marled land, exhauſted by crops, can receive little benefit from the application of lime. As it exhauſts the vegetable food, the proper manure after it is dung, which contains this food in the greateſt plenty.

It was obſerved, that marle operates chiefly by attracting oils and acids from the air; the longer, therefore, that it lies upon land, expoſed to the influence of the air, the more quickly it will operate.

The difference betwixt the clay and ſtone marles was ſaid to conſiſt in this: that the clay marle diſſolves ſooner, and has a ſtronger power to deſtroy acids and produce ſalts. This kind is therefore preferable, as a leſs quantity will produce the ſame effects. If Dr. Home's experiments are to be depended upon, or rather, if all clay and ſtone marles have the ſame powers with thoſe which he made his experiments with, then four cart-load of the clay marle is equal to five of the ſtone.

What was ſaid of lime, with reſpect to the application of it in ſmaller and larger quantities, may likewiſe be ſaid of marle. When barren land is to be improved, the marle ſhould be laid on in large quantities: but when land is in good order, the applying a fifth or ſixth part of the quantity commonly uſed, once in ſix or ſeven years, may have very good effects.

Shell marle is very different in its nature from the other two. It is commonly claſſed among the animal manures.

It does not diſſolve with water, as the other marles do. It ſucks it up, and ſwells with it, like a ſpunge. It is a much ſtronger attractor of acids than they. Dr. Home ſays, that it takes ſix times more of acids to ſaturate it than any of the other marles which he had met with. But the greateſt difference betwixt the ſhell marle and the other marles conſiſts in this. The ſhell marle contains oils. It is uncertain whether the other marles contain any oils; but this kind, it is ſaid, contains them in great plenty.

This marle, it would ſeem, from the qualities which it poſſeſſes, promotes vegetation in all the different ways. It increaſes the food of plants; it communicates to the ſoil a power of attracting this food from the air; it enlarges the paſture of plants; and it prepares the vegetable food for entering their roots.

It increaſes the food of plants by the oils which it contains, and the ſalts which it produces: by theſe ſalts, and by the abſorbent quality which it poſſeſſes, it communicates to the ſoil a power of attracting this food from the air. It enlarges the paſture of plants, by its ſwelling with water, and the fermentation which it occaſions; and it prepares the vegetable food for entering the roots of plants, by the ſalts it produces in fermentation.

It will not be improper to attend to the effects of theſe different operations. The communicating vegetable food immediately to the ſoil, and communicating to it a power of attracting this food from the air, have the ſame effects. By both theſe operations the vegetable food is increaſed.

The enlarging the paſture of plants, and fitting the vegetable food for entering their roots, have alſo the ſame effects. By both the vegetable food is diminiſhed. It is obvious, that, by theſe operations, plants are aſſiſted in extracting this food from the ſoil.

The oils which it contains, it is probable, are ſoon exhauſted: having a ſtrong power of attracting acids, and forming ſalts, it is natural to ſuppoſe that theſe ſalts do more than work upon its own oils: they will alſo attract and diſſolve the oils which they meet with in the ſoil; and would exhauſt it of the vegetable food which it contains, was it not for the ſtrong abſorbent quality which it communicates. This quality, it is probable, remains after the operation of the ſalts is over; and thus, upon the whole, the ſoil is rather bettered by it.

We had occaſion to ſhow, that the difference betwixt poor and rich ſoil conſiſteth in the different powers of attraction. As this marle has ſo ſtrong an abſorbent quality, if it is applied in large quantities, and frequently repeated, it is poſſible that it may communicate ſuch an attractive power to the ſoil, as to enrich it in a very high degree, ſo as to need no further manuring, but by proper tillage may be made to attract from the air in the winter-ſeaſon ſuch a quantity of vegetable food as is ſufficient to nouriſh a crop in ſummer.

As this kind of marle does not exhauſt land of its vegetable food, as the other marles, or as lime do, it may be applied to land exhauſted by them, or it may be repeated. As it diſſolves ſooner than the other marles, its effects will be more ſudden, and as it does not diſſolve ſo ſoon as dung, its effects will not be ſo ſoon over.

A late author ſuppoſes, that the marle found below moſs is compounded of earth and the alkaline ſalts of rotten wood. He explains in what manner he imagines it is formed. If there is a marle compounded of theſe ingredients, it is different from any of the marles that have been mentioned. However, it will operate much in the ſame manner. It will communicate a power to the ſoil of attracting the vegetable food from the air; it will enlarge the paſture of plants, and it will prepare the vegetable food for entering their roots.

As it contains a large proportion of ſalt, its effects will be ſudden and violent. It is not proper therefore that a great quantity of it ſhould be applied.

As its effects are ſudden and violent, it cannot be expected that they will laſt long. It is probable that they will be ſoon over after it is entirely diſſolved.

The ſalts which it contains, will make it operate chiefly in diſſolving the vegetable food in the ſoil, and fitting it for entering the roots of plants. By this it will exhauſt the ſoil, if care is not taken to prevent it, by the application of dung, or turning the land from tillage into graſs for paſture.

There is another kind of marle that goes under the name of ſhell marle, and in ſome parts of the country is found in great plenty. It ſeems to be almoſt wholly lime, and it operates in the ſame manner.

Aſhes contain a large proportion of ſalt; they attract acids more violently than any other thing as yet known, but they ſoon loſe their virtue.

The effects of aſhes will then be of the ſame kind with lime. But as aſhes contain ſalt, their operation will be more ſudden; as they attract acids with greater violence, and ſooner loſe their virtue, their operation will be more violent, and ſooner over. This is confirmed by experience. The firſt crop after land is manured with aſhes is commonly very luxuriant, and the ſecond crop exhauſts almoſt the whole of their virtues.

As the effects of aſhes are ſudden and violent, they ſhould be applied in very ſmall quantities; and as they operate

rate in the ſame way with lime, they ſhould not be applied to land exhauſted by lime or marle ; ſhould not be followed by theſe, nor repeated.

Turf is compoſed chiefly of vegetables ; that which remains then after burning, muſt be of the ſame nature with aſhes. To theſe the fertility communicated to the ſoil is chiefly owing. It is found from experience, that in proportion to the number of roots contained in the turf the burning turns out to advantage; and therefore land, with a tough ſward of graſs upon it, is recommended as the kind moſt proper for being improved in this manner.

The heat which part of the ſoil receives from burning the heaps of turf is ſuppoſed to contribute to its fertility: but this can have little influence except to deſtroy any ſeeds or roots of weeds that may be in the land.

In burning the turf, care muſt be taken to cover the heaps in ſuch a manner as to prevent the fire from breaking out into flame. Where this happens, it is obſerved, that the aſhes loſe part of their virtue, and that the parts of the field manured by them are not ſo much enriched as the other parts are by the heaps of turf that are burned without flame. It is natural to think, that the earth of the turf, when properly piled up, will retain the oils of the vegetables, and prevent them from aſcending into the air in ſmoke and flame.

This makes ſome difference betwixt the manuring by burning and the manuring by aſhes. However, as the oils contained in burned turf are in very ſmall quantities, we may well ſuppoſe that they will ſoon be exhauſted by the ſalts ; and therefore, though the effects of burning may be more violent, yet will be equally ſudden, and as ſoon over.

To prevent burnt land from being exhauſted, one crop only, or two at moſt, ſhould be taken, and then turned into graſs for paſture. If a little dung is added after the firſt crop, its fertility will be the longer preſerved.

Soot cannot be procured in ſuch large quantities as to be uſed by itſelf, excepting in the neighbourhood of large cities ; it is needleſs therefore to inſiſt much upon it.

It contains oil, ſalt, and earth. Theſe, it ſeems, are compounded in ſuch a manner as to be ready to be conveyed into the roots of plants by water. For the effects of ſoot, when ſpread upon the ſurface, are diſcovered immediately after the firſt rain. It promotes vegetation in the ſame manner as dung, or ſhell marle. It increaſes the food of plants by the ingredients of the vegetable food which it contains. It enlarges the paſture of plants, enables the ſoil to attract the vegetable food from the air, and prepares it for entering the roots of plants by the ſalt that it contains, which is of the alkaline kind, attracts and ferments with acids, and attracts and diſſolves oils.

As it contains great plenty of vegetable food, and as its effects are ſudden, it muſt be laid on in very ſmall quantities. Sowing it in the ſpring on winter corn or graſs, ſeems to be the moſt proper way of uſing it.

When the quantity laid on is but ſmall, and its effects ſudden, it cannot be ſuppoſed to laſt long. Its virtues are commonly exhauſted by one crop.

When its effects are over, the ſoil is left in the ſame ſituation as before it was laid on, not exhauſted of its vegetable food, as by lime or aſhes ; and therefore it may be repeated ; or it may be followed by theſe manures, as it is very proper to be applied to land that is exhauſted by them.

All the plants that grow upon the rocks within reach of the ſea, are good manures. Thoſe that grow upon the rocks that are almoſt always covered by the water, are the richeſt.

Some kinds of ſea-weed are burnt for kelp. This, it is thought, turns out to greater advantage than uſing them as manures. The beſt kinds for manures cannot be reached, as their roots are almoſt always below water ; but they are frequently driven on ſhore by the ſea. A conſiderable quantity of them may always be expected on the ſhore in the neighbourhood of the rocks, where they grow, when a ſpring-tide, heavy rain, and a high ſwelling ſea all happen at the ſame time. The ſpring-tide expoſes their roots to the air, the freſh water falling in rain looſes the roots, and the high ſwelling ſea tears them up. Sometime the tide carries them to a conſiderable diſtance.

They are of a ſoft pulpy nature, eaſily diſſolve, and ſoon putrefy ; and they contain oil, ſalt, and earth. They muſt promote vegetation therefore in the ſame manner as dung or ſoot.

Their effects are ſooner over than thoſe of dung mixed with vegetables from a dunghill ; for they ſooner diſſolve and ſooner putrefy.

They may be applied to ſoil in any ſituation, and are very proper for land that is exhauſted by lime or aſhes.

When their effects are over, the land is in no worſe a ſituation than before they were applied, and any kind of manure may be applied after them.

The oftener they are applied, the land becomes the richer ; for the earth of which they are compounded, is of the abſorbent kind. This is confirmed by experience. The land near the ſhores, where theſe ſea-weeds are in greateſt plenty, and have been long uſed as manures, are amongſt the richeſt in Scotland, and have been kept almoſt conſtantly in tillage.

They are preferable to dung in this reſpect, that they do not produce ſuch a quantity of weeds. Every perſon that has uſed theſe manures, knows, that weeds do not appear in ſuch plenty upon land manured with ſea-weed, as upon land manured with dung. This ſeems to confirm the opinion of thoſe, who aſſert, that the great quantity of weeds that appear upon dunged land, are produced by ſeeds mixed with the dung. But it is ſubmitted, whether this difference is not owing to the great quantity of ſalts contained in the ſea-weed and applied with it, which at firſt deſtroys ſome of the ſeeds and roots of weeds. Salt, applied in too large a quantity, is undoubtedly a poiſon to many plants. According to Mr. Tull's experiments, a ſmall quantity of ſalt water deſtroyed a plant of mint. It is obſerved likewiſe, when any graſs upon the ſhore is overflowed by a ſpring-tide, it withers away in a few days, and does not recover till it gets a plentiful ſhower. Then indeed, by the freſhneſs of its verdure, it is diſtinguiſhed from the graſs that was not overflowed by the ſalt water. That it is the ſalt in the water that deſtroys the plants, is obvious : for the ſame quantity of freſh water would have had no ſuch effect. And it is probable, that the oils attracted by the ſalts, and carried down by the rain, is the cauſe of their recovery.

In many places, particularly near the ſea-ſhore, broken ſhells are found in beds. Theſe are uſed by ſome as a manure.

They ferment with acids, and, like other animal ſubſtances, contain oil, ſalt, and earth. The oil and ſalt are not in great quantities in proportion to the earth, and they take a long time in diſſolving.

Their operation muſt be of the ſame kind with that of ſhell marle, but ſlower and weaker.

They make ſome addition to the vegetable food by the ingredients of this food of which they are compounded. They communicate to the ſoil a power of attracting this food from the air ; and they diſſolve it by the ſalts which they contain and produce. And they increaſe the paſture of plants by their fermentation.

They operate chiefly by enlarging the paſture of plants, and preparing the vegetable food for entering their roots. They are ſo long in diſſolving, that the quantity of oil communicated in a ſeaſon muſt be ſmall in proportion to the ſalts which they produce. Though theſe are their principal operations, yet in them they are inferior to lime, marles, or aſhes.

As they take a long time to diſſolve, and do not operate quickly, it is neceſſary to apply them in large quantities. For without this their operations will ſcarcely be perceptible.

For the ſame reaſon it may be expected they will continue for a conſiderable time. They will continue till the ſhells are wholly diſſolved, and all their oils exhauſted in vegetation.

As they operate chiefly by enlarging the paſture of plants, and fitting the vegetable food for entering their roots ; they will in ſome degree exhauſt the land of its vegetable food, though not ſo much as lime or aſhes do, as they communicate ſome oils to it in diſſolving. It is not proper therefore to apply them after lime or aſhes, to repeat them immediately, or apply lime and aſhes after them.

If they are taken up from below the ſurface, as muſt happen moſt commonly, it is proper to allow them to lie ſome time expoſed to the air before they are ploughed down. This will not only aſſiſt their fermentation, but will alſo promote their putrefaction.

As lime, when mixed with them, takes a very ſtrong band, it is probable, that the mixing them together in the application may in ſome caſes produce very good effects.

It is a practice in ſome places to ſow turnip, buck-wheat, peaſe, &c. on land; and when grown up, to plough them down for manures.

Theſe may be called vegetables in an entire ſtate, to diſtinguiſh them from dung made of putrefied vegetables; though no vegetable can be a manure till it is putrefied.

As theſe vegetables receive their food from the ſoil on which they grow, it is natural to think, that when ploughed down, they do no more than reſtore what they have taken; and therefore, that by this operation land cannot be rendered more fertile than before; at leaſt, cannot communicate ſuch a quantity of vegetable food to it as may be done by frequent ploughings. For the vegetables, though ploughed down, are not all preſerved; a part of them being uncovered, is blown away by the winds. Beſides, the plants while growing cover the ſurface, and prevent the vegetable food in the air from entering the ſoil. Whereas, when land is frequently ploughed, none of its vegetable food is exhauſted, and it is expoſed to receive all the benefits from the influence of the air. But, notwithſtanding this, ſome aſſert from experience, that a crop of ſuch vegetables as thoſe mentioned, ploughed down, render land more fertile than frequent ploughings without the application of manure.

To account for this upon the principles eſtabliſhed, let the following things be conſidered.

The ſoil, manured by ploughing down a crop of vegetables, receives all the vegetable food contained in the ſeed ſown. This quantity in peaſe and buck-wheat is not very inconſiderable. The quantity in one grain is probably as much as there is in a whole ſtalk after the ſeed is fully ripened. It is obſerved, that plants, when cut green, exhauſt land of its vegetable food, but in a very ſmall degree to what they do when allowed to carry ſeed.

Some of the plants mentioned puſh down their roots below the reach of the plough, and bring up the vegetable food lodged there to the ſurface. Peaſe, turnip, clover, and other plants puſh down their roots very far; and whatever vegetable food they find, is ſucked up; and when they are ploughed down, this vegetable food is lodged near the ſurface, and thereby the quantity within the paſture of ſome other plants, ſuch as wheat and barley, is increaſed. A late author makes a calculation of the quantity of vegetable food which clover in this manner communicates to land, and repreſents it as very conſiderable. In few places the ſoil is ſo deep as to have the vegetable food in great plenty beyond the reach of the plough; and therefore it is probable, that this author, in his calculation, makes the quantity of this food brought near the ſurface by clover much greater than it really is. However, it is certain, that as plants puſh down their roots below the reach of the plough, they there find nouriſhment, which is communicated to their ſtems and leaves; and therefore, when theſe are ploughed down, the quantity of vegetable food near the ſurface is increaſed.

The covering of the ſurface ſeems to be an advantage; for thereby the air in the ſoil, not having a free communication with the external air, becomes putrefied, by which a fermentation is raiſed, and the vegetable paſture enlarged. Whatever is the cauſe of this fermentation, the fact itſelf is obvious. Every farmer knows, that when the ſoil has been covered for a conſiderable time by a ſtrong crop of peaſe, or any other kind of corn laid down, and what is commonly called flooming, though naturally hard and ſtiff, becomes mellow, ſoft, and free, and obviouſly in a ſtate of fermentation. It is probable, that this is occaſioned by the corruption of the air, or of the water, which the covering of the ſurface prevents from being exhaled.

To theſe things it may be added, that it is not impoſſible but the plants when growing may ſuck in the vegetable food from the air in as great plenty as the ſoil would have done, though there had been no plants growing upon it. If plants have this faculty, conſidering what an immenſe ſurface is expoſed by them to the influence of the air, the quantity of vegetable food acquired cannot be inconſiderable.

Having thus conſidered the effects of ploughing, harrowing, rolling, and manuring land, in order to produce a large crop of wheat, we ſhall now proceed to the cultivation of the uſeful ſpecies of grain.

It has been very juſtly obſerved by the ancients, as well as moderns, that wheat will grow in almoſt any part of the world, and that, as it is the plant moſt neceſſary to mankind, ſo it is the moſt general, and the moſt fruitful. It thrives not only in temperate climates, but alſo in very hot, and very cold regions; and, when ſown in places where it never grew ſpontaneouſly, ſucceeds as well as where it has been always common. The ſucceſs of our crops of wheat in America plainly prove this: and in Peru and Chili in particular, where this grain was not known till the Europeans introduced it there, it now produces as large crops as in moſt parts of Europe.

Wheat ſhould be ſowed in autumn, and always when the ground is moiſt. In the downs of Hampſhire, Wiltſhire, and Dorſetſhire, farmers begin to ſow their wheat in Auguſt, if any rain has fallen, and even employ their people to ſow one place, while they reap another, if wet weather interrupts them in their harveſt: for if the corn is not forward in autumn, ſo as to cover the ground before winter, it ſeldom does well on thoſe high dry lands, eſpecially if the enſuing ſpring prove likewiſe dry. In low ſtrong lands, ſome huſbandmen think they are in good ſeaſon, if they get their wheat into the ground by the middle of November; nay, it ſometimes is Chriſtmas, or even later, before all their wheat is ſown. But this late ſown wheat, beſides being apt to run too much to ſtraw, eſpecially if the ſpring be moiſt, is liable to be thrown out of the ground by froſts.

In general, all wheat ſucceeds beſt upon ſtrong ſoils, eſpecially if they have been well drained, ſo that the corn lies dry: but as ſome ſorts of this grain thrive better in ſome ſoils than in others, it might redound to the public welfare if more particular obſervations were judiciouſly made, in regard to each kind, than have hitherto been. The white egg-ſhell wheat is reckoned beſt for light lands, and to ſow with rye for meſlin; becauſe it ripens ſooneſt. It ſhould alſo be the earlieſt in the ground. This ſpecies is much ſown in Eſſex, upon their hazely brick-earths, or loams; as the red-wheat, and the Poland bearded wheat alſo is there, and in Hertfordſhire upon ſtiff yellow clays. The white Poland, or pole-rivet wheat has not a hollow ſtraw, and therefore is not ſo ſubject to lodge as other corn that has. This kind is particularly fit for lands where the crop is apt to run much to ſtraw.

In Oxfordſhire, they have a ſort of wheat which they call long coned-wheat, and reckon the beſt for rank clays. Its ſtraw not being hollow, it is the leſs liable to lodge, and farmers obſerve that it is the leaſt apt to be mildewed, or be eaten by birds, from which laſt it is greatly guarded by its long rough awns; but the flour of it is ſomewhat coarſe. Their white kind of red eared wheat has a white ear and a red grain, and is a very good ſort for clayey land. It yields a good crop, and ſeldom ſmuts.

In Staffordſhire, they reckon the red Lammas or bearded wheat the beſt for cold lands or ſtiff clays.

In Berkſhire is a wheat called pendulum-wheat, from the hanging of its ear, much like the cone-wheat.

In Northamptonſhire, they have a ſort of wheat with a white ſtraw and reddiſh ear and grain; much commended for the plumpneſs and largeneſs of the grain, and the ſtrength of the ſtraw, which prevents its being ſubject to lodge; nor is it apt to be eaten by birds. They have alſo a red eared bearded wheat, and a ſort of pollard or duck-bill wheat, as it is called, known in Suſſex by the name of fuller's wheat, which has ſo cloſe and thick a huſk, that the birds never injure it. Mr. Miller obſerves that this ſort of wheat grows very tall, and, if it be ſown too thick, is very apt to be lodged by rain and wind; for that its ears are large and heavy, and incline on one ſide as the grain increaſes in weight; but that, if its roots are at a proper diſtance from each other, it will tiller greatly and have ſtrong ſtalks, and that the grain of this wheat yields more flour in proportion than that of any other ſort. The awns of this wheat always drop off when the grain is full grown.

Smyrna wheat, commonly called many-eared wheat, becauſe ſeveral leſſer or collateral ears grow around the bottom of the main ear, which is very large in its ſtate of perfection, requires more nouriſhment than the common huſbandry in the large way can give it, and therefore is not cultivated by our farmers: but it would, probably, do extremely well in the horſe-hoeing huſbandry, where the quantity of food can be enlarged almoſt at pleaſure. For the ſame reaſon maiz, commonly called Turky or Indian corn, is fitteſt for this laſt huſbandry. *See* MAIZ.

Some gentlemen have been curious enough to procure their ſeed wheat from Sicily, and it has ſucceeded very well as to the growth: but the grain of this ſpecies has proved too hard for our Engliſh mills to grind.

The beſt time for ſowing wheat is about the beginning of September, eſpecially if any rain has fallen; a circumſtance ſo eſſential, that, if the earth be very dry, the farmer had better ſtay till friendly ſhowers have moiſtened his ſoil, than put his corn in ground where it will not grow before it has been wet, let the time be every ſo long. Mr. Mortimer ſays he has known wheat to be ſo muſtied and ſpoiled by laying long in the ground, before rain came, that it has never grown at all: to which he adds, that he has likewiſe ſeen very good crops of wheat from ſeed ſown in July. At all events, the huſbandman ſhould certainly have his wheat ſowing finiſhed by the middle of October. Whoever neglect this, ſhews in ſo doing, a want of proper œconomy in his affairs, and will have cauſe to repent the delay.

Early ſowings require leſs ſeed than late ones, becauſe the plants then riſe better, and acquire ſtrength to reſiſt the winter's cold. More ſeed ſhould always be allowed for poor lands than for rich, becauſe a greater number of plants will periſh on the former. Rich lands, ſowed early, require the leaſt ſeed of any.

Another circumſtance which the huſbandman ſhould carefully attend to in ſowing, is that his eſtimate of ſeed be formed, not from the capacity of any particular meaſure, but from the number of grains which that meaſure will contain; becauſe the grains of ſome growths of wheat are much larger than thoſe from off other lands, though of the ſame ſpecies, and perhaps equally good. By not conſidering this, the ground will of courſe frequently be ſown too thick, or too thin: though I believe farmers are ſeldom apt to run into this laſt extreme. That they too often commit the former error, ſo manifeſtly contrary to their intereſt in every reſpect, is demonſtrated by reaſon, and by daily experience:—but neither of theſe is ſufficient to make them deviate from the beaten tract. Inſtead of the uſual allowance of three buſhels of ſeed wheat to an acre of land, repeated trials have ſhewn that half that quantity is generally more than ſufficent: conſequently a great deal of corn is actually thrown away; for the expence of purchaſing ſeed, which moſt ſkilful huſbandmen do, at leaſt every other year, amounts to a conſiderable article in large farms, and in a whole country, merits the attention of the public, eſpecially in ſcarce years: beſides which, the future plants, crowded together by being thus ſown too thick, and not having a ſufficient ſpace allowed them for their ſuſtenance, cannot yield near ſo fine and plentiful a crop as they would otherwiſe produce. A fair trial, made with proper care, would ſoon convince farmers of their error in this reſpect; for if they but examine a field of corn ſown in the common way, they will find few plants with more than two or three ſtalks, unleſs by chance, where ſome of them ſtand ſo as to have room to ſpread. Theſe will have ſix, eight, or ten ſtalks, and frequently many more: but a field of wheat ſown with only a buſhel of good corn has been known to be well covered with healthy vigorous plants, each of which has had from ſix to fourteen, or more, ſtalks, crowned with long well nouriſhed ears, full of fine plump grain, of which it has yielded a much greater quantity than any of the neighbouring grounds ſown with the common allowance. If the land is good, and the plants ſtand at a proper diſtance from each other, few of them will produce leſs than the above number of ſtalks and ears. But farmers think they ſhall have no crop if the ground is not covered with the blades of corn by the ſpring: whereas, if they would have patience to wait till the plants put out all their ſtems, they would be amply convinced of the contrary. Every one muſt have obſerved in places where foot-paths are made through corn fields, that, by the ſide of thoſe paths, where the corn is thin, and has been trodden down in the winter and ſpring, the plants have ſtood erect, when moſt of the corn in the ſame field has been laid flat upon the ground; an advantage which can proceed from no other cauſe, than that their ſtalks are ſtronger from their having more room: for thoſe of the other plants are drawn up tall and ſlender by being too cloſe together.

More ſeed is commonly ſowed upon new broke up ground, than upon that which has been longer in tillage. From half an inch to three inches is the uſual depth at which wheat is planted, according to the nature of the ſoil; the ſtiffeſt lands requiring the ſhalloweſt ſowing, as was before obſerved. The general cuſtom is, to ſow it under furrow, which is certainly moſt adviſeable if the ſoil be ſhallow, to prevent the plants being thrown out by the winter's froſts, or their roots being left bare by the drying winds in the ſpring. Some ſow in broad caſt, either with a ſingle caſt, or a double bout, harrowing once between; after which the ground is again harrowed ſeveral times, till the ſeed is well covered. However, a great deal of it will become the prey of birds, in this manner of ſowing. On the other hand, in planting the corn deep, there is the greater dander of its being eaten off by worms between the grain and the blade.

Great care ſhould be taken to guard againſt the rooks juſt at the time when the wheat is ſhooting up. Theſe miſchievous birds perceive its ſprouting much ſooner than the farmer can, and are led by the ſhoot to pick it up. They muſt therefore be carefully kept off the ground for a week or ten days at this ſeaſon; for at the end of that time the blade will be grown up, and the grain ſo exhauſted of its ſubſtance, that they will not give themſelves any trouble about ſtealing it. They never moleſt the wheat which is ſown about Michaelmas; becauſe ſo much grain of the late harveſt then lies ſcattered about the fields, that they find it eaſier to pick up that, than to ſearch for corn under ground, in the new-ſown lands.

No part of huſbandry requires the farmer's attention more, than keeping his land free from weeds; yet few trouble themſelves much about this eſſential article, are ſenſible of it's importance, or underſtand the proper method of doing it: nay, many do not even know which weeds are annual, and which perennial; a diſtinction highly neceſſary to be made by every perſon who would keep his ground clean and in good order, and without which the greateſt induſtry will often be baffled. Annual weeds may be ſoon deſtroyed, if taken in time: but if they are neglected, their ſeeds will ripen, and ſow themſelves in ſuch abundance, that much additional labour and expence will be required to do that which might have been performed with eaſe at the beginning, without ſubjecting the corn to be robbed of its nouriſhment by bad neighbours. The common method of weeding is very abſurd: for in that practice the weeds are left to grow till the wheat begins to ear, and they are in flower; by which means, the ground being covered by the corn, all the low weeds are hid, left to ripen, and ſcatter their ſeeds: only the tall weeds are taken out; and if the people employed are not careful, many of theſe will eſcape them, by being ſo intermixed with the ſtalks of the wheat, as not inſtantly to be diſtinguiſhed. At the ſame time great numbers of the plants of wheat are broken and trod under foot by the weeders.

To obviate theſe inconveniences, Mr. Miller recommends the method now practiſed by good kitchen gardeners, who clear their ground with a ſmall kind of hoe, which, if uſed among the wheat early in the ſpring, before the ground is covered by the blades of corn, will effectually eradicate all the weeds, eſpecially if this work be done in dry weather; becauſe, being ſmall, they then ſoon wither and die. If the ground happens to be very full of weeds, it may be neceſſary to go over it a ſecond time, about a fortnight after the firſt, to cut up thoſe which may have been too ſmall to be noticed. By this means the corn will be kept clean, freed from robbers which would deprive it of due nouriſhment, and there will not be time for new weeds to grow ſo as afterwards to do it any great prejudice: for the ground will be ſo much ſhaded by the corn, that the weeds will thereby be kept down, in ſuch manner as not to ripen their ſeeds before harveſt.

If, at the time of this operation, ſome of the plants of corn are cut up where they grow too cloſe, the reſt will be greatly benefited thereby: "but in this, adds Mr. Miller, I fear that few of the old farmers will ever agree with me, though what I mention is not from theory, but from experiments, repeated with great care, and ſuch ſucceſs, that the produce of twenty rods of ground was much greater, both in weight and meaſure, than that of the ſame extent in the very beſt part of the field, where this was not practiſed; and the ſtalks of the corn thus thinned ſtood upright, when a great part of the crop in the ſame field was lodged."

Both the advantage of having the plants of corn at proper diſtances from each other, and that of keeping them quite free from weeds, too difficult, not to ſay almoſt impracticable, taſks to be completely effected in the common method of ſowing, are fully obtained in the New Huſbandry, as will ſoon be evidently ſhewn.

M. Duhamel and Mr. Miller juſtly blame the practice of thoſe who either turn hogs in among their wheat, to deſtroy part of it when it grows too thick; or ſheep to eat it down, when they think it too rank. The abſurdity of the former is ſelf evident: and in regard to the latter, it is well known, from long experience, that the leaves, or blades, of corn are neceſſary to draw in nouriſhment from the air and dews, for the increaſe of the ſtalk and ear. To be thoroughly ſatisfied in this, Mr. Miller cut off the leaves of ſome plants of wheat, alternately, early in the ſpring, and always found the ſtalks of theſe plants much ſmaller, the ears ſhorter, and the grain poorer, than thoſe of the intermediate plants whoſe blades were not cut. Several experiments made by M. Duhamel have proved, not only that all plants are impeded in their growth, and rendered leſs perfect in their productions, but often even killed, by ſtripping them of their leaves: and this is confirmed by Mr. Miller, who adds, that he has frequently obſerved in gardens, that plants diveſted only of their lower leaves, plucked off by ignorant perſons upon a ſuppoſition of their drawing the nouriſhment from the head, have been greatly weakened thereby. The ſame will undoubtedly hold good with reſpect to corn; beſides which, cattle, and particularly ſheep, will often bite ſo cloſe as to deſtroy the crown of the plant, from whence its future growth ſhould proceed.

Wheat is ripe when its ſtraw is turned yellow, its ears hang, no greenneſs appears in the middle of them, and the grain is hard when bitten. From four to five quarters is reckoned a good crop: but ſome would hardly credit how much beyond this the produce of good ground, thoroughly well cultivated, may be increaſed. Thoſe who are ſenſible of the vaſt advantages of a perfect culture, will not be ſurpriſed at Mr. Miller's aſſuring us that he has known eight and ten quarters, and ſometimes more, reaped from an acre, over the whole field, where the corn has ſtood thin upon the ground; and that he has been informed by perſons of great credit, that even twelve quarters have been reaped from an acre of land drilled and managed with the horſe-hoe.

Both wheat and rye may be cut ſomewhat before they are throughly ripe, eſpecially if they be lodged; for if the ſtraw be broken, it will no longer convey any nouriſhment to the grain. M. Duhamel ſeems to think this even the moſt eligible way for wheat, becauſe the grain will harden afterwards in the ſheaf; whereas, if it be let ſtand till it is too ripe, it will ſhed greatly in cutting, binding, and carrying home. It is partly to prevent this inconvenience, that good huſbandmen tie it in the evening, and carry it off early the next morning. The ancients reaped their corn before it was full ripe, as Pliny informs us. And indeed it muſt be allowed that very great diſadvantages neceſſarily attend the letting of ſome ſorts of corn ſtand till their grains have acquired their utmoſt maturity. Both the chaff and the fodder are the worſe for it; and, if ſuch ripe corn takes wet, the increaſe in malt is loſt, if it be barley, it having already ſpent itſelf; and if it be wheat, the quality of the flour is greatly impaired, as well as the quantity conſiderably leſſened. But if corn be cut greeniſh, it will bear a pretty deal of wet without damage; for it will not imbibe the water like full ripe corn, but only take in ſo much as to be kindly fed thereby. Again, if any ſort of corn be blighted, the ſooner it is cut down, though but half ripe, the better it will be; for nouriſhment can no longer be conveyed to it by the ſtraw; but it will be fed by lying in the ear. The ſtraw would become more and more brittle, by ſtanding till the corn is ripe; and the grain comes the clearer from the huſk, when threſhed, if this blighted ſort be cut early.

One man, with a binder, may reap an acre of wheat, and ſomewhat more of rye, in a day, if the corn ſtand well: he will alſo clear about an acre of peas, vetches, &c. in the ſame ſpace of time.

The medium price of wheat, in this country, is about five ſhillings the buſhel. If it be much under four ſhillings, the farmer cannot pay his rent and live; and if it exceeds ſix ſhillings, the poorer ſort of people cannot afford to purchaſe wheaten bread. A buſhel of wheat weighs from fifty-ſix to ſixty pounds; a buſhel of barley, from forty-four to forty-ſeven pounds; and a buſhel of peas, from ſixty-three to ſixty-ſix pounds.

"The huſbandman, ſays M. Duhamel, cannot have a more favourable ſeaſon to get in his harveſt, than that which is afforded him by hot and dry weather: for the quality of the corn is improved, and the grain is rendered much fitter to keep, by the ſun's having acted powerfully upon it, either towards the latter part of its ſtanding, or juſt after it has been cut: though it is true, on the other hand, that this very circumſtance renders the ears more apt to ſhed their grain, and that the value of a ſowing is often loſt thereby. To prevent this, as much as poſſible, the corn is firſt laid in gripps, and then tied up in ſheaves, in the cool of the evening, or early in the morning before the heat comes on; and the mowers of oats frequently work during part of the night, to avoid the exceſſively fatiguing ſultrineſs of the noon. Theſe poor people, whoſe taſk is infinitely laborious, are liable to many grievous diſorders; eſpecially the reapers, who, being obliged to ſtoop to their work, almoſt to the very point where the rays of the ſun are moſt violently reflected by the earth, breathe a perfectly burning air. This forces them to drink copiouſly of liquors, which, being heated by the ſun, allay their thirſt only for a few moments, and, I ſtrongly ſuſpect, often occaſion ſevere illneſſes: the inventing of a machine, engine, or inſtrument, by which the hardneſs of this labour might be mitigated, would therefore be a truly uſeful diſcovery; and I moſt heartily exhort all ingenious perſons who have a mechanic turn, ſeriouſly to think of it.

"The two uſual ways of cutting corn, are either with the ſcythe, or with the ſickle. The former is commonly uſed for oats and barley, or, ſometimes, for very thin, ſhort wheat; and the ſickle is generally appropriated to the reaping of tall and thick wheat and rye. The ſcythe diſpatches ſo much more work than the ſickle, that the difference of expence between reaping an acre, or mowing it, is nearly in the proportion of five to two.

"Every part of the mower's body labours and fatigues, and his work requires greater dexterity than that of the reaper: but as the mower is always in a kind of ſtanding poſture, he has the advantage of being refreſhed by every breeze of air; which the reaper, for the reaſons before-mentioned, has not.

"I do not deſpair but that ſome engine may, one time or other, be found out, to eaſe theſe very hard labourers, and expedite their work. In the mean while, I am perſuaded that M. de Lille's following account of what he himſelf has practiſed on his own eſtate, will afford ſatisfaction to all my readers, who will be pleaſed to obſerve, that he does not relate matters of mere ſpeculation, but real facts; things actually executed by him, and which I ſhould certainly have tried, if I could poſſibly have been in the country when our harveſts were got in.

M. De Lille's account of his method of mowing wheat.

"When I firſt put a ſcythe into my corn, I was of courſe laughed at by ſome of my neighbours, becauſe they had never ſeen any ſuch thing. I let them enjoy their jokes; but perſevered in my undertaking, which I have now practiſed ſufficiently to be able to point out minutely its advantages, and its inconveniences; for I allow that, though the former are very great and numerous, it is alſo attended with ſome of the latter.

“ The year 1751 was very rainy; our graſs rotted upon the ground, our corn was poor and infeſted with weeds; and the weather continued extremely bad during all the harveſt ſeaſon. One of my fields of wheat, containing about fifteen acres, was, in particular, in ſuch wretched plight, that I did not think the crop worth taking off. However, after walking over it, and viewing it on every ſide, I found that the quantity of graſs and other growths upon it, might, if mowed, afford a great deal of fodder, which would make me ſome amends for the total loſs of my lucerne. I therefore determined to let my horſes have it all, with the little wheat which appeared here and there. This firſt made me think of mowing a field of wheat; tho' I ſoon recollected that I had met with the hint before, in ſome of your writings. Accordingly, I ſet my mowers to work: my field yielded a great quantity of fodder; the graſs, mowed within two inches of the ground, ſhot up anew, and afforded excellent paſture; and laſtly, my bailiff, more ſaving than I had been, ordered the truſſes to be thraſhed, and got out of them as much wheat as was yielded by other grounds.

“ Whilſt I was congratulating myſelf upon the ſucceſs of my operation, by which my horſes and cattle were provided with plenty of fodder for the next winter, I learnt that the huſbandmen in Hainault, Flanders, Artois, and other adjacent parts, never cut their corn down otherwiſe than with a ſcythe; but at the ſame time I was informed, that they do not mow wheat in the ſame manner as oats; that the ſcythes are not made alike for both theſe works, and that there are ſome other eſſential differences.

“ Theſe obſervations were a ſort of proof that the practice had been found to anſwer, ſince it was ſtill continued; and I concluded, that if my operation, imperfect as it was, had ſucceeded ſo well, I might expect far greater advantages when it ſhould be performed regularly: but, not to be too ſtrongly prejudiced in its favour, I reſolved to make a trial upon about thirty acres only.

“ By dint of inquiry, I found within a few miles of me a huſbandman who came from the province of Artois, and had been uſed to this very buſineſs. I talked with him; he told me how the work ought to be done, pointed out its advantages, and I retained him for my intended next year's mowing of wheat: but as the ſeaſon was pretty far advanced, and there was not time to procure from his country other people equally well acquainted with the practice, to follow the ſcythe, and do the whole completely in every reſpect, he inſtructed two young lads, as well as he could. In ſhort, nothing was wanting but a mere matter of form, by the neglecting of which ſome of the lifts of the cut corn were miſplaced, ſo that there were ears at both ends of the ſheaf.

“ I ought not here to forget the clamour raiſed by this novelty. I made the experiment upon my fineſt wheat; becauſe my new workman had told me, that the ſtronger the corn was, the better and more regularly the mowing would be performed. My neighbouring huſbandmen, and all the reapers employed by them, thought me out of my ſenſes, and ſome of them even came to reaſon the matter with me. They meant well, and I took it kindly; but deſired them carefully to notice the event.

“ My experiment was made upon three pieces of wheat, of ten acres each, ſituated in much more extenſive fields of the ſame corn; ſo that there was the faireſt room to make a juſt compariſon between the operation of the ſcythe and that of the ſickle.

“ Some of the neighbouring huſbandmen had the curioſity to ſee the work performed, and were ſurpriſed to find that leſs corn was ſhed in this way, than in the common practice of reaping with the ſickle. They thought the method good; but made a few objections to ſome particular circumſtances, in which the experience of ſubſequent years ſhewed them that they were wrong. Their entire approbation then followed; and their mowers, finding that they ſhould be able by this means to cut down all their corn without the aſſiſtance of ſtrolling ſtrangers who often do their work very badly, gladly learnt the new method, and commended it to others.

“ This trial ſucceeded ſo well, that I reſolved to cut all my crops in the ſame manner; and that nothing might be wanting to perfect my mowers in this practice, I procured a ſufficient number of expert workmen, maſters of the art, from the village of Trie, near Valenciennes, to aſſiſt and inſtruct them for the harveſt of 1753.

“ This work required a precaution which has been duly attended to ever ſince: it is, to pick all the ſtones from off the land, every year, as carefully as poſſible. The expence of ſo doing is a very trifle, when compared to the advantages attending it. All the roads around my land, which were formerly impaſſable in winter, are now firm and good, fit for any carriage. We no longer hear of horſes lamed, or waggons overturned by them; and, which is equally true, I find that my ground now requires a leſs quantity of ſeed.

“ I have now practiſed this method, in an extenſive manner, during five ſucceſſive years, in the courſe of which I have had opportunities of experiencing every circumſtance neceſſary to be conſidered in order to determine its real merit; I mean, mowing in rainy weather, and cutting of corn either bent, laid flat, totally lodged, or lodged only in particular places, and in various directions. I ſhall firſt deſcribe the mechaniſm of this mowing, and then point out its advantages, with the objections of my neighbours, which will ſhew the only inconveniencies I have met with.

“ The Flemiſh mowers whom I employed in the year 1753, brought with them ſcythes exactly like ours. I ſaw no ſort of difference in their ſize, make, manner of being mounted, or even in the hooks they were trimmed with; ſo that I found I had been miſinformed by thoſe who told me in 1751, that this work required an inſtrument different from that which is uſed for mowing oats. It was not till the year 1755, that an ingenious workman pointed out ſome very proper alterations, which have ſince been made.

“ This intelligent mower obſerved, that the common ſcythe cannot ſuit any ground but ſuch as has been plowed flat; that it therefore was leaſt of all proper for our lands, which are plowed in ridges of ten or twelve furrows, raiſed very high in the middle; and that its hooks broke the ſtraw, plucked off numbers of ears, and did not lay hold of many ſhort plants which grow in the bottom of the furrows, whereby a loſs was occaſioned, or take up the intermixed graſs and weeds ſo exactly as might be wiſhed. To remedy this, he took a ſcythe at leaſt ſix inches ſhorter than thoſe which are commonly uſed, and, inſtead of the hooks, ſubſtituted what he calls the bender, conſiſting of two ſhoots of willow, or other green wood, placed ſemicircularly upon the handle of the ſcythe, where the hooks are commonly ſet. To this end, there muſt be four holes in the handle, ſo that the end of one twig may be put into the lowermoſt hole, and its other end into the third, and the two ends of the other twig into the ſecond and fourth holes. The ſcythe thus trimmed is to be uſed in the manner I ſhall now explain.

“ When a mower ſets about cutting down a crop of oats, he places himſelf ſo that the corn is at his right-hand, from whence the action of the ſcythe throws the waving towards his left. The mower of wheat, on the contrary, proceeds from outſide to inſide, ſo that the corn which he is next to cut is always at his left hand; and that which he has juſt cut, being collected by the bender, is reſted, inclining a little, againſt the adjoining uncut part.

“ A helper, which may be a boy of twelve or fifteen years of age, or an elderly woman, follows the mower at the diſtance of four or five feet, with a reaping hook, or a ſtick about a foot and a half or two feet long, and, by putting that through the interval between the ſloping late cut wheat, and the ſtanding corn againſt which it reſts, takes up the former, gives the ſtraw ends a gentle ſtroke or two upon the ground, to form that parcel into a grip, and lays it down at his right hand. This ſhould be done very expeditiouſly, becauſe the picker-up, as this perſon is called, is followed by another mower; and it ſhould alſo be done dexterouſly, becauſe the greater or leſs quantity of gleanings depends thereon. There ſhould be as many pickers-up (we call them binders), as there are mowers.

“ The poſture of the mower is a circumſtance of ſuch importance, that I think myſelf happy in having taken particular notice of it in 1754. In cutting graſs and oats, the mower goes in ſuch manner that his feet, which are moved alternately at each ſtroke of the ſcythe, deſcribe two parallel lines. But in the mowing of wheat, the mower's track ſhould be upon a ſingle line, ſo that his right foot, which ſhould be foremoſt, be driven forward by the left, at each cut of the ſcythe; not unlike the attitude of a fencer when he advances.

“ An accident, which had like to have over-ſet my whole operation in the year 1754, demonſtrated to me the neceſſity of this different poſture. I employed for mowing my wheat, men who uſed to come yearly to cut down my oats: they were ſeven in number. On the third day of their labour, five of them fell ill; upon which I ſet three others to work: but the conſequence was, that I had ten ſick people to take care of at the end of the week. I viſited them, inquired into their ailments, and found, that ſome of them had a fever, but that all complained of violent pains and ſoreneſs under their left ribs. At firſt, I inclined to think them pleuritic; but, upon a cloſer examination, and upon conſidering the nature of the work they had been at, I ſaw that their illneſs proceeded from badly managed hard labour, the ſtreſs of which had been made to lie chiefly upon the left ſide. I therefore ordered them to take their reſt.

“ The next day, upon viſiting my infirmary, I found that two of the mowers were returned to their work. I went out to them, and ſaw, even at ſome diſtance, that their poſture in this work was the ſame as if they had been mowing of oats. This immediately ſhewed me the cauſe of their pains. The ſcythes which they then uſed had the common ſort of hooks, and were much heavier than thoſe with only wicker benders. I took up one of them, put myſelf in the poſture of a mower of oats, and ſhewed them, that as a much greater weight reſted upon the hooks of the ſcythe when they mowed wheat, then when they cut oats; it was not poſſible for them, in the poſture they had choſen, to move that increaſed load to the left, without an irkſome twiſting of the body. Then, putting myſelf in the poſture of a fencer, as I had ſeen my Flemiſh mowers do the year before, I demonſtrated to them, that the body was thereby placed in ſuch an attitude as enabled it to exert the greateſt ſtrength, when, by the motion from right to left, it had the greateſt load to ſupport, and that, by the ſame means, this load was carried round without fatiguing the ribs of either ſide. My man took back his ſcythe, tried as I had directed, was convinced of the truth of my demonſtration, taught his companions the ſame method, and they have done their buſineſs eaſily ever ſince. I thought it neceſſary to relate the circumſtances of this accident, becauſe I am ſatisfied that even the ſtrongeſt men would ſink under the labour of mowing wheat, if they were to ſtand in the ſame poſture as the mowers of oats.

“ Such is the manner in which this operation ſhould be performed, when the corn ſtands upright, that is to ſay, in the moſt favourable years. I ought to add, that the mower ſhould take care to place himſelf, for his work, in ſuch manner that his left hand may be toward the wind. The corn is then naturally inclined over the ſcythe, and is the more eaſily cut cloſer to the ground. The reſiſtance of the wind, be it ever ſo little, helps to keep the corn which is cut ſteady upon the benders of the ſcythe, and facilitates the motion which reſts it againſt the uncut corn, where the binder takes it.

“ The mower is not hindered from mowing cloſe, by the wind's blowing at his back; but the corn which he cuts will not be ſo exactly collected by the bender: ſome of the ears will be a little ſcattered: but the greateſt inconvenience is, that it does not reſt ſo well againſt the ſtanding corn, but is often blown down; which renders the binder's work ſlower, and more troubleſome, and occaſions greater gleanings.

“ The wind is in a bad corner for the mower when it blows in his face. It then occaſions a loſs of ſtubble, and a great diſperſion of the ears.

“ But the worſt of all winds for this work, is that which blows upon the right hand of the mower. The ſtubble then remains long, and ſo great a quantity of ears lies ſcattered about, that one would hardly think the ground had been harveſted My mowers did not place themſelves in this manner of their own accord; but I made them do it for a quarter of an hour, to try the effect, of which I am fully convinced.

“ When the corn is inclined, or bent, the mower takes it in the direction of its bending, from left to right; which has the ſame effect, in calm weather, as if the wind blew towards his left.

“ Corn which is lodged cannot eaſily be mowed inward, becauſe the binder would be inceſſantly impeded by the intangling of his grip with the un-cut corn. A good mower judges by his eye, which part it is moſt proper to begin at, and takes advantage of the wind when it can be of ſervice to him. The method which I have ſeen moſt commonly practiſed, has been by taking the corn in the direction of its bending, and throwing it in waves. The work thus done is neatly performed: no remains of ſtubble are ſeen after the mowing; but the field looks like a meadow.

Corn laid abſolutely flat, and intangled, is the moſt difficult to cut well. I have ſeen a mower take it in every various direction in which it was beaten down, as if the wind had been conſtantly at his back, and by this means he has cut as cloſe as if it had been only lodged. My wheat was in this condition in the year 1757, and was mowed very regularly: only the work was ſomewhat longer about, than it generally is in other caſes.

“ I ſhall not ſpeak of rainy ſeaſons till I come to the objections againſt this method of cutting corn; becauſe they have nothing to do with our mowing, and the only thing requiſite in ſuch caſes is to keep the corn from ſprouting in the ear: but I ſhall here relate the advantages which I find in this practice.

“ The preſervation of my fellow creatures is ſo dear to me, that I look upon the means of leſſening their exceſſive hard labour at a time when the heat alone is enough to over-power them, as the firſt and greateſt advantage reſulting from this method. Now I ſee that a good reaper, with his ſickle, can ſcarcely cut an acre of wheat in a day, let him toil ever ſo much; whilſt the mower will diſpatch from an acre and a half to upwards of two acres, according to his ſkill and dexterity. I have, indeed, met with but few able to exceed two acres, when they have done their buſineſs well: but we may reckon that a good mower, taking them one with another, and the corn as it runs, upright, lodged, intangled, &c. will clear an acre and a half, or perhaps an acre and three quarters, in a day, neatly, and without waſting any of it. This mower does then three fifths more work than a reaper can. It is true, he has not the grips to tie up, becauſe the perſon who follows him does that part: but he is obliged to whet his ſcythe when he comes to the end of the field, and ſtill oftener when the corn does not grow thick; beſides which, notwithſtanding all the care that can be taken to clear the ground of ſtones, not a day will paſs without his meeting ſome, which will oblige him to have his ſcythe new hammered; and laſtly, when he has finiſhed a row, he muſt go back to the other end of the field before he can begin another. All this takes up at leaſt as much time as the reaper's binding up what he has cut: and in regard to the hardneſs of the labour on each ſide, I believe that every one who rightly conſiders the nature of their reſpective works, and their poſtures in working, will allow, that the mower's toil and fatigue is three fifths leſs than that of the reaper.

“ Another circumſtance, well worth attending to, in this method, is, that the mower is not expoſed to thoſe injuries from thiſtles, thorns, and other noxious plants, which often prove fatal to the reaper.

“ From the firſt of theſe advantages reſult ſeveral benefits: 1, a greater riddance of the neceſſary work. Not a year paſſes without the huſbandman's experiencing that ſome part or other of his corn ripens too ſuddenly; and this unexpected maturity, being exceedingly heightened by the leaſt delay, occaſions a great waſte, by the ſhedding of the grain, both when the crop is reaped with the ſickle, and in loading and un-loading it when carried home: whereas the ſcythe, by clearing in two days a field which could not be reaped in leſs than five, in the common way, guards againſt that exceſſive ripeneſs.

“ 2. This method of cutting down the corn requires fewer workmen.—I muſt here explain myſelf; becauſe the fact would contradict me, if it be objected that a mower and a binder are neceſſary in this way, for what the reaper alone does in the other. But I conſider, that to harveſt ninety acres, for example, of wheat, I muſt employ ten men at leaſt twenty days, with the ſickle; whilſt ſeven mowers, and their binders, (fourteen people), eaſily do my buſineſs in ten days. The difference then is equal to ſixty days work of one man: and if I do not intend to get my harveſt in quicker with the ſcythe than with the ſickle, I take but four mowers and four binders, eight perſons, of which the four laſt ſtand me in leſs expence than three reapers; becauſe I employ for this buſineſs young people, who would not be ſtrong enough to reap with the ſickle. Conſequently I have two workmen the leſs, and ſome advantage in the compariſon between the grown-up man, who has a higher price, and the lad, who anſwers my purpoſe.

“ 3. The thus employing of children, old women, and men whoſe conſtitution is not robuſt, would be an advantage to the inhabitants of the place. It would afford the means of ſubſiſtance to a greater number of people, and prevent idleneſs and beggary; an important object upon many accounts. Almoſt every pariſh would find within itſelf hands enough to get in it's harveſt, without being obliged to have recourſe to accidental paſſengers, who often work badly, require exorbitant wages, and ſometimes leave their maſter in the middle of the harveſt, if they do not ſubmit to their unconſcionable demands.

“ Let us leave ſpeculation, and notice ſome advantages which are evident beyond contradiction. 1, It is not a ſmall one to have a greater quantity of ſtraw, and that ſtraw intermixed with more graſs and other fodder, than when the corn is reaped in the uſual way. This does not need any proof; for every one knows, that the ſcythe cuts as cloſe to the ground as the mower pleaſes. Experience has ſhewn me, that the ſtubble has not been left two inches long upon our mowed fields, where the ſtones had been carefully picked off; whilſt the ſickle generally leaves it eight or nine inches long, and ſometimes much more when the ground is infeſted with thiſtles and other ſtubborn growths, which make the reaper lift up his hand to avoid them. The ſtraw is therefore plainly ſix inches longer when cut with the ſcythe, than with the ſickle; a difference which may be valued at a ſixth part more than that which is uſually reaped in the common way.

“ 2. The green fodder in the mowed fields ſhoots up anew when cut, and affords excellent paſture after the corn is taken off. The ſame demonſtrative evidence as before, will again take place here with thoſe who but conſider, that the reaper, leaving the ſtubble either eight or nine inches long, takes off only the very tips of the graſs which chances to be within his grip; ſo that, being then near its time of maturity, it ripens its ſeeds, ſows them, and withers away: whereas, when the ſcythe cuts it within two inches of the ground, in its greeneſt and moſt un-ripe part, the yet remaining eyes, and the crowns of the roots, ſend forth new ſhoots, which form a good aftercrop for cattle.

“ 3. The paſture upon fields mowed with the ſcythe, is attended with an advantage, in regard to cows, which may perhaps be peculiar to my country. I know not whether it be the ſame elſewhere. We find every year, and I have always taken particular notice of it, that our cows ceaſe to yield milk during the firſt week of their feeding among the wheat ſtubble. I take the reaſon of this to be, that the ſtubble gets into their noſtrils, pricks them, hinders them from feeding, and makes them range the whole field over in queſt of graſs unattended with this irkſome inconvenience; ſo that they ſpend their time in running about, without grazing. I do not find that this accident happens to cows which are turned in among the ſhort ſtubble left by the ſcythe: the graſs there ſoon ſhoots up a-new, and yields me plenty of paſture, eſpecially if a little rain happens to fall after harveſt.

“ It reſults from hence, that the huſbandman is enabled to feed more cattle than he could otherwiſe do, to ſave his ſainfoin or lucerne, and to have a greater quantity of dung; as I have experienced with almoſt incredible ſucceſs.

“ I now proceed to the objections, which I ſhall ſtate in the ſame order as they were made; that is to ſay, as each year gave room for one or other of them.

“ The firſt was, that the ſcythe muſt make the corn ſhed very much by ſhaking it conſiderably. To affirm the contrary may ſeem paradoxical; though the aſſertion will be proved from manifeſt principles, and by facts. To judge rightly of my propoſition, it will be neceſſary to compare the operation of the ſcythe with that of the ſickle; both of which I have examined very attentively.

“ The reaper preſents his hand to the corn, and with wide extended fingers, graſps as much as he poſſibly can; after which, to bring the lower part of the ſtalks ſo cloſe together that the ſickle may encompaſs the whole of his grip, and at the ſame time to give it a tenſion which renders the action of the ſickle more certain, he gives it a violent ſhake, and at that inſtant cuts it. The grip thus cut is generally intangled with the ſtanding corn; or the reaper, when going to lay it down, finds that he has miſſed cutting a ſtalk, or perhaps more, which he then breaks with a jerk of his hand. Thus ſeveral ſhakes precede that which the corn receives afterward when it is tied up.

“ The ſcythe has not theſe effects. I have already explained the mechaniſm of its operation, and ſhewn that the corn, cut without any violent ſhake, is carried gently by the bender (or cradle, as we more commonly call it) upon the ſcythe, to the ſtanding corn, againſt which it reſts inclined, till the binder takes it away to tie it up.

“ To prove my propoſition by facts, I inſtance the following. After my wheat was mowed in the year 1752, in the manner before related, upon the three ſeveral ſpots of ten acres each, which were parts of much larger fields, I went, with four other perſons, purpoſely to examine with all the care we could, what quantity of grain might have been ſhed by the mowing. We found none at all in the two firſt mowed pieces; but a great deal in the other parts of the ſame fields which had been reaped with the ſickle. In the laſt piece, which was not cut till the corn was riper, we found a little grain in the mowed part, but incomparably more in the other. I did not repeat this ſearch every year with the ſame care, becauſe I had not always the ſame conveniencies of making a compariſon: but I have ſeen enough to be certain that no grain is ſhed unleſs the corn be exceeding ripe, and that much leſs is then loſt by the ſcythe, than by the ſickle.

“ The following more important objection was afterward made by a ſenſible huſbandman, who obſerved to me, that, in a rainy year, the corn cut after this manner muſt be more liable to grow in the ear, than that which is reaped in the common way, becauſe the heads of the grips not being ſupported here by a pretty high ſtubble, the wet cannot well drain off; and that the grain will imbibe a great deal of moiſture from the graſs underneath, when the ear is beaten down upon it by rain, which will render it very apt to ſprout as ſoon as the ſun ſhines upon it. I had been told how to guard againſt this accident, but did not try the method till the year 1756, when it anſwered perfectly well.

“ This method conſiſts in laying the grips in a triangular form, ſo that the head of one reſts upon the foot of another. This operation is neither long nor fatiguing; nor does it require, in order to do it quick, any thing more than a little dexterity in cloſing the triangle, by making the foot of the third grip ſupport the ears of the firſt. The rains which fell during the harveſt of 1756, rendering the getting in of that year's crops extremely troubleſome, my neighbours had a great deal of ſprouted corn; but mine eſcaped by this method; and what little I had, proceeded from that which remained un-mowed when the rain became inceſſant.

“ With regard to the ſheaves, when bound, my Flemiſh mowers informed me, in 1753, of their practice when they are overtaken by laſting rains. It is, to heap upon one another, ends to ends, as many ſheaves as they can poſſibly cover with one, which is then opened and laid over them. My people did not practiſe this method, which I believe the beſt; but they ſecured my corn by other means, which anſwer extremely well, and are generally known.

“ From the above objection my huſbandman derived another, relative to the difficulty of drying the graſs and weeds intermixed with the corn, in rainy years, and the danger of houſing the ſheaves when full of that traſh, which may ferment, and be the occaſion of the rotting of a whole pile of wheat, I cannot anſwer this objection otherwiſe than by my experience. The harveſts of 1756 and 1757 were certainly not favoured by the weather: yet all the wild growths which were cut down with, and bound up among my ſheaves, were well withered when they were houſed. No ſort of ſmell which indicated the leaſt fermentation was perceived in any of my barns; the threſhers did not find any thing that looked like it; and the ſtraw which is taken from thoſe barns, to feed my horſes, atteſts that there was not any.

“ I now come to the laſt objection; by ſo much the more ſerious, as it is one of thoſe inconveniencies which I cannot remedy, but to which I readily ſubmit. The ears of the corn, ſay the objectors, do not lie ſo even in your grips, as in thoſe which are reaped with the ſickle; ſome of them are in the middle, and others at the very bottom of the ſheaf; ſo that your corn is not threſhed ſo well or ſo regularly, and you thereby loſe perhaps a conſiderable part of it. 2, All the graſs and weeds contained in your ſheaves are threſhed with the wheat, and their ſeeds are mingled with the corn when the threſher meaſures it out: conſequently you pay him for threſhing this traſh, which again increaſes the labour and pay of the winnower.

“ All this is true: but let us diſcuſs the matter a little more thoroughly. There are ears in the middle and at the bottom of my ſheaves: but they ſeldom are of any other kind than thoſe which we call backward or late ears; the weak productions of ſickly plants, or of ſeeds not perfectly ſound. Repeated examinations have convinced me, that very few others are in this caſe; and theſe ears hardly part with their grain at any time, in whatever manner they are threſhed; for though the grains be torn from off them by the action of the flail, the inmoſt huſk ſtill adheres to the corn. Theſe diminutive imperfect grains are ſo great a detriment to the fine plump, well nouriſhed corn, that they leſſen its value if not carefully ſeparated by winnowing; after which they ſerve to feed poultry. If theſe ears eſcape the flail, the ſtraw is ſo much the better. Our horſes and other cattle reap therefrom a benefit which we ought not to grudge, becauſe, I think, it turns to our advantage.

“ The threſhed graſs and other wild productions, do indeed yield a conſiderable quantity of what are commonly called bad or uſeleſs ſeeds, for the beating out of which I pay the threſher. But the graſs which occaſions this expence, ſaves me that of a great deal of ſainfoin and lucerne which my cattle would conſume: and it would be unjuſt in me to complain of the additional charge in the winnowing, ſince my manager has thought of applying thoſe ſeeds to domeſtic purpoſes, ſuch as feeding fowls, &c. which prove more profitable to me than an equal quantity of the fineſt corn.

“ A real increaſe of expence, is what I pay the threſher beyond the common price of the country. This difference, which conſiſts in two-pence or three-pence for a quarter of wheat, is but a juſt compenſation for his extraordinary trouble in unbinding and binding up again perhaps an hundred and fifty ſheaves, and ſometimes more, for what an hundred ſheaves generally yield, when reaped in the common way. But this expence is ſo amply repaid by the extraordinary quantity of ſtraw obtained by my method, that I rate the difference at more than the value of five quarters of corn, which, to ſilence contradiction, I will ſuppoſe to be otherwiſe loſt in my practice. Still my crop is cut down and houſed with far leſs toil and expence, than if it was reaped.”

“ They begin plowing in the iſle of Thanet, ſays a correſpondent of the editors of the Muſeum Ruſticum, about the firſt week in November, contriving ſo that the wheat ſeaſon may be over by the end of the month.

“ In the ſpring, if the wheat is rank and the weather dry, they feed it down with their ſheep, which they think makes the wheat branch more, and ſettles the earth about the roots of the plants. Experience has convinced them, that this method of ſowing wheat after trefoil, is better than ſowing it on a fallow; for the land hereabout is naturally very light and hover, and the wheat on that account very much ſubject to be root-fallen. To prevent this, it is no uncommon thing for them, as ſoon as they have ſown their wheat, to drive a flock of ſheep over the land, to ſettle the earth cloſe to the ſeed.

“ Their crops of wheat here are generally three, four, and five quarters on an acre; which laſt is, indeed, a very large crop, when it is conſidered, that the land is in general, by nature, poor and barren, and that it is almoſt entirely owing to the induſtry and good huſbandry of the farmers that it is at all brought to bear wheat: in fact, they are an aſſiduous people, and ſpare neither coſt nor labour to improve their land.

“ On the light land here they for the moſt part ſow about fourteen pecks on an acre, but on the richer lands they allow four buſhels.

“ The farmers here never ſow the ſeed produced by their own land; they find their wheat ſucceed much better by change; for which reaſon the ſeed which they ſow on the light hover-land they chuſe to procure from a gravel or deep cledge, or clay land, taking care that the ſoil on which the ſeed has grown ſhould be as different as poſſible from that on which it is to be ſown.

“ Inſtead of making artificial ſteeps with great parade, they make uſe of that which Providence has put in their way, wetting their ſeed with ſalt water, which they fetch from the ſea; and they afterwards ſprinkle it with lime, to prevent the ſmut: they are alſo particularly careful to clear their ſeed from wild oats, cockle, &c.

“ I know no part of England where there are better farmers; for though they keep their lands conſtantly cropped without fallow, which they call ſowing a round tilth, yet do they ſo manage matters, as to keep them ſtill in good heart.

“ They reap their wheat very high here, leaving as much ſtraw as poſſible in the field: this they ſay they do to ſave barn-room. Some farmers here have a practice of ſowing rye to make bands for their ſheaves, the ſtraw being longer, and as they think tougher, than that of wheat. The reaper makes the bands, which he cuts as low as he well can, and binds the ſheaves.

“ The wheat ſtubble, which, as I ſaid before, is left very long, is generally mown for the maltſters, as they burn it in their kiln to dry their pale malts for the London market. The greateſt part of this iſland is a light chalky ſoil, ſo that wet ſummers in general agree beſt with it; and it is by this means the farmers here get ſo much money: for when the crops fail in other parts of the kingdom, they are almoſt ſure here to be very large; and they have the great convenience, beſides, of water carriage to the London markets. It is extremely pleaſant, towards the latter end of the ſummer, before harveſt, to ride over this little iſland: I do not imagine there is a more improved ſpot in the kingdom; the fields are all kept ſo clear from weeds, that they reſemble a well kept garden; they grudge no expence in hoeing, weeding, plowing, or manuring; and experience has long ago convinced them, that they purſue a right method. Their practices are many of them good and worthy imitation; it would therefore be great pity if they were not made known, by ſome means or other, to the reſt of the kingdom.” *Muſeum Ruſticum, vol.* I. *pag.* 3.

“ It is now upwards of ſeven years that I have been tenant of a conſiderable farm in Eſſex; but as there are ſome particular circumſtances attending this farm, I muſt beg leave to ſay a few words on the ſubject.

“ The ſoil, which is, for the moſt part, a fine mellow loam, or what is in general called a good wheat ſoil, was in very good heart, and not impoveriſhed; yet the laſt tenant broke on this farm, and the landlord loſt by him near two years rent; for his crops of wheat were continually damaged by ſmut, let him take what care he would of the ſeed, and were beſides often laid, and the land got very foul, though he was not ſparing of his fallows.

“ On the contrary, ſince I have occupied this land, it has borne large crops of good ſound wheat, with very little ſmutty corn, and barley, oats, peas, beans, and other things in proportion. What will appear ſtill more ſurpriſing is, that I do not lay on half ſo much dung as he did.

" It will now, perhaps, be neceſſary to explain this ſeeming paradox. At no great diſtance from the farm lives the landlord, who is a man of fortune, and drives a ſet of horſes. This gentleman keeps no land in his own hands, ſo that he was for many years obliged to buy all the ſtraw uſed for the litter of his ſtables, which amounted to a very conſiderable quantity: however, when the laſt tenant of this farm came into it, having been a ſervant in the family, he offered to ſupply the eſquire with ſtraw for his ſtables, provided he might have all the dung, except what the gardener had occaſion for. The 'ſquire thought this a good propoſal, and the farmer imagined he had the beſt of the bargain; ſo the matter was ſoon ſettled.

" Now, you are to underſtand, that the 'ſquire kept, beſides ſeven coach-horſes, a ſtable of hunters, a number of road-horſes, and a pack of hounds; ſo that there was made on his premiſes, in a year, an incredible quantity of rich dung.

" The farmer imagined he was now in a fair way of making his fortune; for his father had taught him, that the man who can command dung is always ſure of large crops: but this did not prove true in the preſent caſe.

" To proceed; my predeceſſor went on ploughing his land, got his fallows in good order, dreſſed them largely with dung, and always ſowed them with wheat.

" His crops of this noble grain, however, by no means anſwered his expectations: his wheat conſtantly looked well and promiſing in the winter and the early part of the ſpring of the year; but as it advanced, it grew rank, and at harveſt was either run all to ſtraw, and was beſides very ſmutty, or elſe, if a heavy ſhower of rain happened to fall, it was lodged, matted, and grew. This was indeed a very mortifying circumſtance, but our farmer could find no remedy for it. He ſeveral times, without ſucceſs, tried folding ſome ſheep on his wheat; but this part of huſbandry, for want of ſkill, he managed ſo badly, that he loſt two entire crops, for he had ſcarcely the return of his ſeed at harveſt. This could never hold long; ſo that in the end he was, as I ſaid before, broke and ruined.

" This man never could be perſuaded that any part of his loſs was to be attributed to the dung he laid on his land, though he conſtantly manured it with the horſe-dung before it was half rotten, and without any mixture to allay its great heat: this kept the ſoil in a conſtant ſtate of fermentation, and ſtocked it with weeds, inſomuch that, when I took poſſeſſion of the farm, ſome of the ſoil was abſolutely mouldy, and ſtunk again, it was ſo rank.

" I will now inform you of my method of management, that you may be enabled to judge how far I was benefited by the errors of my predeceſſor.

" I found ſixty acres of fallow ready for ſowing with wheat: theſe, as the land was rank, I ſowed with the winter tare, which I knew, by experience, would choak the weeds, and abate the rankneſs of the ſoil. In ſome parts, where the ſoil was not ſo rank, I ploughed in the tares in order to ſow wheat over them; in other parts I ſuffered the tares to ſtand for a crop, which, however, was not conſiderable, they ran ſo much to ſtraw or haulm.

" When the tares were off, I got the land inſtantly in order, and ſowed the whole with wheat, of which I had a better and cleaner crop than had been known upon the land for upwards of ſeven years before: this all my neighbours acknowledged: however, it was neither clean enough, nor conſiderable enough, to ſatiſfy me. Some of your readers may, perhaps, wonder what I did with my tares, as but few are ſold at the country markets; but I muſt inform them, that I live within ten miles of a ſea-port town, whither I ſent them at various times, in order to their being carried by ſea to London.

" I am to obſerve to you, that I continued the agreement of giving the 'ſquire ſtraw for his dung; but I made a uſe of it very different from my predeceſſor.

" I make it a rule never to manure for wheat, or ſow wheat on a fallow. I do not indeed allow many fallows on my land; and when I do, I generally ſow my fallow with barley, to which I allow four or five ploughings. This commonly yields me a large return, and I have a good crop of wheat after it.

" This, however, is not my general method; for I am very fond of the hoeing huſbandry, to practiſe which, in ſome degree, is the only infallible way of keeping land clean. To begin then with my method, I never lay dung alone on my land, let it be ever ſo rotten; but as ſoon as I get any long dung from the 'ſquire's, I carry it to my compoſt-heap, where it is mixed in alternate layers or beds, with freſh virgin earth, (if I can get it) lime, or chalk, lime rubbiſh, ſcourings of ditches and ponds, turf, leaves of trees, and all the dung and offal of my family, of the hog-yard, the poultry-yard, and the dog-kennel. As to my pigeons-dung, I always preſerve it to mix with ſoot, and uſe the mixture as a top-dreſſing for my wheat, whenever it happens to be too backward in the ſpring.

" But to return to my compoſt: I have always ſeveral diſtinct heaps of different ages, and I ſometimes leave it three years before I uſe it, and never lay on any under two years old.

" When I have got a plot of ground in order, I give it a thorough good dreſſing of this compoſt, which I immediately plough in. I then ſow it with ſome crop that requires hoeing, ſuch as horſe-beans, broad-beans, or white or grey peas. During the whole ſummer, I take care to keep theſe crops very clean by hoeing, eſpecially if the ſeaſon is rainy; and I am particularly cautious in preventing any of the weeds from perfecting their ſeeds.

" When my hoeing-crop, which generally more than pays me all my expences, is off the land, I immediately get it into as fine tilth as I poſſibly can, by repeated ploughings, and then ſow it with either wheat or barley, whichever is likely to pay me beſt; for little as ſome of your readers may think of it, barley, when it is ſown on good land well prepared, is very frequently as profitable a crop as wheat.

" By thus ſowing my wheat after a hoeing-crop with dung, I have always a good return of clean corn, often five quarters on an acre; and my land will ſtill be in heart enough to give me a reaſonable crop of oats; after which, without any fallow, comes my hoeing-crop, &c.

" When I ſow barley after the hoeing-crop, I ſuffer wheat to follow it; and then it is that, if I find it neceſſary, I give the wheat in the ſpring a top-dreſſing of ſoot mixed with pigeons-dung.

" I ſometimes allow only ſix pecks of wheat-ſeed to an acre: this is when I ſow over it, in the ſpring of the year, eighteen pounds of broad clover-ſeed, which I harrow in with a pair of very light harrows; and it does not in the leaſt damage my wheat-plants. I leave the clover only two years on the land; for the ſecond year, after I have mown the firſt crop for hay, I ſuffer the ſecond to grow very rank, (having given my land a ſlight dreſſing from my compoſt dung-hill the preceding year) which I plough in, and over it ſow wheat, to be harrowed in on once ploughing.

" Theſe crops of wheat are ſmaller in quantity than any others I get, but the grain is finer, plumper, brighter, and heavier, generally ſelling for more at market, as being always very clean and clear from ſeeds of weeds.

" In my method of farming, ſome particulars are to be noted. In the firſt place, as my crops ſucceed one the other very quick, I am under a neceſſity of having all my ſtubble extirpated before I give the land the firſt ploughing after the crop is off. If it is a wheat or bean-ſtubble, I generally have it all pulled up by hand by women and children; barley and oat ſtubbles I have torn up by a pair of loaded drags, and afterwards gathered into heaps and carted to the compoſt-heap. This I do to prevent the ſtubble from being buried by the plough, and from growing mouldy in the land; from which mouldineſs I have great reaſon to think ſmut often proceeds.

" Another thing to be noted is, that I allow leſs ſeed to my land than moſt of my neighbours, my quantity being from ſeven to nine pecks of wheat, from nine to twelve of barley, and about twelve of oats to an acre of land; but it is always to be preſumed that the ſeed I ſow is good. If any farmer ſhould imagine that theſe quantities are too ſmall, let him ſuppoſe every wheat-plant to occupy a ſpace of ſix inches ſquare, which is ſmall enough: let him then calculate how many ſuch ſpaces there are in a ſquare acre. When he has done this, let him proceed to count how many grains of wheat there are in a pint, which multiply by the number of pints in nine pecks, and he will find by the reſult that I, in fact, allow too much ſeed." *Muſeum Ruſticum, vol.* V. *p.* 104.

"I have, for ſome years laſt paſt, held a conſiderable farm in the county of Leiceſter, and have, thank God, met with ſome ſucceſs in my practice.

"My methods of farming are thought by many to have ſomething peculiar in them; yet, as I do not often miſcarry, no one has a right to find fault with me.

"Great part of my farm is very good wheat land, the ſoil being a ſubſtantial loam.

"I frequently, as well as the reſt of my neighbours, make uſe of lime as a manure; but then I uſe it differently from what they do.

"The common practice is, to lay about forty buſhels of unſlaked lime on an acre, which makes a peck on every ſquare perch, (half a buſhel when it is ſlaked.) On wheat land they ſpread the lime at the ſame time they ſow the ſeed; but this is a way I do not much approve, and for this reaſon I vary my practice. The method I uſe is as follows: I ſow my wheat without laying on any manure; but in the beginning of the month of February I get, for every acre of land I intend to lime, twenty buſhels of that manure, unſlaked, and forty buſhels of ſand, or the rubbiſh of a brick-kiln.

"Towards the latter end of the month I cauſe the lime to be ſlaked, which doubles its meaſure, and very well mixed with the ſand; immediately afterwhich, in the laſt week of the month, I have it ſcattered by way of top-dreſſing over the green wheat; and as rain generally ſucceeds, it is ſoon waſhed down to the roots of the plants, and gives them a vigour and ſtrength of growth, that is really aſtoniſhing to a perſon who had never ſeen this method practiſed.

"This is my way, if I ſee the weather is inclinable to be wet; but if it is dry, and not likely to rain, I double the quantity of ſand, in order to take away all danger of the wheat-plants being burnt, or hurt, by the ſtrongly-corroſive power of the lime.

"The above method I would willingly recommend to the attention of your readers; and though I have benefited greatly by it, yet need they not take my word, as it is ſo very eaſy to make a ſmall trial, and form a judgment from the ſucceſs they may have.

"I muſt obſerve, that I look upon it to be almoſt a matter of indifference what kind of ſand I uſe, except that I prefer lime-ſtone ſand to the cryſtal ſand, as being moſt abſorbent, and in truth prefer the rubbiſh of broken bricks to either.

"It will perhaps be unneceſſary to tell your readers my motive for this preference; yet that I may not be thought obſcure, I ſhall do it.

"When lime is ſlaked, it crumbles and falls into very minute particles: the ſmalleſt of theſe particles are, together with the moiſture that adheres to them, abſorbed by the large open pores of the brick rubbiſh, which afterwards diſpenſes them by ſlow degrees to the ſoil on which it is laid, for the ſupport of the crop: this occaſions the operation of the lime to be more equal; the parts which were not abſorbed, are firſt attracted by the earth; theſe nouriſh the young plants, which, in time growing ſtronger, have power to draw from the abſorbent the particles it had reſerved for their uſe." *Muſeum Ruſticum, vol.* III. *p.* 366.

"Almoſt every part of this kingdom has a method of farming peculiar to itſelf; and this I have often found to be true, in the many journeys I have made through various parts of the iſland.

"A ſhort time ſince, my occaſions calling me down into the Weſt, I ſtopped for a few days in Wiltſhire, where I could not help obſerving, that the wheat-corn was remarkably backward, though it, in general, promiſed to be a good crop.

"I thought it worth my while to aſk ſome of the neighbouring farmers the reaſon of this appearance, when I was informed that moſt of the wheat was ſown late, owing to a wet autumn, which prevented them from giving their land the neceſſary ploughing for that crop ſooner than November, December, and even January.

"The ſoil is a pretty good loam, on a chalky bottom: and I found they often ſow late; but whenever they do it, they take care to allow an additional quantity of ſeed, generally one fourth, or a third, more than they uſe when they ſow early.

"I was alſo told, that many benefits often reſulted from ſuch late ſowing; particularly, the crop is generally clearer from weeds; for in early-ſown wheat, poppies, and other noxious weeds, are very apt to get a-head, and greatly injure the corn. I even ſaw in my walks many early-ſown fields, which rather ſeemed to be under poppies than wheat, as the poppies were in full bloom, and made a glaring appearance.

"The Wiltſhire farmers, the beſt of them I mean, often give their land four ploughings for wheat; and they find their advantage, as it is by ſuch means brought to a fine tilth, and yields a good crop.

"Another advantage they told me they had from ſowing their wheat late was, that in the blooming ſeaſon the weather was generally fine; whereas, in a wet ſummer, the bloom is often waſhed off from the forward-ſown wheat.

"But it muſt not be imagined this method of ſowing wheat late is indiſcriminately purſued: in many circumſtances it would be very imprudent to do it.

"This method of huſbandry muſt, to meet with ſucceſs, be chiefly practiſed on fallows, where the land is good, and has been well dreſſed.

"Every crop, and method, has dangers to encounter; and the chief danger of late ſowing is, that a froſt may come on juſt as the ſeed begins to ſprout; but then good land, well dreſſed, is not ſo ſubject to this misfortune as poor, unmanured land, that has, perhaps, been not half ploughed.

"I find, from enquiry, alſo, that it is dangerous ſowing wheat on clover lays on one ploughing only, unleſs it is done ſooner than the middle of November; for the turf, or graſs lay, forms a cruſt immediately under the ſeed corn; and this not only prevents its taking a firm rooting, but alſo expoſes it to the ravages of field fowls, which are, at this ſeaſon, particularly voracious, as having a ſcarcity of food; and the infant plant is, beſides, liable to be killed by the froſt, juſt as it is about ſprouting and ſhooting out its firſt leaf. It ſtands, therefore, to reaſon, and is warranted by experience, that wheat ſhould not be harrowed in on a clover lay, on one ploughing, ſo late after the middle of November, as the danger is great, though the loſs may not always be certain." *Muſeum Ruſticum, vol.* III. *pag.* 1.

"As I have been many years a farmer, it is not to be wondered at that I ſhould know ſomething of huſbandry.

"Experience, which is an excellent miſtreſs, has, in fact, beſtowed on me moſt of the knowledge I have acquired: I imagine, therefore, that an account of the reſult of this experience, will not be unacceptable to your readers.

"Moſt farmers chuſe to ſow wheat on a fallow; we, in Eſſex, on the contrary, often, not without good reaſon, avoid it. Every fallow deſigned for wheat requires a good dreſſing of rotten dung, or ſome other manure; and this dreſſing, we imagine, often is the cauſe of a ſmutty crop, if laid on uncompounded; therefore, whenever I ſow my wheat on a fallow, inſtead of laying on my muck-heap unmixed, I make it into a compoſt in the preceding ſpring: this compoſt conſiſts, according to the nature of the ſoil it is to be laid on, either of chalk, light earth, and rotten dung, or of lime, clay, and dung, laid in a heap, in alternate layers, or beds.

"This compoſt-heap I cauſe to be frequently turned during the courſe of the ſummer, till it is thoroughly mixed, and forms one united maſs of manure, rather crumbly than otherways.

"With this manure I dreſs my fallows in the ſame manner farmers lay on their rotten dung alone; and I find, by experience, it is leſs apt to heat and canker the wheat-ſeed, and it is alſo much leſs inclined to mould and burn the ſeed.

"This, I ſay, is my method of management when I ſow my fallows with wheat as a firſt crop; but I more generally approve of making wheat the ſecond crop after barley, oats, beans, or peas.

"I am ſenſible many of your readers will be ſurpriſed at this method, and exclaim that it is impoſſible to get a good crop of wheat but after a good fallow; yet I know the contrary: it is from experience I know it; may I not therefore venture to aſſert it?

“ When I intend to ſow wheat as a ſecond crop, I lay my due quantity of compoſt on the land ſome time before I ſow it with barley, oats, beans, or peas.

“ When this crop is off, the following year I ſow wheat. You may ſuppoſe the land to be duly prepared by well-timed and careful ploughings; but I am to premiſe, that after beans and peas, being hoeing crops, the land is much ſooner brought into good tilth, than after oats or barley.

“ The wheat ſowed the ſecond year of the fallow is, with me, generally a good crop, and almoſt always clear from ſmut and pepper-wheat.

“ If, by any accident, the wheat ſhould be ſickly, or pining, after Chriſtmas, I beſtow on it a top-dreſſing of wood aſhes, ſoot, if I can get it, or coal aſhes, if the ſoil happens to be ſtrong: this ſeldom fails anſwering my expectations; checking the growth of the weeds, and forwarding that of the corn.

“ It is very frequently that I ſow wheat in this manner for a ſecond crop; but when I have an opportunity of chuſing, which I cannot always do, as I muſt ſuit my crop to my wants, I prefer, for the firſt crop, beans or peas, either of which I take to do the land nearly as much good as a fallow.

“ Neither peas, nor beans, are, in my opinion, great impoveriſhers; and the frequent hoeing which they both require, if they are properly cultivated during their growth, brings the land into finer order than the beſt regulated courſe of huſbandry with the common implements could effect.

“ Wheat ſucceeds particularly well after either of theſe two laſt-mentioned crops; and I have found, by experience, that if peas, or beans, are made intermediate crops, and are well and properly hoed during their growth, land of a moderate quality may, without being impoveriſhed or hurt, be made to bear a continued ſucceſſion of crops for many years; but it muſt be underſtood that it ſhould, from time to time, be refreſhed with proper dreſſings of well-prepared compoſt.

“ I know, many farmers think there is no ſuch thing as carrying on a courſe of huſbandry without allowing, once in three or four years, a year of fallow; but ſuch are little acquainted with the benefit reſulting from hoeing crops; and it is this benefit that has of late induced farmers to ſow ſuch immenſe quantities of turneps in the counties of Norfolk, Suffolk, Eſſex, and other counties adjacent.

“ Many of the advocates for intermediate fallows think that the earth requires reſt; but this is a great miſtake; for I could eaſily make it appear that, in a proper method of huſbandry, land might be almoſt continually cropped, without being impoveriſhed or worn out.

“ The real benefit accruing from frequent fallows is, that they allow the huſbandman time and opportunity to bring, by good tillage, his land into proper order for the reception of the ſeed; but in the method of huſbandry I would recommend, the land would always be kept, by frequent ſtirring, in ſuch good tilth, that the time betwixt gathering the crops, and ſowing the next ſucceeding ſeed, would be abundantly ſufficient for any preparation it might require; for it is a well-known fact among huſbandmen, that when land is well tilled and kept in good order, one ploughing will go much farther than three where the land has been neglected, is rough, and grown hard and cloddy, through inattention or lazineſs.” *Muſeum Ruſticum, vol.* III. *p.* 3.

“ A wet harveſt, ſays an old huſbandman, is what a farmer dreads more than almoſt any thing, as it hurts the quality of his corn, increaſes his expences, and greatly leſſens his profits.

“ So much depends on the well getting-in of our bread-corn, that every man, who knows any thing that can forward ſo good a purpoſe, is, I think, in duty bound to communicate it for the benefit of the public.

“ It is a well-known maxim that wheat ſhould be left for ſome days in the field, after it is cut, before it is inned: this, the farmers think, and not without reaſon, improves its quality; the dews plump the kernels, and the ſun brings it to a proper and perfect ſtate of maturity.

“ Theſe then are the benefits that reſult from leaving the ſheaves for ſome time abroad; but it is neceſſary the weather ſhould be fine, or great loſſes are often the conſequence of this practice.

“ Sometimes, when the farmer leaſt expects it, the weather ſets in foul, and it rains for ſeveral weeks ſucceſſively: it is then very difficult to preſerve the wheat from being greatly damaged, notwithſtanding the many contrivances that have been thought of for this purpoſe.

“ Some ſhock their ſheaves, ſetting them up in traves of ſix ſheaves of a ſide, and two to cap them; but this is a very dangerous method, and never to be practiſed after much rain has fallen: if the ſheaves were dry when the traves were ſet up, from an expectation of its raining, it is of great ſervice; but if the ſheaves are firſt ſuffered to be wet, ten to one but the corn ſweats, ſprouts, and rots, by being ſo cloſe confined from the action of the air.

“ After all, I am apt to think that it is full as well not to cap the ſhocks; for if the rain is not very heavy and conſtant indeed, the ears, provided they do not touch the ground, will dry nearly as faſt as they are wetted.

“ In Middleſex, Kent, and ſome parts of Eſſex, they generally bind their wheat as they reap; but then it muſt be ſuppoſed that their crops are, for the moſt part, pretty clear from green weeds, which would otherwiſe cauſe the ſheaves to ſweat violently in the mow, and greatly damage the corn.

“ When a farmer is ſo unfortunate as to have his wheat-ſheaves thoroughly wetted, if fine weather enſues, I would by all means adviſe him to unbind them, and afterwards ſpread them out to be dried by the ſun. This ſimple method will often prevent great loſſes, and the wheat may at laſt be got in in tolerable good order.

“ If the rain, however, ſhould continue long, and there ſhould be danger of the kernels growing, which by obſervation he may eaſily judge of, I would adviſe the thinking farmer inſtantly to carry it home wet as it is, and afterwards manage it as I ſhall direct from my own frequent experience.

“ When the waggon, or cart, comes home loaded with ſheaves, let them be thrown promiſcuouſly into the bay of the barn, and not regularly mowed; for it is neceſſary they ſhould lie hollow, that the air may get into the vacuities, and prevent the ſheaves from heating during the little time they are to continue in the ſituation above deſcribed.

“ Let our farmer next prepare ſome cutting-boxes, ſuch as horſe-meat is cut in, in Kent, and ſome other counties. The number of theſe boxes ſhould be according to the quantity of wheat he has wet; but three or four conſtantly kept going will do a great deal of work.

“ With theſe cutters let the ears be cut off from the wet ſheaves; and when a ſufficient quantity are collected from all the boxes, let them be put looſely up in ſacks, and carried to a malt-kiln, there to be regularly and gradually dried; and when the firſt parcel is done, another is to ſucceed, and ſo on till the whole work is completed.

“ This method I can, from my own experience, recommend to your readers; and it is leſs expence than would at firſt thought be imagined. The heat of the kiln may be kept up higher than when malt is drying, as the chaff of the ear will prevent the kernel of the wheat from being damaged by the fire, unleſs the heat is very intenſe indeed; but it will, however, be proper to keep the ears gently ſtirring with a fork, or rake, during the time they are drying.

“ In this management the farmer will find great advantages; and his wheat will, with a very inconſiderable additional expence, be nearly, and ſometimes quite, as good in a wet harveſt, as if it was houſed in ever ſo good order, in fine ſun-ſhining weather.

“ If, by chance, after you have cut off the ears from the ſheaves, the weather ſhould change, and become fine, you may often dry them without the aſſiſtance of the kiln, by ſpreading them thin on a large threſhing-cloth, and turning them frequently with a wooden rake; and even, if by this method you ſhould not entirely dry them, it will ſtill bring them ſo forward that the kiln will eaſily complete the cure.

“ I muſt, however, before I conclude, caution the farmer not to ſuffer the kiln to be much heated, unleſs the ears are kept conſtantly ſtirring during the time they are drying.” *Muſeum Ruſticum, vol.* II. *p.* 106.

“ Give me leave, ſays a practical farmer of Warwickſhire, to mention to you a practice which, however, I do not abſolutely recommend, though with me it ſucceeded, and, as I have been informed, has done ſo with ſeveral other farmers, who have ventured to make the experiment.

“ A few years ago, after what I thought a good fallow, I ſowed a field, containing five acres, with wheat. The ſoil was a good loam, but rather light than ſtiff, and inclined to be ſtoney. The wheat plants looked healthy during the whole winter, and promiſed fair to yield me a plentiful crop; but in the ſpring, warm rains coming on brought ſuch ſtore of weeds, that my wheat was in danger of being choaked.

“ I was for ſome time puzzled what to do; for it being now the latter end of May, and the wheat being on the ſpindle, and ſome even in the ear, to weed it with hooks would have been endleſs, not to mention the damage that would have been done to the plants by the weeders feet.

“ I had at one time thoughts of mowing wheat and weeds all together, and drying them to make fodder for my cattle: intending, if I had done this, to have got the land as faſt as poſſible in order, and ſown it again with wheat the ſucceeding autumn.

“ However, in looking over the field, I found no great deficiency of wheat plants; but they were in moſt places ſo over-topped by the weeds, as to be ſcarcely viſible, and in the furrows, in particular, not a blade of wheat was to be ſeen.

“ My method of ploughing for wheat-ſeed in this land is, to make narrow ſtitches, but wider than a ridge, and more rounding, being not ſo ſharp on the back.

“ Whilſt I was meditating what to do in this matter, a gap was by ſome accident made in the hedge, and a parcel of my ſheep got into the wheat field.

“ As ſoon as I ſaw where they were, apprehending great damage, I ordered them to be immediately driven out, and the gap mended.

“ On taking a ſurvey, I was not a little ſurpriſed to find that the ſheep, inſtead of doing any damage to the wheat, had done it a great deal of good, for they had eat up almoſt every weed which grew in that part of the field next to the paſture.

“ Encouraged by this accidental diſcovery of a propenſity in ſheep to eat weeds rather than wheat, I turned a hundred of my flock, into the field, two or three hours in the morning and the evening, for ſeveral days together, till all the weeds were nearly conſumed.

“ On inſpecting my field afterwards, I found the ſheep had done very inconſiderable damage to the wheat, but the weeds were eat down ſo cloſe that they could never again get a-head; the wheat going on proſperouſly, and yielding me at harveſt a plentiful crop of clean, good corn, which was more than any of my neighbours could that year boaſt of.

“ Whilſt the ſheep were eating the weeds, I found they moſtly walked in the furrows, as being eaſier to their tread than the ſloping ſides of the narrow ſtitches; and this might be one reaſon of their doing the wheat ſo little damage by their treading.

“ In this new method of huſbandry I took, however, one precaution, which, I am apt to think, greatly contributed to my ſucceſs.

“ The precaution, I mean is, that I never let them lie in the fields at night, as the weight of their bodies when they lay down to ſleep could not have failed doing great damage to the plants.” *Muſeum Ruſticum, vol.* III. *p.* 31.

“ Permit me, ſays another experienced farmer, to communicate to your readers, for their benefit, I hope, a little of the experience I have in many years acquired.

“ Being now grown old, and retired to ſpend the remainder of my days in this city, I trouble myſelf but little about the practical part of farming; yet did I ſome years ago occupy a conſiderable tract of ground in Norfolk.

“ I ſhall, for this time, confine myſelf to the propriety and impropriety of feeding wheat down with ſheep in the ſpring; a practice which has by many been hitherto but little underſtood.

“ This practice, when prudently adopted, is replete with many and great advantages; but if indiſcriminately adopted, nothing would ſooner ruin a farmer.

“ The advantages to be derived from it are, that it affords feed for your weathers and ewes after the turneps are conſumed, and before the ſpring feed comes in; it cauſes the wheat to tiller and branch more than it would otherwiſe have done, and of courſe produce a larger and better crop; it brings, by the rich manure it affords the land, the crop forwarder, and makes it heavier in the ſcale, as well as plumper in the buſhel.

“ The diſadvantages attending this practice are, that, in certain circumſtances, it checks the growth of the corn, and makes the ſecond ſhoot diminutive and ſmall; of courſe the ears are lean and poor, and the crop in proportion. It gives the weeds an opportunity of getting a-head, and ruining the crop, to the farmer's great loſs and diſappointment.

“ I ſhall, to be better underſtood, relate ſome caſes which happened to myſelf, as I find them noted in my journal, for I always kept one.

“ In the year 1742, I had ten acres of wheat, which, after Chriſtmas, ſeemed proud. The ſoil was a looſe loam, and I had, when I fallowed, laid on plenty of dung.

“ I turned into this field a parcel of ſheep on the twenty-ſecond of January, in order to feed it down, which they did; but the weather coming in milder than I expected, the weeds, which had been brought in with the dung, got ſuch a head, that I was above twenty pounds loſer by feeding it.

“ In 1744, I fed, very indiſcretely indeed, another piece of wheat of fifteen acres. The land was poor, and had not been well dreſſed, ſo that about the tenth of March the wheat-plants ſtood very thin. I turned in ſome ſheep, thinking it would afterwards branch more, and produce a better crop; but I was diſappointed, for the ſheep bit off the knot of the plant, and I had, I think, the worſt crop I ever reaped.

“ The next year, 1745, I had another thin crop of wheat on much the ſame land as the laſt: I turned in ſome ſheep the ſixth of February, before the knot was above the ground within reach, and it ſucceeded; for, as I gave it a good top-dreſſing within a fortnight, it tillered and branched ſo well, as to produce a much better crop than I expected.

“ I could relate to you many other circumſtances of this nature, but it would take up too much room; I ſhall therefore proceed to make ſome obſervations on my general experience in this manner.

“ I find wheat ſhould never have any ſheep turned on it, unleſs it is forward in January, and likely to be lodged at harveſt, except now and then, with great precaution, when you want to thicken a crop.

“ Such wheat only ſhould be fed down as was early ſown; and I hold it a bad practice if the land is rich with dung.

“ Wheat ſhould not be fed down, unleſs the land is pretty clear of weeds, and has ſtrength and ſubſtance enough to afford the wheat nouriſhment in plenty, that it may get into ear at the proper ſeaſon, notwithſtanding the growth was ſo checked.

“ There is in every plant of wheat a certain knot, or crown of the root as I call it, from which all the branches iſſue: now, if this crown is nipped off by the ſheep, a dwindled production is the certain conſequence; for this reaſon, ſheep ſhould never, (unleſs it is in a very backward ſeaſon, and then it will not be prudent to feed wheat down at all;) I ſay, ſheep ſhould never be turned on it after the middle of February: the beſt time, in general, is the latter end of January, or even the middle of that month.

“ If ſeaſonable rains follow, provided the ground is clear of weeds, it will be greatly to the advantage of the farmer.

“ If the farmer has the leaſt doubt of the ſtrength of his land towards giving the checked plant nouriſhment, I would by all means have him afford his wheat a top-dreſſing of ſoot, aſhes, malt-duſt, or whatever other proper manure he may have at hand, provided he is ſure it is quite clear of weeds.

“ Let not the induſtrious farmer be at all uneaſy if, after feeding down his wheat, he perceives the plants ſtand at a diſtance one from the other; for if he has practiſed this piece of huſbandry, with the precautions above noted, he may depend upon it, that every plant will throw out a number of branches, and that he will have a field full of ſtalks at harveſt, and a crop that will ſurpriſe him.

“ I

“ I am very fond of recommending wheat crops to the farmers attention, not only becauſe it is the moſt noble of grains, but alſo becauſe, if well managed, it is the moſt profitable.

“ We muſt not always judge of the farmer's profits by the produce of his land; which ſome of your readers may think odd; but I will make it appear by an example from my own practice.

“ In the year 1743, I had two fields, of twenty acres each, in wheat; one of which yielded me, at harveſt, at the rate of four quarters an acre throughout; the other yielded me only twenty buſhels, one acre with another; yet I got more by the laſt than the firſt. The caſe was thus: falling ſhort of dung, I was obliged to buy; but it was ſo dear, that I only bought enough for the firſt field, giving the other two ploughings extraordinary, inſtead of manuring it; and theſe ploughings I reckon at a mere trifle, as my horſes would otherwiſe have ſtood ſtill.” *Muſeum Ruſticum, vol.* III. *pag.* 151.

“ I have often thought that it would be of great ſervice to the public, if, by any method, there could be determined a mean weight for any given quantity of corn, and likewiſe what number of grains, upon an average, ought to be contained in each ear, and the proportional weight between the ear, with the grains in it, and when taken out, and likewiſe the proportional difference between the weight of the whole ſtalk, including the ear and the grain.

“ But in order to ſettle this medium, under our preſent conſideration, it will be abſolutely neceſſary, in the firſt place, to make accurate and impartial experiments for a number of years, and then, by comparing the produce and the weight, &c. of the whole, both ſeparately and together, we may come pretty near the mark in view.

“ In order therefore to purſue the plan I had laid down, in the beginning of the harveſt of the year 1757, I got three ears of common red Lammas wheat out of ——— field, Auguſt 26. I then cut off the ſtalk cloſe to the ear, which I weighed with the corn in it: I then weighed the grains when rubbed out of the ear, and cleared from the chaff: in the next place I compared the difference, and then counted the number of grains in each ear reſpectively; and at the end of every year ſet down the weight of a cubical inch of the produce of that harveſt.

“ But in order to give a clearer idea of my method of proceeding, I will ſet down the weight, &c. of the corn which was gathered from the firſt field, in columns, in the manner I entered it in a book kept for that purpoſe, which will be ſufficient to explain the whole without a multiplicity of figures.

Number of ears, when and where got.		Weight of the ear with the corn in it.				Weight of the grain when free from the chaff.				Difference.				No. of grains in each ear.
1757.		ʒ	℈	gr.		ʒ	℈	gr.		ʒ	℈	gr.		
Three ears got	1	0	1	5		0	0	19	5	0	0	5	5	28
in ——— field,	2	0	1	2		0	0	17	5	0	0	4	5	27
Auguſt 26.	3	0	1	7		0	1	1		0	0	6		36
Total.		1	0	14		0	2	18		0	0	16		91

“ I proceeded in the ſame method with each of the three ears taken out of fourteen other different fields, during the time of the ſame harveſt: then caſting up the ſum total of each column, and dividing their products by the number of ears gathered that ſeaſon, the quotient would give me the mean weight, &c. of an ear of that harveſt, and its number of grains, &c. &c.

“ I then made a cubical veſſel containing exactly a ſquare inch; and having mixed all the corn together, I filled the above veſſel, and weighed its contents with the greateſt accuracy; which weight I ſet down, repeating the operation ſeven or eight times, having well mixed the little heap of corn together, after each trial, and then ſet down the weight of each as before: and as there would ſometimes be the difference of a grain or two more or leſs in each cubical inch, I divided the product of the whole by the number of times the experiment was made, and ſet down the quotient as the mean weight of a cubical inch of corn for that year, which in 1757 I found to be 3 dr. 12.3 gr. I have perſevered in this method every year ſince: but to avoid troubling you with the particulars of each, I will give you at one view the mean weight, &c. the number of grains in an ear, and the weight of a cubical inch for each of theſe laſt ſeven years paſt, and after that the medium of all taken together.

“ I made uſe of apothecaries weights upon account of the ſmaller ſubdiviſions of the ounce into drachms, ſcruples, and grains, which I have afterwards, in reckoning up the weight of the buſhel, reduced to troy, and averdupois. But we will now give the reſult of the ſeven years experiments in the following columns.

A. D.	Mean weight of each ear with the corn in it.				Mean wt. of the grains alone.				Difference.				Mean No. of grains.		Mean weight of a cubical inch.			
	ʒ	℈	gr.		ʒ	℈	gr.		ʒ	℈	gr.				ʒ	℈	gr.	
1757	0	1	10	5	0	1	5		0	0	5	5	38		3	0	12	3
1758	0	1	5		0	1	0	5	0	0	4	5	30	4	3	0	13	3
1759	0	1	8	2	0	1	2	4	0	0	5	8	37	6	3	0	14	5
1760	0	1	14		0	1	4	4	0	0	9	6	36	8	3	1	4	3
1761	0	1	9	5	0	1	4	5	0	0	5		36	6	3	1	4	3
1762	0	1	17	4	0	1	8	3	0	0	9	1	36	5	3	0	16	5
1763	0	1	10	1	0	1	3	3	0	0	6	8	35	5	3	0	17	
Total.	3	1	14	7	2	2	8	4	0	2	6	4	251	4	23	0	2	2
Mean wt.	0	1	10	67	0	1	4	05	0	0	6	62	35	9	3	0	17	457

The total divided by ſeven gives the mean weight, &c. &c. of the whole together, as in the preceding line.

“ The firſt of the above columns (the date of the year not being reckoned) ſhews us, at one view, what we may expect a ſingle ear of Lammas wheat, ſeparated from the ſtalk, to weigh upon an average; and the ſecond what its produce in grain ſhould weigh when ſeparated from the chaff: the next diviſion gives the difference, being the weight of the ear and chaff alone without the grain; the fourth, the number of grains in each ear; and the laſt, the weight of a cubical inch; which latter we ſhall further conſider, and ſee what will be the mean weight of a buſhel, omitting the odd grains and decimal parts, as immaterial in ſo large a meaſure.

“ As the ſtandard Wincheſter buſhel contains 2150.4 cubical inches, if the above weight of one, viz. 3 3 17.457 gr. be multiplied by that ſum, the product will be 73 lb. 8 oz. 12 dwt. troy. But this ſtandard buſhel is in fact too ſmall, the real contents of a buſhel dry meaſure being 2178 cubical inches, which, according to that calculation, will give 74 lb. 7 oz. 19 dwt. which ſums reduced to averdupois weight will ſtand as follows.

$$\begin{array}{l} \qquad\text{lb. oz. dwt.} \qquad\qquad\qquad \text{lb. oz. dr.} \\ \text{Troy}\left\{\begin{array}{ccc} 73 & 8 & 12 \\ 74 & 7 & 19 \end{array}\right\} \text{ equal to } \left\{\begin{array}{cccc} 60 & 10 & 8 & 6 \\ 61 & 6 & 15 & 9 \end{array}\right\} \text{averdupois.} \end{array}$$

“ But it will be proper to take notice that none of this corn was weighed till thoroughly dry, and ſeldom till the harveſt after it was got, and ſometimes later; therefore there muſt be ſome allowance made for the loſs of weight by keeping; which I found upon trial to be about four grains yearly in a cubical inch, and conſiderably more the firſt year, eſpecially if the corn happened to be got in a wet harveſt: therefore I think we may fairly eſtimate the mean weight of a buſhel of wheat, containing 2178 inches, to be about 62 lb. averdupoiſe weight.

“ I know that a buſhel of good wheat is, by the generality of writers upon agriculture, calculated at about 64 lb.; but our preſent enquiry is not whether it is good or bad, light or heavy of its kind; but what is the medium betwixt the two extremes, in order the better to judge of its qualities, according as it falls ſhort of, or exceeds, that determined weight.

“ The fields out of which the corn was gathered for the above experiments, are moſtly ſituated within a circle of ten or twelve miles round the town of Warwick, and ſome of them in Northamptonſhire; and in ſoils of different kinds, and ſuch as have been productive of good, bad, and indifferent crops.

“ With regard to the obſervations, which I now offer to the public, they may be aſſured that they have been made with the greateſt accuracy, and, barring any errors in the calculations, without the leaſt deviation from the truth.

“ My method of gathering the ears of corn was, to crop them ſtanding during the time of harveſt, always endeavouring, as near as I could gueſs, to take ſuch as were of a middling growth, avoiding the fulleſt ears, as well as thoſe which were ſhrivelled, or ſtinted. I therefore generally got them from about the middle ſpace between the ridge and the furrow; I then carefully wrapt up the produce of each field in ſeparate papers, to prevent the corn from ſhedding, or intermixing.

“ The column which ſhews the difference between the weight of the ear with the corn in it, and that of the grains alone, is meant only as relative to the ear itſelf, without the ſtalk added to it, which latter was always ſeparated from it. But I have ſince made ſome few experiments with regard to the proportional weight between the whole ſtalk and ear, and its produce in grain; and I found the former to be to the latter as about ſixty-ſeven to ſeventy-two. But I cannot depend ſo much upon the juſtneſs of this calculation, as of the others, it being only tried upon the produce of one harveſt.

“ It muſt be obſerved that the weight of corn will vary more or leſs by keeping, according to the nature of the grain itſelf, the ſeaſons that it has had for its growth and maturity, and the dryneſs or moiſture of it when reaped: for notwithſtanding, it was before obſerved, that there may be an annual loſs of about four grains in every cubical inch upon an average, yet it may ſo happen that the weight of it may even be encreaſed by keeping, as was really the caſe with regard to the corn which was got in the harveſt of the year 1762, after an exceſſive dry ſummer; for I found, upon weighing a cubical inch of the ſame corn, a year after the firſt trial, that it had actually encreaſed in weight 2.6 grains, which I can by no means account for, but upon a ſuppoſition that the corn contained in the ear, having been ſo thoroughly dried, whilſt ſtanding, by the preceding heats and great drought, there was no room for any further evaporation of aqueous particles; but that, on the contrary, being laid up in this extreme ſtate of dryneſs, it muſt even imbibe moiſture afterwards, from the coolneſs of the place where it was repoſited; by which means the grain would become more plump than when freſh gathered, and would conſequently encreaſe in weight. From hence the reaſon is very obvious, why corn that is thoroughly ripe, and well ended, will undergo a much leſs change by keeping, than that which has been plumpt up by preceding rains, though perhaps it may look better to the eye than the other. But I think it may be laid down as a rule, that the more the external coat of the grain is extended by redundant moiſture from within, the more will it appear ſhrivelled and wrinkled, whenever that moiſture is evaporated, which it muſt loſe upon being kept for any conſiderable time in a dry place: therefore it will be moſt to the advantage of the owner to have ſuch corn ſpent as ſoon as it is ſufficiently dry for common uſe, and not to hoard it too long in the granary, as the heap from the above-mentioned cauſe will be daily decreaſing.

“ If further experiments of this kind were to be tried in other parts of this kingdom, and even in different climates; and if the reſult of each obſervation was to be compared with the others, we might probably come ſtill nearer to the medium which we have been aiming at; and the ſame trials might be made with any other ſort of grain.” *Muſeum Ruſticum, vol.* II. *p.* 175.

“ The experiments made by the above ingenious gentleman are very accurate, though, in my opinion, much too ſmall to determine matters of ſuch importance: but he has, I think, fallen into a miſtake that I alſo did in trying ſome experiments upon wheat, viz. in ſuppoſing that a middling ear is a ſtandard for computing the crop. This, indeed, would be the right rule, provided there was a regular gradation in the ears above and below the middle ſize: but, in fact, it is otherwiſe; there are generally more ſmall ears than large ones, and yet the corn in the large ears may weigh moſt.

“ To explain this, let us ſuppoſe a perſon going to chooſe ſome middling ears as they ſtand in the field: he muſt do this either gueſſing by his eye, or by meaſuring ſome of the different ſizes, and taking thoſe of the middle ſize as near as he can. The ſizes can only be determined by their length and fullneſs: and if, for example, the longeſt are five inches, and the ſhorteſt one, the medium is three inches. Now, though thoſe of three inches are undoubtedly the middle ſize, yet, unleſs the weight and meaſure of the corn in the ears below three inches are equal to that of the ears above that ſize, the calculation of the crop from the three-inch ears will be wrong. This will be ſeen in the following tables.

“ I once took an account of great part of a ſheaf of red Lammas-wheat; but having miſlaid my notes of it, I ſhall at preſent take notice chiefly of an experiment made upon white Lammas wheat, of the crop of 1762. The ears and ſtraw of this crop were in general very ſhort; but the corn was remarkably fine, full, and heavy. The wheat of this experiment was raiſed upon clover lay, and the crop about twenty buſhels upon an acre. A nine-gallon buſhel of this wheat weighed above ſeventy pounds averdupoiſe, which is uſually reckoned the full weight of good wheat, though ſome will weigh more, as the beſt generally did that year.

“ In February, 1763, I took ſome of this corn out of a middling ſheaf, and, as near as I could, of the middle-ſized corn: but it was taken out all together, and, without ſeparating of it. I ſorted what was thus taken out, into four parcels, nearly according to the length of the ſtraw, in order to diſcover the proportion between the ears and ſtraw of different lengths; but there ſeems to be little certainty in this.

“ Theſe four parcels were weighed ſeparately, ears and ſtraw together; then the ears by themſelves; and, laſt of all, the corn when ſeparated from the chaff.

“ I weighed twenty of the firſt parcel by themſelves, that had the longeſt ſtraw, and longeſt fulleſt ears; and afterwards weighed them ſingly, taking the weight and meaſure of each, as in the table.

“ Being deſirous to know the weight and produce of the ears of different lengths, I ſorted each parcel according to the length of the ears, differing one from another about half an inch; and I weighed theſe ſubdiviſions ſeparately, noting the length of the ears, and the number of cheſts and grains in each. The length of the ears was meaſured from the bottom of the loweſt cheſt that had any corn in it, to the top of the ear. The longeſt ear was three inches and a half, but there being only one of that length, it is included among thoſe of three inches and a quarter. The twenty ears firſt weighed are included in the ſixty-three large ears in this laſt weighing.

“ Several ears have ſome very ſmall grains in them: theſe are ſet down in the table, but not reckoned in the weight, becauſe I ſuppoſed them not marketable, and that they would go to the tailing, or off-fall corn. Of theſe ſmall grains two thouſand one hundred and eighty-ſeven weighed an ounce averdupoiſe. The reſt were weighed by troy weight, as below.

The weight of the four parcels.

			oz.	dw.	gr.
250 of the longeſt	(the ſtraw	28 to 36 inch.	18	18	4
500 of the ſecond ſize		24 to 32	26	17	16
250 of the third		20 to 26	11	7	20
250 of the fourth		16 to 22	5	4	18
1250 ears with the ſtraw			62	8	10

Twenty, with the longeſt ſtraw, and longeſt fulleſt ears, weighed ſingly,

	Inches.	Cheſts.	Gr.
1 ear	3½	20	40
1 do.	3¼	18	41
1 do.	3¼	17	39
1 do.	3¼	17	35
1 do.	3	16	34
1 do.	3	17	35
1 do.	3	17	34
3 do.	each 3	17	101
10 do.	each 2¼	15 to 17	325
20 ears		333	684=34 2 grains in each ear upon a medium.

	oz.	dw.	gr.
The corn in theſe twenty ears wd.	1	2	12
The chaff ——	0	5	15
The ſtraw ——	1	0	21
The ears and ſtraw	2	9	0

“ In the firſt of the following tables are inſerted the aſſortments of the four parcels, by the length of the ears, with the number of cheſts and grains in each, and the ſeparate weight of the ears, grain, and chaff. I muſt obſerve, that by accident I miſſed taking the diſtinct weight of the two hundred and fifty ſmalleſt ears: they are ſet down in the table as I computed tham, in proportion to the third, or preceding parcel, which may differ a little from the real weight; but this cannot be much, for the weight of the whole parcel is right.

“ In the ſecond table, the length, weight, &c. of the twenty largeſt ears, are ſet down in the firſt line: in the ſecond line are the ſixty-three large ears, including theſe twenty: and the third line contains the two hundred and eighty-eight ſmalleſt ears. They are ſet thus together to give the more eaſy comparative view of them. The next three lines of this table ſhew the weight, &c. of all the middle-ſized ears, and of all thoſe above and below the middle ſize, brought thus together alſo by way of compariſon. To theſe I have added, in the following columns, a calculation of the number of cheſts in each aſſortment of ears, and the mean number of grains in each cheſt; alſo, the number of grains, and weight of a mean ear, of each aſſortment.

“ The laſt table ſhews the total weight of the corn, chaff, and ſtraw, upon an acre, agreeable to this experiment, reckoning the crop at twenty buſhels of nine gallons, or ſeventy pounds, averdupoiſe, per buſhel.

“ The very ſmall grains are not reckoned here, for the above reaſons; and that the waſte in reaping, carrying, threſhing, and ſome left in the ſtraw, is more than they amount to. But by adding them, and allowing for about ſeven or eight inches long of ſtubble, the total weight of the crop may be nearly eſtimated.

A table of the length, weight, &c. of one thouſand two hundred and fifty ears, ſorted according to their length.

Ears. No.	Length. Inches.	Cheſts. No.	Grains. Gr.	Sm. do.	Wt. of Ears. Oz. Dw. Gr.	Wt. of Grain. Oz. Dw. Gr.	Wt. of Chaff. Oz. Dw. Gr.	Wt. of Straw Oz. Dw. Gr.	Total Weight. Oz. Dw. Gr.
20	2¾ to 3¼	15 to 20	684		1 8 3	1 2 12	0 5 15	1 0 21	2 9 0
7	2¼ to 3¼	16 18	215	11	0 8 3	0 6 9	0 1 18	7 11 16	
11	2¾	15 16	300	11	0 11 21	0 9 5	0 2 16		
80	2¼	14 15	1930	60	3 13 10	2 17 13	0 15 21		
85	2	11 14	1600	110	2 18 18	2 5 6	0 13 12		
47	1¾	9 12	738	31	1 5 8	0 19 18	0 5 14		16 9 4
250			5467	223	10 5 15	8 0 15	2 5 0	8 12 13	18 18 4
8	3	17 18	265	4	0 10 12	0 8 8	0 2 4		
17	2¾	14 16	443	29	0 17 9	0 13 4	0 4 5		
108	2¼ 2½	14 15	2405	70	4 4 9	3 8 13	0 15 20		
164	2	11 14	2925	145	5 2 14	4 0 0	1 2 14		
203	1¾ 1½	9 11	2727	121	4 10 0	3 10 0	1 0 0		
500			8765	369	15 4 20	12 0 1	3 4 19	11 12 20	26 17 16
40	2¼ to 2½	13 16	827	50	1 10 12	1 3 13	0 7 0		
65	2	10 13	1075	70	1 15 15	1 7 14	0 8 0		
107	1½	8 10	1350	45	2 1 13	1 12 17	0 8 20		
38	1	6 7	293	5	0 8 19	0 6 19	0 2 0		
250			3545	170	5 16 11	4 10 15	1 5 20	5 11 9	11 7 20
250	¾ 3¼		1622	78	2 13 13	2 1 16	0 11 21	2 11 5	5 4 18
1250			19399	840	34 0 11	26 12 23	7 7 12	28 7 23	62 8 18

A comparative view of the above one thouſand two hundred and fifty ears of wheat.

	Ears. No.	Length. Inches.	Grains. No.	Wt. of Grains. Oz. Dw. Gr.	Cheſts. No.	Grains per Cheſt.	Grains in a mean Ear.	Weight of a mean Ear.
Largeſt ——	20	2¾ to 3¼	684	1 2 12	333	2 . 054	34 . 2	27 . 000 Grains
Large ——	63	2¾ 3¼	1907	2 19 14	1012	1 . 884	30 . 269	22 . 696 Troy.
Smalleſt ——	288	0¾ 1¼	1914	2 8 10	2016	0 . 949	6 . 645	4 . 034
Large ——	291	2¼ 3¼	7069	10 9 5	4318	1 . 637	24 . 292	17 . 288
Medium ——	314	0 2	5600	7 12 20	3849	1 . 454	17 . 834	11 . 681
Small ——	645	0¾ 1¾	6729	8 10 21	6199	1 . 085	10 . 432	6 . 358
Total	1250	0¾ 3¼	19399	26 12 23	14366	1 . 35	15 . 519	10 . 232

Total weight of the crop upon an acre, agreeable to the above ſpecimen, reckoning the ſame at twenty buſhels of nine gallons, or ſeventy pounds per buſhel.

Wheat. C. q. lb.	Chaff. C. q. lb.	Straw. C. q. lb.	Total Produce. C. q. lb.
12 2 0	3 1 23	13 1 7	29 1 2

“ Small experiments are not ſo ſatisfactory as large ones; and I could wiſh this had been more extenſive, but I had no thoughts of offering it to the public view till I read your correſpondent's letter, who has, I apprehend, gone upon a wrong rule in computing a crop, and has alſo choſen the mean ears too large: for, though the ears of red Lammas wheat are uſually longer than the white, it cannot be ſuppoſed that, upon an average, they are above double, both in weight and number of grains, as we find thoſe were to the mean ears of this experiment. Neither is it at all probable, that the mean ears of the common crops in any part of England, and in the ſame year, ſhould be heavier, and contain more grains in them, than the very largeſt ears of this experiment.

“ The ears of this wheat being from three and a quarter to three quarters of an inch in length, the medium is two inches. I have ranged all theſe together in the ſecond table. They are a fair medium in regard to length; and they are ſo alſo as to fullneſs, becauſe they are all included: but, as appears in the table, they are not ſo in reſpect to the weight of the grain, which is the rule for the medium of the crop; for the ſmall ears are more than double the number of the large ones, and yet the large ears are the heavieſt. If, in order to make the number of ears equal, we chooſe the mean ears ſhorter than two inches, the inequality of weight will be greater than before; and if we take our medium higher than two inches, the weight may be made equal, but this will encreaſe the diſproportion in the number; and hence I think it is evident, that we cannot fix upon any ſize of ears that will give us a juſt medium of the crop. The ſame will happen in other crops, for they all vary one from another in the ſize and number of ears: and, as we cannot be certain of their real proportion as they ſtand in the field, it is impracticable to calculate a crop from thoſe of any ſize.

“ The calculation of a crop from a mean ear is made by multiplying the weight of grain in that ear by the number of ears upon an acre. A mean ear of this experiment weighed, as in the table, 10.232 grains troy, and the crop was about twenty buſhels upon an acre. Your correſpondent reckons the weight of a mean ear at 24.05 grains troy, upon an average of ſeven years; ſo that, reckoning the ſame number of ears upon an acre as in this experiment, his crops will amount annually to forty-ſeven buſhels per acre, of ſeventy pounds, averdupoiſe, per buſhel. Theſe are ſuch crops as, I ſuppoſe, no conſiderable extent of contiguous lands in England produce annually; and are, doubtleſs, more than double the common crops upon an average.

“ The diſproportion in the number of ſmall and large ears is very remarkable, and alſo their diſproportion in ſize: for, if we calculate from the twenty largeſt, we ſhall find that forty-three of them weighed as much as all the two hundred and eighty-eight ſmall ones, viz. one large ear produced as much corn as ſeven ſmall ones, and the grain in them alſo larger, and conſequently more flour in them: for one hundred of the large corns weighed ſeventy-eight grains troy, and one hundred of the ſmall but ſixty grains; ſo that four grains of the large ears were heavier than five of the ſmall. This great difference is not from any defect in the rudiments of theſe ſmall ears, but is occaſioned principally from bad culture, and a defective nouriſhment; becauſe we ſee that the plants raiſed from the ſame ſeed will have larger or ſmaller ears, according as they are cultivated. It might, however, be uſeful to know at what period of their growth thoſe ſmall ears are ſtinted, and whether they are produced from the original plant, or from the tillers. I am not furniſhed with experiments to determine theſe points, but recommend them to the enquiry of your readers.

“ It is certain that the ears of wheat, in general, do not arrive to the ſize that they are naturally capable of: and if it was known at what period they are formed, the ſtinting of them might, in ſome degree, be prevented, by a dreſſing, or other culture, at that period. That there is ſome ſuch period in nature, may appear from other circumſtances in the growth of this plant. There is a particular ſeaſon for its tillering, or ſpreading; another for its upright growth; and one for its bloſſoming and forming the ſeed; and probably one alſo for the ear being formed: and the growth of it, in reſpect to each of theſe, may be promoted by culture, or retarded by a defect of nouriſhment, at theſe periods.

“ When the ſeaſon of tillering is paſt, no culture will make this plant throw out more branches; and after the ear is ſhot out, it is then impracticable to make it larger, viz. to encreaſe the number of cheſts. Again, when it has bloſſomed, no art will cauſe the ſtem to riſe higher. And, laſt of all, after the time of bloſſoming, there is no adding of one grain more than is already formed in the ear; though, in all theſe caſes, an addition, or improvement, may be made by culture, if applied at the proper time.

“ It is therefore of importance to know the periods of growth of the different parts of the plant; and that if we happen to miſs aſſiſting of it in one, we may improve it in another. If the ſeaſon is loſt to encreaſe the number of tillers, we may enlarge the ears; or, if that is alſo omitted, we may encreaſe the number of grains in the ears, and make them larger and fuller of flour.

“ To ſhew this more plainly, with reſpect to the grain, let us a little conſider the ſtructure of an ear of wheat. The grain is placed in a cell, conſiſting of two valves, or leaves; and there is one leaf extraordinary on each outſide of the cheſts, which ſeems intended as a fence, or ſecurity, againſt accidents to the outward grains. The cheſts about the middle of the ear are the largeſt, and uſually conſiſt of four, five, and ſometimes ſix or ſeven cells: and the number of cells decreaſes towards the top and bottom of the ear. If the ear is examined when in bloſſom, we may ſee what number of grains each cheſt is formed to produce: or this may be ſeen afterwards by the number of double valves, which are properly the chaff; for theſe remain, though the grains have proved abortive; and therefore, by counting the leaves of chaff, allowing two to each grain, and two extraordinary to each cheſt, we ſhall find what number of grains each cheſt might have produced.

“ The outward grains of the cheſts are commonly the largeſt, and ſmaller towards the middle, and often ſtinted grains, or none at all, in the middle cells; and this, notwithſtanding moſt of theſe had bloſſoms in them, and the grains had made ſome progreſs, or begun forming. They are later than the outſide grains, as if laſt impregnated.

The number of theſe deficient, or miſſing grains, is greater than might be ſuppoſed without examining them. In a favourable ſeaſon moſt of the cells have grains in them; and, if examined at the time of bloſſoming, the grains may be ſeen in different degrees of maturity, many of them with the naked eye, and others with a good glaſs; but though they appear then in general to be freſh, and in a growing ſtate, a conſiderable number of them is afterwards ſtinted, or die away entirely. In an ear of red Lammas wheat, of ſix inches long, twenty-five cheſts, and two hundred and eighty-ſix leaves of chaff, I have counted ſeventy-four grains ſome time after bloſſoming; by which it appears, that this ear might have produced one hundred and eighteen grains; and yet at harveſt I have not commonly found above ſixty grains in an ear of that length. I have likewiſe this ſeaſon counted fifty-four grains in an ear of white Lammas wheat, of three inches and a quarter long, nineteen cheſts, and one hundred and ſeventy-four leaves of chaff; ſo that this ear might have yielded ſixty-eight grains: but we ſee in the above tables, that the fulleſt ear, of the ſame ſort of wheat, and the ſame length, yielded only forty-one grains; and three of the ſame length yielded but thirty-eight grains and one third each, upon an average.

“ The tillage and dreſſing of land for wheat is done, for the moſt part, before the wheat is ſown, and the benefit of theſe gradually decreaſe; whereas the wheat requires a gradual encreaſe of nouriſhment, both in order to form large ears, and afterwards to fill them with large grain. And hence appears the great defect of the common huſbandry, and points out the advantages of top-dreſſing wheat in the ſpring with ſoot, or other light manure, which bring the plants a freſh ſupply of nouriſhment when they want it moſt; and hoeing, when they can be performed at the proper times, particularly the deep, or horſe-hoeing, has the ſame effect of producing large ears; and for filling them, the horſe-hoeing is the moſt effectual, as that can be performed at the critical time, and when the plants are large.

“ It has been commonly ſuppoſed, by thoſe who practiſe the new huſbandry, that the moſt important hoeing, for the purpoſe of filling the ears with good grain, is ſoon after the wheat has bloſſomed: but this, I believe, is a miſtake, and that it ſhould be performed immediately before the wheat blows; for before that is over, the grain is conſiderably advanced. I have found no leſs than ſeventy-ſeven grains in an ear of red Lammas wheat, of four inches and three quarters long, and at the ſame time a conſiderable part of the bloſſoms ſtill remaining on the outſide of the ear.

“ This is above one third more than uſually comes to maturity in an ear of that length; ſo that it ſeems very probable the ears would produce near one third more corn than they commonly do, were they to be aſſiſted at that time with ſufficient nouriſhment. But this would come too late after the bloſſoming is over; for by that time, ſome of the weak grains die, and others are ſtinted, ſo as not to be recovered again by any future hoeings. A check at this critical time ſeems to have the ſame effect as it has upon a grain of corn, or other ſeed, after it has begun to vegetate: if that is put a ſtop to, it never recovers.

" From the great number of ſmall ears in a crop, and the deficient grains in all the ears, we may plainly ſee the advantage of good culture, and of taking the proper ſeaſons to apply it. The new huſbandry is, in this reſpect, much to be preferred; and alſo becauſe much fewer plants will produce an equal crop; in which there are ſeveral advantages, beſides ſaving above half the ſeed. This method of culture is, indeed, ſo much ſuperior to the common huſbandry, not only in raiſing wheat, but plants of almoſt every kind, that is to be wiſhed it was more promoted.

" I am ſenſible that ſeveral gentlemen have objections to this huſbandry, ariſing partly from a miſinformation of Mr. Tull's practice and ſucceſs, and partly from the difficulty they apprehend in overcoming the prejudices of the farmers to any new methods.

" That they are very tenacious of old cuſtoms, is readily admitted, nor are they to be too much blamed on that account: but that they cannot be prevailed with to alter them, upon rational evidence, and proper encouragement, is, it is apprehended, carrying the argument too far, as this tends to diſcourage all attempts of improvement.

" One of the reaſons aſſigned, why the farmers cannot be brought to practiſe the new huſbandry, is the difficulty of managing a drill-plough for ſowing corn, which is admitted, though that is not ſo great as ſome have ſuppoſed; for I have ſeen a huſbandman learn to manage ſuch an inſtrument, who, after one day's practice, could ſow with it four or five acres a day, with the proper quantity of ſeed, at a leſs expence than common ſowing and harrowing.

" Some have objected farther, that the farmers cannot practiſe this huſbandry, becauſe they are ignorant of its principles: but theſe principles are not many, nor hard to be underſtood, ſo far, at leaſt, as relates to practice; and, in fact, the practice of the new huſbandry is eaſier than the old, becauſe it is founded upon clear principles, which often is not the caſe in the old huſbandry.

" It ſeems that ſeveral gentlemen are not for introducing this new method, becauſe they are not convinced that it is, upon the whole, better than the old. If we may credit thoſe who have gone furtheſt in the practice of the new huſbandry, thoſe gentlemen abroad in particular, who have publiſhed their experiments, there ſeems to be no doubt of its ſuperiority: but as it is a matter of great importance, that this fact ſhould be fully eſtabliſhed to the ſatisfaction of all gentlemen, from whoſe influence and example the moſt valuable improvements are to be expected, the trial is not difficult, nor very expenſive: a ſmall farm, with ſome variety of ſoils in it, cultivated in the ſeveral methods, by way of compariſon, and exact accounts kept of the expence and produce of each, would determine this point without any reaſonable doubt.

" In matters of this ſort, ſpeculations and reaſonings are not to be relied on without experiments; and the larger they are, they will be the more convincing. Whether ſomething, like what is here propoſed, might not have the deſired effect, and likewiſe be a means of making uſeful diſcoveries in vegetation, and the culture of plants, is ſubmitted to the conſideration of thoſe who have at heart the improvement of agriculture.

" A more extenſive plan is neceſſary for introducing new methods into common practice, and which might comprehend the farmers, and alſo the huſbandmen, who execute and excel in the performance. It is recommended to your readers to conſider and propoſe what they think the moſt probable means for attaining theſe deſirable ends." *Muſeum Ruſticum, vol.* III. *pag.* 38.

" It is certain, ſays another ingenious huſbandman, that many ſtrange reports were raiſed of Mr. Tull, and his huſbandry, by prejudiced perſons; and his book being printed for the author, ſome bookſellers were much offended, and employed ſeveral hands to write againſt him, which they did in a moſt ſcurrilous manner, aſſerting many things that were falſe, and miſrepreſenting others. Some of theſe he takes notice of himſelf, in the additional parts of his work. I ſhall mention only one inſtance how ready people were to give credit to ſuch falſe reports. " Laſt ſummer," ſays he, " the vulgar in general believed, in a country but twelve miles diſtant from me, that I always carried my dung and threw it into a river: now there is no river nearer to the barton where my dung is made, than is the fartheſt part of my land; ſo that the expence of loſing my dung would be greater than ſpreading it on any part of my farm. Beſides, I live in a country where farmers buy dung at a good price; but it is known that I neither ſell nor waſte any dung. Againſt ſuch lying tongues there is no defence."

" But a principal cauſe, that the reports of his bad ſucceſs in his wheat crops have gained ſo much credit, I believe, is, that the additions to his Eſſay are out of print, and not generally known; and it is chiefly with a view to inform your readers of them that I write this letter.

" Mr. Tull began his ſcheme of ſucceſſive wheat crops with four rows. Afterwards he found that three rows were better, and was in that practice, of drilling three rows upon a ridge, when he publiſhed his Eſſay. Upon further experience he found, that two rows produced as good crops as three or four, and were more eaſily managed. This he recommends as his laſt and beſt method; and altered his drill-plough to his practice of planting only two rows upon a ridge, of which he gives a cut and deſcription in his Addenda and Concluſion. By this alteration, his drill is much leſs complicated, and leſs difficult to manage, than that for planting three rows, deſcribed in his Eſſay.

" The gentlemen abroad, who are now promoting the new huſbandry, have gone into the practice of planting three rows upon every ridge, ſuppoſing that to be the beſt method; and the drill-ploughs invented by M. Du Hamel, and M. De Chateauvieux, are conſtructed to ſow three rows.

" From the practice of the gentlemen abroad, and other inſtances that might be given at home, it is evident, that they have not ſeen the additions that Mr. Tull made to his Eſſay, in which, beſides his different method of drilling, there are ſeveral very material improvements in the manner of hoeing and cultivating wheat, and other crops; and from theſe laſt parts of his work may be alſo ſeen, that the reports of his bad ſucceſs, in repeated wheat crops, are without any juſt foundation.

" In order to ſhew this more clearly, it may be proper to premiſe a ſhort chronology of the progreſs of his huſbandry, collected from his own account of it; in which it is to be obſerved, that as the year, at that time, was by ſome reckoned to commence the firſt of January, and by others the twenty-fifth of March, and the crops at other periods, it occaſions an uncertainty of ſometimes a year in this account.

Mr. Tull began his horſe-hoeing huſbandry about the year —— ——	1723
his ſucceſſive horſe-hoed wheat crops	1726
He publiſhed his Specimen —— ——	1731
his Eſſay —— ——	1733
his Supplement to the Eſſay ——	1735
his Addenda ——	1737 or 1738
His Concluſion is dated March 31, ——	1739

(All theſe are printed in ſmall folio)

He died about the year 1741.

" As to his practice of raiſing ſucceſſive crops of wheat, he made the experiment firſt upon part of a field, which had not been dunged for ſome time, and upon this part he continued to raiſe wheat for twelve years, without the aſſiſtance of any manure. In the preface to his Eſſay, he ſays, " The particular ſcheme of raiſing annual crops of wheat, without dung or fallow, is as yet only upon probation; but, by the ſix crops I have had in that manner, I ſee nothing againſt their being continued." In the Supplement, page 249, he tells us, " There is now the eleventh crop of wheat on the ſame field, (except that in the ninth year, by accident, of having contracted to let my farm, it was drilled with white oats) and I do not yet ſee any reaſon againſt its being continued for wheat annually, as long as it is kept in this culture." In the Addenda, page 261, "The field which laſt year had the eleventh crop of wheat," (as in page 249) "has now the twelfth on it, very likely to be a good one." And in the Concluſion, he ſays, that the twelfth crop of wheat, upon this field, "was the beſt, I believe, that ever grew on it." "It has now the thirteenth crop, likely to be very good, though the land was not ploughed croſsways;" which he mentions it was the year before, in order to alter the ſize of the ridges.

"I have here collected what he ſays of this field in particular, as it was his field of experiment, upon which he had raiſed the moſt crops of wheat, without any manure. Let us next ſee what crops he had upon his lands in general.

"He begins his Addenda with acquainting the reader, that he was deſired to take an exact account of the crop of an acre of horſe-hoed wheat, part of a field of twenty-five acres, in order to ſee the difference between that and the crop of a ſmall piece of ground, drilled upon the level, and hand-hoed. This acre being meaſured, and the crop reaped, and threſhed by itſelf, yielded twenty-nine buſhels and three pecks of clean wheat, nine-gallon meaſure. But he obſerves that great waſte was made by the reapers of this acre, and ſome damage was done to the corn by cattle; for which allowance being made, he reckons the real produce of this acre to have been thirty-two buſhels, or four quarters, of wheat.

"He then proceeds to give an account of the crops of wheat upon his other fields, which, including the above-mentioned field, were in all one hundred and ſix acres. The corn was not threſhed when he wrote this; but it appears, by his account of the crop, as I have computed it, that theſe one hundred and ſix acres produced, upon an average, nearly twenty buſhels of wheat per acre.

"If the quality of this land is conſidered, none of it rich, and the greater part light, and of a thin ſtaple, this cannot be called a bad crop. But there was another very important circumſtance, which ought to be conſidered: Mr. Tull was now advanced in years, and in a very bad ſtate of health; was frequently confined to his room, and ſometimes to his bed; inſomuch that, as he tells us, he had not ſeen ſome of his crops from the time they were ſown till the ſpring following. And in his Supplement he ſays, page 225, "My agriculture having been carried on by common day-labourers, without any body to inſpect them, (except when my diſeaſes ſuffered me to attend them, which, for ſeveral years laſt paſt, has been very ſeldom) cannot be expected to be all well managed; for though they can do it well when they pleaſe, yet their will being above controul, I muſt be content with their doing ſome tolerably well every year."

The duſt of the maſter's feet is a kind of manure ſo neceſſary in every ſcheme of huſbandry, that no perſon of experience in ſuch matters, who reflects upon theſe circumſtances, would have reaſon to be much ſurpriſed, if Mr. Tull's crops had really failed as much as has been ſuppoſed; and if we alſo take into the account, that theſe day-labourers whom he employed, and who had the management of his agriculture at the critical ſeaſons, were then generally, as ſuch men ſtill are, prejudiced againſt the new huſbandry, I think his ſucceſs, notwithſtanding theſe diſadvantages, is a ſtrong argument in favour of this huſbandry.

"But let us proceed to what Mr. Tull ſays further of theſe ſucceſſive wheat crops. In the Addenda, page 263, he tells us, "I have now ſix ſcore acres of wheat, an hundred acres of which are on the ſtubble of the laſt years wheat crop.

"And in the Concluſion, page 273, "The crop of the ſix ſcore acres of wheat, that was growing at the time of publiſhing my Addenda, was much greater than the crop the year before it, and would have produced more grain in proportion, if the heavens had been as propitious; but the heavy rains that fell when the firſt-planted was moſt in bloſſom, diminiſhed the filling of the ear and its grain, yet not ſo much as of moſt ſown wheat, eſpecially of the early-ſown, which generally eſcapes the beſt in this common calamity. The burn-beaked wheat, being always early ſown, I am informed had next to no grain in it; and this is the moſt expenſive ſort of huſbandry, the tenants pay ſuch exorbitant fines for the liberty of ploughing this land."

Again, page 274, "The ſame ſix ſcore acres that was wheat the laſt year, is planted with wheat now, and is all of it as ſtrong and likely for a good crop as in any of the former years, though there is but about one acre of it dunged. The whole is the freeſt from weeds before hoeing that ever was ſeen, and the ſown wheat in the neighbourhood the fulleſt of them."

"I can ſhew, at this inſtant, one of the experiments I have recommended, which, though it be on leſs than two perch of ground, muſt convince every man who ſees it (and doth not renounce the evidence of his reaſon and ſenſes) that pulveration by inſtruments can vaſtly exceed the benefit of common manure.

"It is to ſuch experiments that I leave the progreſs of my horſe-hoeing huſbandry, aſſuring the public, that in all my practice, which is now thirteen years, I never have met with one inſtance that gives me the leaſt ſuſpicion of the truth of the principles I have advanced; and that, I believe, they have nothing to fear from enemies, but the falſe relation of facts, or fallacious arguments."

"Mr. Tull mentions here, that he intended this to be his laſt crop. He lived about two years afterwards. Whether he continued to occupy his farm, I am not certain; but if he did, and his crops were worſe than the preceding years, that could not be juſtly attributed to any error in the principles, but to the other cauſes above mentioned. We ſee here that he appeals to an experience of thirteen years: nor can it be ſuppoſed, or admitted, that a perſon of Mr. Tull's underſtanding would go on from year to year to enlarge his plantations of wheat to the extent of one hundred and twenty acres, had he not been fully ſenſible of the advantage of ſo doing.

"The repetition of wheat crops upon the ſame land may, by many perſons, be ſuppoſed rather a matter of curioſity than of any great uſe; a change of crops being the general cuſtom, and ſuppoſed to be the moſt profitable: but this is not ſo clear as ſome imagine. The cuſtom is founded upon the ſuppoſition that change of crops is neceſſary; which, though it may be true in the old huſbandry, is not ſo in the new; and, without doubt, the change is often hurtful to the farmer; for, not to inſiſt on the extraordinary labour neceſſary to prepare the land, and the loſs of the ſeaſon, if it cannot be got into proper order in time, or, which is as bad, ſowing it, though not in proper tilth to receive the ſeed, the main point of all is, whether the profit of theſe ſeveral different crops is really more than hoed ſucceſſive crops of wheat, or other corn commonly propagated? In anſwer to this, I believe it is not very difficult to ſhew, by a fair compariſon of both, that the hoed crops are the moſt profitable, even including the clover and turneps in the old huſbandry. Nor is a profitable change of the crop, or the advantage of obtaining ſometimes three crops in two years, peculiar to the old huſbandry; for the ſame may be had to greater advantage in the way of hoeing.

"There is another circumſtance in the old huſbandry very unfavourable to the farmer. As he is under a neceſſity of changing his crops, he cannot adapt them to the ſoil. Moſt farms have land in them of very different qualities, and theſe are not equally proper for the production of plants of every kind. The ſtrong land, that is very fit for beans, wheat, and clover, is not equally ſo for peas, barley, and turneps. But the farmers commonly vary their crops according to the cuſtom of the country, and the conſequence is, that moſt of their lands are planted in their turn with crops not the moſt ſuitable to them; which is an inconveniency that may be avoided in the new huſbandry.

"Having pointed out the additional parts of Mr. Tull's work, it is hoped that we ſhall ſoon have a new impreſſion; but as it may poſſibly be ſome time before the laſt parts of his work are re-publiſhed, I ſhall, for the benefit of ſuch of your readers as incline to practiſe the new huſbandry, take notice of one or two important alterations in the horſe-hoeing culture.

“ In the Eſſay, Mr. Tull directs, that the hoe-plough ſhould be brought as near as poſſible to the rows at firſt, and when the plants are young; but that the ſubſequent hoeings ſhould be at ſome diſtance from the rows, leſt the plough ſhould tear off too many of the roots, and deſtroy the plants; alſo that the laſt hoeing ſhould throw the earth of the intervals up to the plants, which he thought neceſſary for their better nouriſhment, when they were grown large. His laſt practice was different in both theſe reſpects.

“ For in the Concluſion, page 272, he ſays, “ At the ſecond hoeing, the plough goes in the furrow of the firſt, making it deeper and nearer to the wheat: the third hoeing fills up this furrow; and then, at the fourth hoeing, the plough goes in the ſame place as the ſecond, turning the mould into the intervals. It is remarkable, that though the furrows of the ſecond and fourth hoeings be deep and near to the rows, ſeeming to deprive the wheat of the mould which ſhould nouriſh it, whereby one would imagine, that theſe furrows, lying long open, ſhould weaken or ſtarve it; but it is juſt the contrary, for it grows the more vigorous: and it is the obſervation of my ploughmen, that they cannot, at theſe hoeings, go too near to the rows, unleſs the plough ſhould tear out the plants.

“ If I may preſume to aſſign the cauſe of this ſurpriſing effect, it is in my opinion the following, viz. this open furrow has a double ſurface of earth, which, by the nitre of the contiguous atmoſphere, is pulverized to a great degree of minuteneſs near the row. The roots that the plough cuts off on the perpendicular ſide of the furrow, ſend out new fibres to receive the pabulum from this new-made paſture; and alſo part of this ſuperfine powder is continually falling down into the bottom of the furrow, and there gives a very quick growth to thoſe roots that are next it, and a quick paſſage through it into the earth of the interval, where they take likewiſe the benefit of the other ſide of this pulverized furrow. When it is ſaid that air kills roots, it muſt not be underſtood that it kills a plant, unleſs all, or almoſt all, its root is expoſed to it, as it is not in this caſe. Some think there are roots that run horizontally below the plough into the interval; but of this I am not convinced.

“ It is not often that we plough above four times, and then the furrow is turned towards the row at the third time only.

“ Whether theſe furrows lying long open next the rows, in very hot dry climates, may be prejudicial, cannot be known but by trials.

“ The practical hoer will find this method of going cloſe to the rows of wheat, and other plants, of great ſervice to him; not only in the vigour of his plants, but alſo in the more perfect tillage of his land, and a conſiderable ſaving in hand-hoeing, weeding, and manure.

“ The other circumſtance, of a large plant growing more vigorous, and the ſeed filling better, by ploughing the earth away from one ſide of it, is ſo ſingular, and oppoſite to the common practice of gardeners, that ſhould it ſucceed generally, it may lead to ſomething new in the theory of vegetation.” *Muſeum Ruſticum, vol.* III. *p.* 159.

A comparative calculation of expence and profit between the drill and the common huſbandry, taken from Mr. Baker's report to the Dublin ſociety of his experiments in agriculture, for the year 1765. *Publiſhed by order of the ſociety.*

An eſtimate of the expence upon a plantation acre of wheat, in the common huſbandry.

	l.	*s.*	*d.*
To the firſt plowing, commonly called breaking, for fallow, eight horſes eight ſhillings; two plowmen one ſhilling and four-pence; two drivers one ſhilling ———	0	10	4
To the firſt harrowing, four horſes four ſhillings; a driver ſix-pence ———	0	4	6
To the ſecond plowing, commonly called gaurowing ——— ———	0	10	4
To the ſecond harrowing ———	0	4	6
Carried over ——	1	9	8
Brought over ——	1	9	8
To the third plowing, commonly called ſtretching ——— ——— —	0	10	4
To ſowing the ſeed, eight horſes eight ſhillings; two plow-men one ſhilling and four-pence; two drivers one ſhilling; the ſeed-man eight-pence ——— ——— ———	0	11	0
To ſeed wheat, one barrel ———	1	0	0
To rent for the year of fallow ———	0	18	0
To ditto, the year the crop is growing —	0	18	0
	5	7	0

In this account forty ſhillings are charged for forty horſes, employed in the culture of one acre for wheat, in the common huſbandry; a charge which ought to be conſidered by the farmer, for he actually buys and maintains his horſes for this buſineſs.

The crop which follows wheat is generally oats; but ſometimes peas are ſown inſtead of oats; with ſome, the practice is to let the peas follow oats, in which caſe they fallow only every fourth year; but where land receives no other aſſiſtance than what ariſes from fallow, it is a bad practice not to fallow every third year. It is the general practice to plow but once for oats, and therefore it ſhall be ſtated ſo; but it is a much better practice to plow the wheat ſtubble once before winter, and again in the ſpring.

An eſtimate of expence upon an acre of oats.

	l.	*s.*	*d.*
To plowing once - - - - -	0	10	4
To ſeed oats, 2 barrels - - - -	0	12	0
To harrowing 4*s.* 6*d.* ſeed-man 4*d.* - -	0	4	10
To one year's rent - - .	0	18	0
	2	5	2

Theſe two crops conſume three years; after which the farmer is to begin again, and to incur every article of expence ſtated in the above accounts, in order to obtain two crops more.

An eſtimate of expence upon a plantation acre of wheat in the drill huſbandry, the firſt year

	d.	*s.*	*d.*
To plowing 4 times, to prepare the fallow -	2	1	4
[This is the ſame charge as in preparing for the common huſbandry.]			
To harrowing twice for ditto - -	0	9	0
[This is the ſame alſo.]			
To rent for the year of fallow - -	0	18	0
[This charge is ſaved after the firſt year.]			
To harrowing with the drill harrows - -	0	0	$6\frac{1}{2}$
[Four acres a day may be harrowed with one horſe.]			
To ſowing with the drill plow - -	0	1	1
[From 3 to 5 acres may be ſown in a day.]			
To ſeed-wheat, generally 5 ſtone, but ſuppoſe 6	0	6	0
To the firſt, or winter hoeing - -	0	1	7
[Two acres may be hoed in a day, two horſes, plow-man and driver: the deſign of this hoeing is to leave the plants dry, and to meliorate the earth.]			
To the ſpring hoeing with the cultivator -	0	1	1
[To deepen the ſoil, one horſe, plow-man and driver.]			
To the 3d hoeing, *i. e.* to return the meliorated earth to the corn - - -	0	1	7
[To make the corn tiller, *i. e.* to encreaſe its branches.]			
To the fourth and final hoeing - -	0	1	1
[To fill the grain and render it large.]			
To rent, the year the corn is growing - -	0	18	0
	4	19	$3\frac{1}{2}$

N. B. Although the drill culture for the firſt year is very near as expenſive as the common, yet, after taking the firſt crop, the expence and labour of fallow, and loſs of time, is not to be incurred again, as is unavoidable in the common huſbandry.

An eſtimate of expence upon an acre of drilled wheat, after the firſt crop.

	l.	*s.*	*d.*
To plowing the land once - - -	0	10	4
[One plowing is all that is neceſſary.]			
To harrowing with the drill harrow - -	0	0	6½
To ſowing with the drill plow - -	0	1	1
To ſeed-wheat - - - -	0	6	0
[Be it rememberd, 5 ſtone is enough.]			
	0	17	11½
To four times horſe-hoeing, as before ſtated	0	5	4
To one year's rent - - -	0	18	0
	2	1	3½

Thus the land is ſown again with wheat every year, and inſtead of 4 *l.* 9 *s.* which is the farmer's expence in the common huſbandry, excluſive of one year's rent of the land: in the drill method it is no more than 17 *s.* 11½ *d.* and the total expence, inſtead of 5 *l.* 7 *s.* is no more than 2 *l.* 1 *s.* 3½ *d.* rent included; whereby there is a ſaving of 3 *l.* 5 *s.* 8½ *d.* an acre.

Before the account of profit and loſs upon theſe different methods of culture be ſtated, it will be neceſſary to take notice of an objection, which may perhaps be made to the above charge of plowing in the common huſbandry. It is pretended, that three quarters of an acre may be plowed in a day, with one plow: but can it be done effectually? The land may, indeed, be ſcatched, but cannot really be plowed as it ought to be. The farmer ought to be cautioned againſt a trick too frequently practiſed in plowing. When a plow-man enters his plow, and paſſes acroſs the field, he turns a ſod about a foot broad; when he is to return, he enters his plow about four feet diſtant from the outſide of the former furrow, and ſo turns another ſod of the ſame breadth, which, when turned, juſt meets the former ſod; thus four feet of the land appear to be plowed, whereas the fact is, that the two feet lying under the ſods is not touched with the plow at all. This deception, added to the practice of juſt ſkimming the ground, enables hirelings to undertake plowing at 6 and 7 *s.* an acre. But if a plantation acre of land be well and effectually plowed, 10 *s.* 4 *d.* as charged above, will not appear too much; and it is, in fact, ſupported by the common courſe of buſineſs. When wheat is to be ſown, it is the general cuſtom to ſend a barrel of ſeed into the field with two plows, which is to ſow an acre of land, and that is the uſual day's work for two plows in the general courſe of buſineſs. Let us ſee then, what the expence will amount to. Eight cattle will be 8 *s.* two plow-men 1 *s.* 4 *d.* two drivers 1 *s.* and the ſeeds-man 8 *d.* which in all makes 11 *s.* and correſponds with the above charge.

Dr. One acre of wheat and oats in the common huſbandry, for fifteen years. *Per Contra*, Cr.

	l.	*s.*	*d.*		*l.*	*s.*	*d.*
To the expence on a wheat crop, 2d year -	5	7	0	By the produce of wheat 9 barrels, at 20 *s.*	9	0	0
To the expence on an oat crop, 3d year -	2	5	2	By the produce of oats, 14 —— at 6 *s.*	4	4	0
To the expence on a wheat crop, 5th year -	5	7	0	By the produce of wheat, 9 —— at 20 *s.*	9	0	0
To the expence on an oat crop, 6th year -	2	5	2	By the produce of oats, 14 —— at 6 *s.*	4	4	0
To the expence on a wheat crop, 8th year -	5	7	0	By the produce of wheat, 9 —— at 20 *s.*	9	0	0
To the expence on an oat crop, 9th year -	2	5	2	By the produce of oats, 14 —— at 6 *s.*	4	4	0
To the expence on a wheat crop, 11th year -	5	7	0	By the produce of wheat, 9 —— at 20 *s.*	9	0	0
To the expence on an oat crop, 12th year -	2	5	2	By the produce of oats, 14 —— at 6 *s.*	4	4	0
To the expence on a wheat crop, 14th year -	5	7	0	By the produce of wheat, 9 —— at 20 *s.*	9	0	0
To the expence on an oat crop, 15th year -	2	5	2	By the produce of oats, 14 —— at 6 *s.*	4	4	0
	38	0	10				
To clear profit in 15 years - - -	27	19	2				
	66	0	0		66	0	0

Dr. One acre of drilled wheat, for fifteen years. *Per Contra*, Cr.

	l.	*s.*	*d.*		*l.*	*s.*	*d.*
To the firſt and 2d year's expence -	4	19	3½	By the produce of wheat, 2d year, 6 barrels	6	0	0
To the —— 3d year's expence -	2	1	3½	By the produce of ditto, 3d year, 6 ——	6	0	0
To the —— 4th year's expence -	2	1	3½	By the produce of ditto, 4th year, 6 ——	6	0	0
To the —— 5th year's expence -	2	1	3½	By the produce of ditto, 5th year, 6 ——	6	0	0
To the —— 6th year's expence -	2	1	3½	By the produce of ditto, 6th year, 6 ——	6	0	0
To the —— 7th year's expence -	2	1	3½	By the produce of ditto, 7th year, 6 ——	6	0	3
To the —— 8th year's expence -	2	1	3½	By the produce of ditto, 8th year, 6 ——	6	0	0
To the —— 9th year's expence -	2	1	3½	By the produce of ditto, 9th year, 6 ——	6	0	0
To the —— 10th year's expence -	2	1	3½	By the produce of ditto, 10th year, 6 ——	6	0	0
To the —— 11th year's expence -	2	1	3½	By the produce of ditto, 11th year, 6 ——	6	0	0
To the —— 12th year's expence -	2	1	3½	By the produce of ditto, 12th year, 6 ——	6	0	0
To the —— 13th year's expence -	2	1	3½	By the produce of ditto, 13th year, 6 ——	6	0	0
To the —— 14th year's expence -	2	1	3½	By the produce of ditto, 14th year, 6 ——	6	0	0
To the —— 15th year's expence -	2	1	3½	By the produce of ditto, 15th year, 6 ——	6	0	0
	31	16	1				
To clear profit in fifteen years - -	52	3	11				
	84	0	0		84	0	0

	l.	*s.*	*d.*
To clear profit ariſing upon an acre of land in fifteen years in the drill huſbandry - -	52	3	11
To clear profit ariſing upon an acre of land in fifteen years in the common huſbandry -	27	19	2
Greater profit on the drilled acre, in fifteen years	24	4	9

Which amounts to 1 *l.* 12 *s.* 3¼ *d.* *per annum*, for fifteen years on the acre, more than by the common huſbandry.

In the drill huſbandry the crops are ſtated at three barrels of wheat leſs upon an acre than in the common huſbandry, that it may not be ſuppoſed to be over-rated; but in the common huſbandry, the crops are rated at the higheſt; fourteen barrels of oats an acre, are alſo allowed in the common huſbandry, which every farmer muſt admit to be a great allowance upon the general produce.

That the drill culture will produce ſix barrels an acre, is fully proved in Mr. Baker's report at large, which will be ſhortly publiſhed, where it will be ſhewn, that much more has been produced.

Doubtleſs, it will be obſerved, that in fifteen years fourteen wheat crops are obtained in the drill huſbandry; in the common huſbandry only five wheat and five oat crops; the five other years are not only loſt, but are an heavy expence to the farmer.

A farmer having forty acres of tillage, ſuppoſing him to direct his attention to bringing it to the drill culture, would make in fifteen years 969 *l.* 10 *s.* more than he can in the common huſbandry; which is ſuch an advantage, that the greater profit in the drilled acre in fifteen years will purchaſe the fee-ſimple of that in the common huſbandry, at twenty-ſeven years purchaſe, valuing the land at 18 *s.* an acre.

Thus it appears, that in every fifteen years the fee-ſimple of all the tillage lands of the kingdom, is loſt to the community by the common courſe of tillage.

In ſtating theſe accounts, no mention is made of fences, water cutting the land, weeding and reaping, as theſe articles of expence depend on a variety of circumſtances, but, in general, will be more on the common huſbandry than on the drill.

Though we, happily, in this kingdom, are not under the ſame neceſſity as ſome foreign countries, of building large edifices for public granaries, becauſe our harveſts are much leſs apt to fail us; yet as this work is, perhaps too preſumptuouſly, intended for general uſe, it is incumbent on me to ſpeak of thoſe effectual, though expenſive means of guarding againſt dearth, or even famine, as well as of the cheaper and eaſier methods, by which every farmer may be enabled to enjoy the advantage of preſerving a large quantity of corn in a ſmall ſpace, without danger of its heating and fermenting, of its being preyed upon by deſtructive animals and inſects, or of its being ſpoiled thro' the ignorance, or want of judgment, of inattentive ſervants.

Corn reaped in a dry year, and eſpecially that of the growth of a hot country, is well known to be the moſt perfect, and the fitteſt for keeping: as on the contrary, experience has proved that the ſofter and leſs ripened grains of wet years and rainy harveſts ſhould always be diſpoſed of for more immediate uſe, though their too great humidity, which would infallibly occaſion a putrefaction, if not remedied in time, may be exhaled, and they may then be preſerved a long while in very good condition, as will be ſhewn from repeated facts and proper experiments.

The ancient Romans imported annually vaſt quantities of corn from Egypt, a very hot and dry country, ſcarcely ever watered but by the periodical overflowings of the fruitful Nile; and they found this grain anſwer much better than any of their own growth, both for yielding plentiful crops, when ſown in Italy, and for keeping in their public granaries, where they frequently preſerved it many years, perfectly ſound. Pliny tells us, that, in his time, they kept corn a long while in ſubterranean caverns, made in a dry ſoil, and ſo cloſely ſtopped that not a breath of air could enter. They then covered the bottom with ſtraw, and laid upon that the corn in the ear. We have the concurrent teſtimony both of the ancients and moderns, that it will keep thus perfectly well for at leaſt ſix or ſeven years; and an accident, not long ago, diſcovered a parcel of corn thus preſerved at Amiens, where, though it had been laid up during a great number of years, it was found to be freſh and good, neither worm-eaten, rotten, nor mouldy. This was certainly owing to the moiſt air having been kept out, and with it the eggs of animals, and ſeeds of thoſe minute vegetables which we ſee in form of mouldineſs on ſuch corn as has been leſs carefully defended from their acceſs. In effect, experimental philoſophy has proved that the air is the great ſource of corruption; for even the moſt corruptible ſubſtances, ſuch as meal, butter, milk, and the like, have been preſerved freſh four months in the exhauſted receiver of an air pump.

There ſtill is, near Grand Cairo, a vaſt ſubterranean magazine of corn, defended with good walls, and called Joſeph's granaries. It is hardly to be ſuppoſed that they are quite ſo old as the days of that patriarch: but they abundantly prove the utility of ſuch places of ſtore, by the vaſt quantities of grain annually preſerved in them.

Many parts of Africa, the corn of which country, and particularly that about Algiers and Tunis, will keep much longer than the growth of any other place, abound with granaries of this kind. They are deep pits made in the ſolid rock, but juſt wide enough at their top for a man to go down into them, but they grow larger immediately after, and are uſually ſquares of from thirty to forty feet in diameter. In theſe, the great men of the country preſerve their corn. They firſt cover the floor with ſtraw, then ſpread upon that a layer of corn, upon this another, but thin, bed of ſtraw, then another couch of corn, and ſo on, till the whole cavity is filled; obſerving all the while, as the heap riſes, to place ſtraw between the corn and the ſides of the walls. When this is finiſhed, they cover the mouth of the entrance with a ſort of hurdle, over which they lay about two feet thick of ſand, and over this they raiſe a ridge of earth, well beaten together, in order to throw off the rain both ways, that none may ſettle on the place and ſoak into the magazine. The corn thus ſtored up always keeps three, four, or more years very ſound; and not unfrequently the proprietor being taken off by the cruel deſpotiſm of the Eaſtern governments, the magazine is forgotten, ſome accident diſcovers it many years afterwards, and the corn is almoſt always found perfectly good in it. All the care they take, by way of preparing the grain, is to expoſe it two or three days to the heat of the ſun, to dry it thoroughly before they carry it into the magazine.

In the dutchy of Lithuania, and in the Ukraine, the people always preſerve their corn in nearly the ſame manner, in wells or pits made in dry places: but great care muſt be taken there in the opening of theſe ſtores; for people who have deſcended into them, before they had had ſufficient communication with the freſh air, have been killed by the damps.

The Ruſſians too preſerve their corn under ground, in deep pits of almoſt the figure of a ſugar loaf, wide below, and narrow at top. The ſides are well plaſtered, and the top is covered with ſtones. They are very careful to dry their corn well, generally by means of ovens, kilns, or ſtoves, for their ſummer is too ſhort to effect it ſufficiently, before it is laid into theſe repoſitories.

The ſame thing is practiſed with unvaried ſucceſs in the iſland of Malta: and alſo in Gaſcony, the Vivarais, and other ſouthern parts of France, the corn of which is remarkable for keeping many years longer than that of any other province in the ſame kingdom. M. Duhamel tried this method in the Gatinois: but his corn was ſoon ſpoiled there by its humidity when laid up; that country being ſubject to wet and moiſture, and his grain, in this trial, not having been previouſly dried in an oven or ſtove.

Upon the whole, it is evident from theſe, and from many more inſtances, which might be alledged, of the practice of other countries, that ſubterraneous granaries properly made in a thoroughly dry ſoil, are the beſt of all repoſitories for the keeping of corn: but, at the ſame time, experience ſhews that this method will not ſucceed in our climate, the ſun here not having power to exhale the moiſture from the corn, ſufficiently to prevent its fermenting when laid in a large heap. I muſt likewiſe add, that when one of theſe ſubterranean magazines is opened and expoſed to the air, it muſt be emptied immediately, and the corn taken out of it muſt be thoroughly ſifted and ſcreened, or it will ſoon corrupt. Some think it more nouriſhing, when it has been well preſerved, than that which has been kept in granaries above ground.

The marquis of Santa Cruz, author of many excellent remarks on the political and military ſtate of different nations, obſerves, that the corn of Galicia and the Aſturias will hardly keep from one year to another, becauſe of the humidity it contains, which rots and decays it: but that the corn brought thither from Caſtile will keep good many years. This laſt is therefore the only kind that the Spaniards ever venture to lay up in their public granaries: and the ſole difference, in M. Des Landes's opinion, between it and their other ſorts, is, that it grows in a country where there is leſs rain in ſummer. They might indeed, if their religion and policy did not forbid their having intercourſe with the Moors of Barbary, once their conquerors, eaſily import from Africa plenty of ſome of the beſt corn that the world affords, perfectly ripened, thoroughly dried, and, in all reſpects, fit for keeping many years.

The great objection to public granaries, even in countries where the uncertainty of the climate, the indolence of the people, the ill-judged form of government, and various other cauſes frequently combine to render them highly neceſſary, is the expence attending ſuch eſtabliſhments; generally ſo great, that none but a monarch, or a ſtate, can properly undertake them: and they, moſt certainly, cannot do any thing more laudable, more truly noble, in countries whoſe misfortune it is to be expoſed to the dreadful calamities of want and famine, or to depend upon the precarious aſſiſtance of their neighbours.

Though ſubterranean repoſitories for the keeping of corn are preferable to all others in countries proper for them; yet, even the common granaries may, with due care, and perhaps ſome few alterations, be rendered much more ſerviceable than they generally are. The principal cautions neceſſary to this purpoſe are, 1. To guard againſt the too great humidity which always prevails in places where there are many doors and windows: 2. To prevent a too free acceſs of the external air, becauſe this brings in with it the eggs of a vaſt number of different inſects, which prey upon and deſtroy the corn: and 3. To take care that the corn be thoroughly dry, and as clean as poſſible, when it is laid up. Theſe are the three general rules to prevent its corrupting.

The chief cautions to be obſerved in the erecting of granaries are, to make them ſufficiently ſtrong, and to expoſe them to the moſt drying winds. Sir Henry Wotton, and Mr. Worlidge agree particularly in theſe; both judiciouſly adviſing a northern aſpect for theſe buildings, becauſe that quarter is cooleſt and moſt temperate; and the latter rightly obſerving, in general, that the beſt granaries are thoſe built of brick, with quarters of timber wrought in the inſide, whereto to nail well joined boards ſo cloſely to the wall, that there be no room for vermin to ſhelter themſelves. Floors of plaſter are reckoned the beſt, becauſe they are cool in ſummer, and if well made, do not retain dampneſs in the winter. There may be ſeveral ſtories one above the other; for the ſhallower the corn lieth, the better it will keep, and the more eaſily it is turned. Some have a ſmall hole in the floor of their upper granary, thro' which the corn deſcends into the lower one, like the ſand of an hour-glaſs; and after it is all come down into the loweſt granary, it is conveyed back into the upper one; ſo that it is kept in continual motion, which is a great means of preſerving corn.

The granary in the city of Schönbank, in the vale of Parinburg upon the river Elbe, which is a ſtore-houſe for the wheat of which the mum is made at Brunſwick, is built nearly in this manner. It is three hundred feet long, eighteen feet wide within, has ſeven ſtories, each of which is ſeven feet high, and large windows all around, to open and ſhut cloſe according as the wind ſits. By this means, the droſs and duſt are carried off as the corn is turned; for which a weſt wind is always preferred, becauſe it is the drieſt. At each end of this granary, and in the middle, are ſtoves for fire in damp weather, and at the going away of great froſts and ſnows, to prevent moiſture. There are alſo on each ſide of this building three long troughs or ſpouts, in the upper loft; and in fair weather men throw the corn out of this loft into thoſe ſpouts, through which it falls into others, about ten feet wide at the top, and eight or ten inches at the bottom, by which it is conveyed into the lower ſtory, from whence it is wound up again by a crane fixed in the upper loft. By thus falling from one ſtory to another, the corn is cleanſed by the wind from all duſt and chaff, and receives the benefit of the air, &c. Theſe troughs, or ſpouts, are put on and taken off as occaſion requires, to any of the windows; that when veſſels come to lade corn, it may be conveyed, through them, into the proper barges, without being carried thither by men, or cattle. The wall of the two firſt ſtories is two bricks and a half thick, that of the three next is two bricks thick, and the thickneſs of the two uppermoſt is a brick and a half. Fourteen thouſand quarters of corn may be kept in this granary.

Mr. Mortimer, who gives us this account, which is taken originally from captain Andrew Yarranton's England's improvement by ſea and land, adds, that the ears of corn, cut off from their ſtalks, and packed up cloſe in a tight caſk, will keep very well, and that this is the beſt, he indeed ſays, the only way of carrying any ſort of corn over the ſea, in order to ſow it in a foreign country.

The public granaries at Dantzick are ſeven, eight, or nine ſtories high, and have a funnel in the middle of every floor, to let down the corn from one to another. They are built ſo ſecurely, that the corn does not contract any damp, though they are ſurrounded with water on every ſide, in ſuch manner that veſſels come up to the very walls for their lading, which is let down into them, likewiſe thro' pipes or funnels, with very little labour and charge. No houſes are ſuffered to be built near them, for fear of accidents by fire.

At Zurich, in Swiſſerland, corn is kept eighty years, or more, in the public granaries, which are very ſpacious, and well aired by means of many ſquare wooden pipes which paſs through them.

The twelve companies of London, with ſome other companies and private perſons, had formerly their granaries at the bridge-houſe in Southwark, under the ſuperintendance of a juſtice of the peace, a ſteward, and two maſters. Theſe granaries were built on two ſides of an oblong ſquare (now uſed for a wharf,) one of which ſtood north and ſouth, and was near an hundred yards long. Along this ſide were lattice windows which faced the north-eaſt; and on the other ſide, which was about fifty yards long, the windows looked to the north. The oppoſite ſides had no apertures. All the windows were about a yard high, without any ſhutters, and ran on in a continued ſeries, with very ſmall partitions, ſufficient only to nail the lattices to. Each of theſe granaries was three or four ſtories high; but the loweſt, or ground ſtory, which was twelve feet high, was uſed only for a ware-houſe.

In Kent, two ſquare holes are made at the end of the floor, and a round one in the middle, by means of which the corn is thrown from the upper into the lower rooms, and back again, the better to turn and air it. The ſcreens uſed on this occaſion are made with two partitions, to ſeparate the duſt from the corn. The duſt falls into a bag, and when it is ſufficiently full, it is thrown away; the pure and good corn remaining behind. By theſe means corn has been kept thirty years in this country: and it is obſerved, that the longer it is kept, the more flour it yields in proportion, and the purer and whiter the bread is; only the ſuperfluous humidity evaporating in the keeping: for grain does not diminiſh in weight or bulk, after the firſt year.

The uſual way of preſerving it in our common granaries is, after it has been well ſifted and ſcreened, to ſpread it upon the floor about ſix inches thick, to turn it twice in a week, and to repeat the ſcreening of it once a week, during the firſt two months. It is then laid a foot thick, for two months more; and in this time it is turned once a week, or twice, if the ſeaſon be damp, and now and then it is ſcreened again. At the end of five or ſix months, it is raiſed to the thickneſs of two feet, turned once a fortnight, and ſcreened once a month, or as occaſion requires. After a year, it is laid two feet and a half or three feet deep, turned once in three weeks or a month, and ſcreened in proportion. When it has lain two years, or more, it is turned once in two months, and ſcreened once in three, and how long ſoever it is kept, the oftener it is turned and ſcreened, the better the grain will be preſerved. An empty ſpace, about two feet or a yard wide, is always left on each ſide of the corn, to prevent its running down holes or chinks at the edges of the floor, and to remove it from all moiſture that may proceed from the ſweating of the walls, or from any defect in the roof; and another ſpace is commonly left along the middle of the heap, if it be a wide one, to facilitate the turning of it as often as is needful. This is the general cuſtom; and experience has ſhewn it to be neceſſary in the uſual manner of keeping grain.

But all the foregoing methods of preſerving corn in granaries above ground are attended with very great expence, by reaſon of the vaſt buildings, which they require, and the many ſervants neceſſary to be employed to take care of theſe ſtores: beſides which, too much depends here upon the aſſiduity, ſkill, and probity of thoſe ſervants; and the grain is ſtill liable to be preyed upon, waſted, and ſpoiled, by vermin and inſects.

To obviate theſe inconveniencies, and to point out an eaſier, cheaper, and ſurer way of keeping all ſorts of grain, is the principal deſign of M. Duhamel's excellent Treatiſe on the Preſervation of Corn; in which, after rightly noticing the ſeveral diſadvantages attending the common practice, he propoſes a method founded in reaſon, and on his own repeated experience, as well as that of others, whereby a large quantity of corn may be preſerved in a ſmall ſpace, during a number of years, without danger of its heating, fermenting, or contracting a bad ſmell or taſte, and ſecure from the ſpoil of animals and inſects, at a trifling expence, and with very little trouble. All theſe deſirable ends may be obtained, in ſome caſes, by ventilation only; in others, by drying the corn in a kiln over a ſtove; and in others again by both theſe methods. *See the article* VENTILATION.

A letter to Dr. Templeman, ſecretary to the ſociety for the encouragement of arts, manufactures, and commerce, deſcribing a new-invented granary for preſerving grain.

“ SIR,

“ Where public utility is in queſtion, a private apology becomes unneceſſary: accept, therefore, without ceremony, the following hints to be laid before the ſociety.

“ I have long been of opinion, that a method of preſerving grain from decay is much wanting; but it muſt be, to anſwer any good purpoſe, eaſy in its execution, and cheap in its proceſs.

“ The method now practiſed, of laying wheat in a room or granary, and turning it frequently with ſhovels, and ſometimes ſcreening it, is ſubject to many inconveniencies: it muſt be laid very thin, or it is apt to ferment; and by being laid thin it takes up ſo much ſpace, that to lay up and keep five hundred quarters for three years only, would be conſiderably expenſive.

“ Could we preſerve our corn for a number of years, it would not only be of great ſervice to the public, but of no ſmall benefit to the farmers. For want of doing this, we find a great, and often a ſudden, variation in the price of bread-corn: wheat will one year ſell for five pounds a load, (that is, five quarters) and the next year it will riſe to fourteen or fifteen pounds or even higher.

“ The rents of lands are of late greatly riſen, owing to the encreaſe of our trade; ſo is the price of all kinds of labour, inſomuch that when wheat is low in price, the great farmers are conſiderable loſers, and the poor ones are ruined: this is one reaſon why our lands are ſo much monopoliſed as they are in ſome counties. The great farmers, being rich, can afford to be loſers for ſeveral ſucceſſive years, as they are ſure that once in a while the markets will riſe, and not only repay all their loſſes, but ſecure them a large profit. The poor farmers are under a neceſſity of ſelling their corn before the winter is paſſed: if the markets are low, they fail in the payment of their Michaelmas rent, their ſtock is in conſequence ſeized, and ſome over-grown monopoliſer in the neighbourhood adds their little plot to the many formerly ſeparate farms he already holds.

“ Were the intereſt of the community to be conſulted, no man ſhould be allowed to rent above three hundred acres of land: the profits of ſuch a farm will, with proper regulations, maintain a family decently and well; and it is not requiſite, or even ſalutary, that farmers ſhould acquire large fortunes.

“ But to return to my ſubject. Were a proper method projected for keeping wheat good for a number of years at a ſmall expence, all this would be remedied, our lands would no longer be monopolized, and corn would from year to year vary very little in price. This ſtands to reaſon; for in a very plentiful year a farmer would not ſell his corn too cheap, if he had the power in his hands to lay it up without great charges; and when the crops by any accident failed, the price of corn would not greatly riſe upon the poor manufacturer and labourer, as what had been ſome years before laid up would now of courſe be ſold at a reaſonable price, and make up the deficiency, and this without loſs to the farmer, and with great benefit to the community in general.

“ This intereſting ſubject has, for many years, employed my thoughts and attention; and I have in conſequence imagined, and even executed in miniature, or rather in ſmall dimenſions, a plan, which will, I have reaſon to think, anſwer the important purpoſes above mentioned: my whole plan conſiſts in building a proper granary, (the conſtruction of which will not coſt much) which will keep corn for any number of years ſound, ſweet, and good, and that with very little annual expence.

“ I imagine the following poſtulata will be allowed.

“ If we can preſerve corn from fermentation, it will be in a way of keeping.

“ To keep it from damp and moiſture, is the beſt means of preſerving it from fermenting.

“ To move it frequently, give it air at proper times, and ſeparate the duſt and other extraneous matter, is certainly the beſt way to keep it from being moiſt and damp.

“ Deſtructive inſects are to be kept from it, which by frequent ſtirring is beſt effected.

“ I imagine there are few, who have made this part of nature their ſtudy, but will allow the above poſitions: I ſhall therefore, without farther prelude, inform you in what manner I effect this at a ſmall expence.

“ The granary I would recommend conſiſts of ſeven ſtories of floors, and may be built in any dimenſions, provided proper proportions are adhered to.

“ The form of it is ſquare; and I ſhall at preſent ſuppoſe it to be fourteen feet ſquare within the rooms or cells; the diſtance of the floor from one cell to the floor of that above it is to be five feet: and the whole building ſhould ſtand on ſtrong poſts, more or leſs in number according to its dimenſions, at the diſtance of ſix feet from the ground: the ſmall ſtairs, or rather ladder, to go to the ſeveral cells, muſt be fixed to the outſide of the building ſide-ways, with a leading rail or rope to prevent falling.

“ The whole granary is to be built of what is generally called brick-noggin; that is, the whole is firſt framed in ſtrong timber-work, and the interſtices filled up with brick-work: the floors, beams, and joiſts, muſt be made ſtrong to bear the weight of the corn; the inſide of the cells muſt be well lined with dry oak-boards, cloſe jointed, ſo as to leave no cracks; and the outſide muſt be weather-boarded, the boards being ſtrongly nailed to the timber-work of the frame, and afterwards payed over with pitch. The floors of the cells muſt be ſo contrived as to ſhelve towards the middle, in which part is to be an aperture ſix inches ſquare, to be opened, or cloſed, by means of a ſliding ſhutter, which muſt have a long handle reaching in a groove without the granary.

On three ſides of the rooms there muſt be a window, ſtrongly latticed, covered with wire to keep out larger inſects and birds, and with ſtrong ſhutters to defend the corn from the weather: on the fourth ſide is a door to each room to open from without: the windows are to be ſmall, and as cloſe as poſſible to the cieling: over the upper room or cell for the corn is a loft, on the outſide of the door of which is fixed a crane to be worked within, by a winch and flyers.

“ The uſe of the windows in the ſides of the rooms, is to give the corn all the benefit it can receive from the wind and freſh air: the door, when the cell is empty, gives the workmen entry to ſweep, duſt, and clean it.

“ My method of managing my corn in this granary is as follows.

“ When my wheat is thraſhed and cleaned, it is put up into ſacks and carried to the granary: the apertures I mentioned above to have been contrived in the floor of the cells are then opened, except two, viz. one in the floor of the undermoſt cell, and that in the floor of the ſecond cell, reckoning from the bottom.

“ The ſacks are then craned up into the loft, and emptied, through a hole made for the purpoſe, into the uppermoſt cell, whence it falls through the apertures till it reaches the floor of the undermoſt cell but one, where it is ſtopped by that aperture being ſhut.

“ When this cell is filled to the height of about two feet from the floor, which may be ſeen through the lattices, the aperture in the floor of the third cell is ſhut by means of the ſlider: the workmen then continue craining up the ſacks till all the cells are filled in the like proportion,

tion, except the undermoſt, obſerving the proper opportunities of ſhutting the apertures.

“ In this condition the corn is left for a week, or ſomewhat longer, if it was got in very dry.

“ The firſt ſtirring it receives, occaſions very little trouble: when it has been in the granary about a week, a workman, after having ſwept and cleaned the undermoſt cell, which was left empty, opens the aperture in the floor of the ſecond cell, by drawing the ſlider back: this lets the corn fall from the ſecond, into the undermoſt cell, the windows of which being open, the corn receives great benefit, as it falls, by the current of air that paſſes through the cell.

“ When the ſecond cell is empty, the aperture in the floor of it is ſhut, and the workman, going in at the door, by means of the ſtairs on the outſide of the granary, ſweeps it and cleans it from all impurities, in order to prepare it for receiving the corn of the third cell, the aperture of which is next opened, and the floors being all made ſhelving towards the middle, the corn falls gradually through, in the ſame manner it did from the ſecond to the undermoſt cell.

“ In this manner they are all managed, till at laſt the uppermoſt cell remains empty.

“ It is then left for another week, when two workmen muſt for a ſmall ſpace of time be employed: one of them goes up into the loft at the top of the granary, to work the crane, and the other takes his ſtation on the ground under the floor of the undermoſt cell: under the aperture in this floor he firſt fixes a ſcreen, upon which the corn falls, and then, by means of a conductor at the foot of the ſcreen, drops into the mouth of a ſack which hangs to it, the bottom of the ſack reſting on a miller's hand-barrow: when all is prepared, he draws away the ſlider, and lets the corn fall on the ſcreen.

“ When the ſack is full, the ſlider is for a moment cloſed, till another ſack, on another barrow, is put under the conductor: the workman then wheels the firſt ſack to the outſide of the granary, and faſtening the crane-rope to it, makes the ſignal for the other to draw it up. Whilſt this is doing, the ſecond ſack is filled, which is wheeled and drawn up in the ſame manner; and this method is purſued till the undermoſt cell is empty.

“ If it is neceſſary to ſcreen all the corn at this time, a ſmall ſcreen is fixed under the aperture of the ſecond cell, ſo contrived as to have a box at the back of it, which receives all the duſt, traſh, off-corn, and ſeeds of weeds that paſs through the wires; and this ſcreen is ſucceſſively fixed under every aperture, as the cells are ſucceſſively emptied.

“ After the firſt month the corn need be ſtirred in this manner only once a fortnight, and after the firſt ſix months, only once a month, unleſs the weather ſhould prove, in autumn, very hot and damp.

“ This then, Sir, is the manner in which I have for ſome years managed my wheat, and find it anſwers very well, the vegetative quality of the corn being preſerved in full vigour, and no ſigns being diſcoverable in it of a tendency to fermentation.

“ My country hovel is at ſome diſtance from London, in a retired quarter, conſequently unnoticed; and there being but little probability of this eaſy method's being ſufficiently known by my practiſing it, is the reaſon of my troubling you with this long letter, flattering myſelf that by your means it may make a proper appearance in public. Had vanity been my predominant paſſion, I might have preſented it to the ſociety in perſon, which as a member I had an undoubted right to do; but this would have been encroaching on my beloved obſcurity: to you, therefore, Sir, do I truſt this child of my invention; and if in your hands he can be trained ſo as to be of public utility to my country, my every purpoſe is fully anſwered.

“ I forgot to obſerve, that I have lately ſeen Monſ. du Hamel's methods of preſerving grain, by means of cheſts with falſe bottoms and ventilators.

“ This method may in ſome caſes be of ſervice, I allow: but I am nevertheleſs of opinion, that corn cannot be properly preſerved, unleſs the whole bulk of it be frequently ſtirred, which by du Hamel's method is not done: could the current of air be equally diſtributed over the whole cheſts, and in due proportion, I ſhould ſtill think it inſufficient to preſerve the corn; and if corn has been kept for ſome time in that manner, I ſhould rather be apt to attribute it to Monſ. du Hamel's firſt drying it on a kiln, before he puts it into the cheſts, than to any regular effect of the ventilators.

“ Were I acquainted with this gentleman, I would recommend it to him, to make an experiment of his method in the following manner.

“ Let him firſt fill a cheſt with dry corn that has not been on the kiln: another cheſt ſhould be filled with ſome that had been well dried, and a third with the ſame dried corn: let the firſt and ſecond cheſts, at proper intervals, be ventilated, and the third be kept without ventilating, in a dry place. Were this done, I am apt to think, that after ſix months, or a longer time, there would not be found ſo great a difference as ſome may imagine, betwixt the corn which was, and that which was not, ventilated.

“ In my method, the expence, as well as hazard of drying is avoided, it being never neceſſary, unleſs when corn is got in very ſoft, in a wet harveſt; and then a common malt-kiln anſwers the purpoſe very well.

“ I ſhould have mentioned, that in my method of preſerving corn, when by frequent ſtirrings it is become hard and brittle, it may be laid to the height of three feet, on the floors of the cells, without any danger of damage enſuing; for when it is hard, it is not ſubject to heat and ferment; neither are inſects ſo fond of attacking it.

“ I have by this time, perhaps, tired your attention, and to be plain, am not unweary myſelf; ſhall therefore conclude with aſſuring you that I am, Sir,

Your very humble ſervant,
A Member of the Society.”

“ In order to form an idea of the expence of public granaries for corn, ſays an ingenious correſpondent of the editors of the Muſeum Ruſticum, it will be neceſſary to examine ſome of thoſe in other countries, that are recommended for our imitation; ſuch as that at Schoonbank on the river Elbe, which is three hundred feet long, and eighteen feet wide within; has ſeven ſtories, each ſtory ſeven feet high, with a row of windows round each ſtory, to be opened in dry weather to air the corn, and blow the duſt out of it when turned. A path of a yard wide is left next the walls, all round the corn in each ſtory; and another path acroſs the middle, of two yards wide. In theſe are trap-doors, to let the corn run down from the upper to the lower ſtories, to ſcreen and air it: whence it is drawn up again with cranes, or other engines. Stoves are likewiſe to be placed in the middle, and at each end of the granary, to dry the corn in damp weather. At firſt the corn is to be laid about ſix inches thick on the floors, and to be often turned, aired, and ſcreened: in about a year it may be laid two feet thick; and the turning and ſcreening being continued at proper intervals, it may, at the end of two years, be laid two and a half, or three feet thick: and being by that time perfectly dry, turning it once a quarter, will keep it ſound many years.

“ This is the method propoſed for preſerving corn in England. But as we are aſſured, by M. Duhamel, in his Treatiſe on the Preſervation of Corn, that they uſually lay it but eighteen inches thick in France, we cannot ſuppoſe it proper to lay it thicker in England, both on account of the greater moiſture of our climate, and quality of the corn, which in wet ſeaſons is not fully ripened in England, nor can it then be got in perfectly dry. And, though in hot dry climates, they lay it much thicker than in France: that is, becauſe their corn is perfectly ripened; and their wheat of a different ſpecies from ours. The Lammas, which is generally eſteemed in England, is a full plump fat grain; and, therefore, more difficult to be preſerved ſound: whereas, moſt of the foreign wheat, of the warmer countries that I have ſeen, is a drier and harder grain; and ſuch were ſeveral parcels that I have received from Smyrna, Sicily, and Italy: being of the cone or bearded ſort.

“ It is, alſo, to be remarked, that the quantity, which can be kept in ſuch granaries, has been greatly over-reckoned. Mortimer has implicitly copied from Yarranton, and others from both, that ſuch a granary as the above, would contain fourteen thouſand quarters of corn. But a quarter, nine gallon meaſure, being 11.2 cubic feet, and each ſtory, after deducting the paths round and acroſs the middle, being only three thouſand four hundred and fifty-ſix ſquare feet, all the ſeven ſtories will contain no more than three thouſand two hundred and forty quarters of corn, laid eighteen inches thick; which is but about one-fourth of the quantity they have ſuppoſed. Mr. Dobbs is more moderate, when he reckons, in his Eſſay on the Trade of Ireland, that a granary of the above dimenſions will contain fourteen thouſand barrels; but he ſuppoſes the corn to be laid two and a half, or three feet thick. He calculates the expence of erecting ſuch a granary, built with bricks, and of a ſufficient thickneſs and ſtrength, at fifteen hundred pounds; and eight or ten pounds a year each to ſix men, to turn and ſcreen the corn, and forty pounds a year to a clerk. This calculation was made for Ireland about thirty-five years ago, but is much too low for England; eſpecially as ſuch granaries are erected near cities and populous towns, where materials and labour are dear: for the building would coſt conſiderably more in England, and the wages double: alſo the clerk would deſerve a ſuitable appointment for the care and conſtant attendance neceſſary in a buſineſs of ſuch truſt and importance; nor would one clerk and ſix men be ſufficient, to do all the buſineſs, and alſo to take in and deliver out the corn: and therefore the clerk and men, at a moderate reckoning, would coſt two hundred pounds a year.

“ But there is another article that Mr. Dobbs has omitted, which cannot, nor is it proper to be done by the clerk. One or more perſons muſt be employed to buy the corn; which, at the rate of the uſual commiſſion for buying in private trade, will coſt one ſhilling per quarter: to this is to be added the expence of fuel, of repairs, intereſt of money, and alſo for the waſte of corn in drying and ſkreening, which, according to M. Duhamel's experiments, amounts to about a tenth part of the whole.

“ The expence of erecting granaries in France, is by this gentleman computed at a much higher rate than the above. For, he ſays, that a granary, to contain two thouſand ſeven hundred cubic feet of corn, which is about two hundred and fifty quarters, will coſt in France eight or nine hundred pounds. So that if the corn was bought at twenty-four ſhillings per quarter, the granary would coſt near three times as much as the corn contained in it.

“ The principal corn, to be preſerved in granaries, is wheat: of which, the quantity produced in England is uncertain. The author of the Eſſays on Huſbandry computes the wheat, barley, and rye, annually produced, at near fifteen millions of quarters, over and above what is uſed for feeding and fattening cattle, &c. and for malting, diſtilling, and ſeed: and, as probably about a third part of theſe crops is wheat, the quantity of wheat remaining for bread, and other domeſtic uſes, may be about five millions of quarters; and this would be the proviſion of wheat for a year, to be laid up in public granaries, beſides rye, and ſuch other ſorts of corn as might be kept for a ſhort time. But I ſhall ſtate a year's proviſion of wheat at no more than four millions of quarters, and charge nothing for keeping any other ſort of corn.

“ I do not find, that thoſe, who recommend public granaries, have determined what quantity of corn they thought neceſſary to be laid up in them. The ſtate of Genoa had always, in their public granaries, ſeven years proviſion of corn before hand. This ſeems to be a very ample proviſion; and I ſhall, in favour of theſe granaries, ſuppoſe, that leſs than half this, or only three years proviſion, may be ſufficient for England, at a medium of the granaries being full when corn is cheap, and near empty in a dear time of the longeſt continuance. But to have this quantity always before-hand, or even leſs than this, it is neceſſary to provide ſtore-room for more than three years proviſion, to be laid up in cheap times; and alſo room to ſpare, in order to lay the corn thin at firſt; and for it to run from the upper to the lower ſtories, when ſcreened and aired. And, therefore, if we ſuppoſe, that room for only four years proviſion may be ſufficient, this will alſo be allowed as favouring the ſcheme of granaries. But after all theſe abatements, to have room for four years proviſion of wheat at firſt, or when the granaries are quite full, there muſt be four thouſand ninehundred and thirty-eight ſuch granaries, as that above deſcribed: for ſo many will be neceſſary to contain ſixteen millions of quarters.

“ To determine what advantage theſe granaries may be of to the public, we muſt fix ſome price for the prime coſt; and, alſo, how much it may probably ſell for. The markets are governed by the quantity produced: which, being variable, the prices will be ſo likewiſe; and the granaries cannot be always filled when wheat is cheapeſt. For, in that caſe, much more room would be neceſſary than is here ſuppoſed. But, in general, the granaries are to be filled, when wheat is under the middle price; and ſold out when above it: and, therefore, the prime coſt will be nearly the mean between the common and loweſt prices; and the ſelling price the mean between the common and higheſt. Theſe, according to Windſor market, for ſeventy-five years, ending in 1762, (admitting wheat to fall five ſhillings per quarter, upon diſcontinuing the bounty) are nearly twenty-ſix ſhillings and ſix-pence half-penny, and forty-four ſhillings one penny half-penny per quarter; and the difference between theſe, being ſeventeen ſhillings and ſeven-pence per quarter, is the profit accruing to the public from theſe granaries, upon ſo much as is ſold every year.

“ Howmuch this profit would amount to every year, is uncertain, as it depends upon the quantity ſold in a year, which cannot be determined: but, if the whole quantity, lodged in theſe granaries, were to be ſold once in ſeven or eight years, the annual profit would fall very much ſhort of the expence: as will appear from the following ſtate of it, viz.

	£
To firſt coſt of erecting four thouſand nine hundred and thirty-eight granaries, at fifteen hundred pounds each - - - - - - - - - -	7,407,000
To three years proviſion of wheat, being twelve millions of quarters, at twenty-ſix ſhillings and ſix-pence half-penny per quarter - - - - - - - - - - - - - - - - - -	15,925,000
To commiſſion for buying, at one ſhilling per quarter - - - - - - - - - - - - - - -	796,250
	24,128,250
To intereſt of this ſum - - - - - - - - - - -	1,206,912
To clerks and men - - - - - - - - - - - -	987,600
To repairs, fuel, &c. and waſte of corn, above - - - - - - - - - - - - - - - - -	305,488
	2,500,000

“ Thus there is above twenty-four millions ſunk, and two millions and a half a year expence. The profit upon the wheat ſold, and the bounty together, will ſcarce pay half this expence: and though it is not pretended that this eſtimate is accurate in every particular; yet, if upon the whole, it is any thing near the truth, the ſcheme of public granaries will not, I think, be either expedient or practicable.

“ The next thing to be conſidered is, whether, after all this expence, corn would be cheaper; and if it were, what effect this would have upon agriculture?

“ It has been ſuppoſed, that, upon diſcontinuing the bounty, wheat would of courſe fall five ſhillings per quarter; and likewiſe that the ſame quantity would be ſtill exported. Now it is certain, that all the wheat produced in England, is either conſumed at home, or exported: and, therefore, the wheat exported is all that can be ſpared for the granaries. The quantity exported yearly, at an average of twenty-five years, ending in 1756, was three hundred and forty-five thouſand eight hundred and twenty-three quarters: ſo that, if all the wheat exported were to be lodged in theſe granaries, they would not be full in leſs than thirty-five years, even if none were to be ſold out of them, in all that time: which is a further argument, that ſuch granaries are impracticable; or, that, if they could be introduced, they would put an entire ſtop to the exportation; and, conſequently, occaſion a further and very great loſs to the nation.

“ It is often ſaid, in favour of theſe granaries, that they would be a ready market for the farmers, when corn was cheap. But the intention of them being to ſink the price of corn in general, it is but poor encouragement to the farmers, that they muſt always ſell at a low price. This, however, could be but temporary; for the bounty being taken away, the price ſunk, and the farmers confined to one market, corn would become an unprofitable crop to them: for which reaſon they would undoubtedly raiſe leſs corn than they do now; and then, of courſe, it would be dearer. Thoſe, who adviſe the bounty to be diſcontinued, and to erect public granaries, are ſenſible this would be the conſequence: and, therefore, propoſe, that other encouragements ſhould be given to agriculture in lieu of the bounty. But, till it is ſhewn what other can be given equal to the bounty, and a free trade, it will be ſafeſt to purſue the ſame meaſures, that have been found ſo long ſucceſsful.

“ Though it is the practice of ſeveral countries, to lay up corn in magazines, it may not be proper to do ſo in England. In large kingdoms, where the interior parts are remote from the ſea, or navigable rivers, it may be neceſſary to ſave corn in magazines; and alſo in populous ſtates, that have a ſmall extent of territory, ſuch as Holland. As the policy of the Dutch, in this reſpect, has been greatly magnified, and their example recommended for England, it may be proper to take notice here, that their circumſtances being very different, what is neceſſary to one, may be not only improper, but very prejudicial to the other.

“ The province of Holland, though only about a fifth part larger than Kent, is computed to contain above two millions of people. The ſoil, in general, is of a bad quality, and improper for corn; of which it is reckoned, they do not raiſe enough for a tenth-part of the inhabitants. So that about two millions of them muſt have corn from other countries; and, therefore, they are under neceſſity of laying up enough in magazines for their conſtant ſupply But their magazines are not intended ſolely for the uſe of their own people; but alſo to lay up corn, when they can buy it cheap, to ſell it again wherever they can get a profit by it. So that if they did not want to buy for their own people, they would, notwithſtanding, have magazines of corn for trade; as they have for all kinds of merchandize: and, therefore, if we ought to imitate the Dutch in erecting magazines for corn, why not for all other goods, and make all our ports free?

“ And herein lies the miſtake of thoſe, who recommend the ſame policy for both countries, though their circumſtances are widely different. Holland is but a ſmall tract of bad land, and produces very little for manufactures, or trade. England, on the contrary, with about three times the number of people that are in Holland, contains about thirty times the quantity of much better land, in a better climate; and has a large native product, ſufficient for the inhabitants, and, alſo, for a conſiderable foreign trade. The land and product of England, are a large part of the riches of the ſtate, and of individuals: and, therefore, in all deliberations concerning the public, they are to be conſidered; and land and trade are to be made ſubſervient to each other, ſo far as is conſiſtent with the good of the whole.

“ For this reaſon, public granaries cannot be for the intereſt of England, unleſs the benefit, ariſing from them to trade, were of more conſequence to the public, than the loſs occaſioned by them, in ſinking the value of land: which does not appear in the preſent caſe. But the bounty is advantageous to land, and to trade alſo, as may be ſeen from the following obſervations.

“ England was not conſiderable in foreign trade and ſhipping, till about 1600; nor had made great progreſs in huſbandry. For money was then at ten per cent. and the current price of land was twelve years purchaſe. In theſe circumſtances, no great improvements would be made: when thoſe, who had money, could make ten per cent. of it without that trouble. The ſhipping was, alſo, very low at that time: for, by an account taken in 1582, by order of the lord high-admiral, there were then only two hundred and ſeventeen ſhips and veſſels, above eighty tons, belonging to England: and about thirty years after this, not above three merchant-ſhips, of three hundred tons, and upwards: as we are informed by Sir Joſiah Child, in his Diſcourſe of Trade.

“ But, about 1660, trade had made a quick progreſs, intereſt of money was fallen to ſix per cent. and the value of land very much advanced; and it appears, that wheat had riſen above thirteen ſhillings per quarter: this was the conſequence of a growing trade, for that makes every thing dearer. And hence it is evident, that to make corn cheap, a further encouragement is neceſſary, than what ariſes from trade.

“ Hitherto a conſiderable part of the trade of England had been carried on by foreign ſhips, and chiefly by the Dutch; and, for this reaſon, the Act of Navigation was made, to exclude the Dutch and others; and to encourage Engliſh ſhipping. At the ſame time, an act paſſed, laying a duty upon corn imported, and permitting alſo a free exportation of it; which, with the additional duties laid ſoon afterwards upon corn, and granting a bounty upon the exportation of it, laid the foundation of the improvements in huſbandry, that have been made ſince.

“ The trade of England is now much greater than it was in 1660: and though it has been interrupted by war, and other accidents; yet, if upon the whole, it has increaſed in the laſt hundred years, as much as it did in the former ſixty, the price of corn would have advanced in proportion, as in fact the prices of other things have done: and in that caſe, the mean price of wheat in 1662, would have been nearly ſixty-nine ſhillings per quarter, whereas it was really leſs than thirty-nine ſhillings: and, therefore, this difference of thirty ſhillings per quarter, is clear profit to the public upon wheat; and a profit in proportion, upon all the corn produced in England. This is an important fact in the preſent argument; nor is it material whether the price of wheat is ſo much lower as is here ſtated: but it is certainly very much cheaper; and thence we may draw the following concluſions. *Firſt*, that public granaries are unneceſſary: for the end, that was propoſed by them, is attained by the bounty. Secondly, the bounty does not make wheat dearer to our own people, five ſhillings per quarter, as has been ſuppoſed: but, on the contrary, they have it, by that means, thirty ſhillings per quarter cheaper. And, thirdly, this points out the reaſon of the demand for our corn abroad: as we can afford to ſell it to foreigners forty per cent. cheaper, than we could have done, had agriculture received no other aſſiſtance, than it does from an extended commerce. All theſe ſufficiently prove the utility of the bounty.

“ But it is objected, that now we are got into the tract of improvement, the bounty may be diſcontinued: this might be true in a profitable trade, wherein we had no competitors; which cannot be ſaid here: and it may be a ſufficient anſwer to the objection, to ſhew the danger of ſuch an experiment in a parallel caſe. “ A large bounty,” ſays Mr. Gee's Treatiſe upon Trade, p. 212, “ was given for ſeveral years, to encourage the making of pitch and tar in America, till it came to be imported in ſuch vaſt quantities, that we had not only enough for our own conſumption, but even to export to our neighbours; from which great plenty, we were ready to perſuade ourſelves, that the buſineſs was effectually eſtabliſhed; and thereupon neglected the continuance of the bounty: ſince which, the importation of theſe commodities from Ruſſia, Sweden, and Norway, is re-aſſumed.”

“ Was it indeed true, what has been frequently aſſerted, in ſupport of ſome favourite ſcheme, that foreigners muſt have corn of us, a bounty would be unneceſſary, in reſpect to foreign trade. Thus, Sir Matthew Decker, ſpeaking againſt the bounty, ſays, p. 54, “ The pretence of encouraging tillage, by a bounty on corn, can have no weight now, ſince our great improvements in huſbandry: much leſs, if we erected magazines of corn in every county, againſt times of ſcarcity. Foreigners never buy proviſions till they want them, and then they muſt have them, whether we give bounties or no.”

“ If this be the caſe, we have got the monopoly of corn; and may ſet our own price upon it: but, if we only fancy ſo, and ſhould act as if it were real, we ſhall fall into a dangerous error. The profit upon corn exported, is a matter of great conſideration to England, in a national view: but it is a ſtrange conceit, that we have the monopoly of it againſt all Europe, though all that we export, is ſcarce ſufficient for one-third of the people in the province of Holland.

" Beſides, it is well known, that all countries produce corn, from about twenty-five or thirty, to ſixty degrees of latitude; and though we have no reaſon to complain, yet it is certain, that ſeveral other countries are more fertile than England; and that the principal reaſon, why all of them, of any conſiderable extent, do not produce corn enough for the inhabitants, is a want of induſtry: which it is the intereſt of England to encourage, by ſupplying them with cheap corn.

" Moſt of the countries in the Baltic, and Mediterranean, abound in corn; and, from thence, the Engliſh were ſupplied, before they raiſed enough of their own. It is quite unneceſſary to enlarge upon a thing ſo generally known; and, therefore, I ſhall only mention a circumſtance, reſpecting the fertility of Barbary, ſpoken of by the curious and learned Dr. Shaw, who lived twelve years in that country. The ſoil is ſo light, that a pair of ordinary oxen uſually plough an acre of it a day: " and one buſhel yields ordinarily from eight to twelve, though ſome diſtricts may perhaps yield a much greater increaſe: for it is common to ſee one grain produce ten or fifteen ſtalks." Travels, p. 137. This is a much greater increaſe, than is common in England; and with this additional advantage, in favour of that part of Africa, that the corn is in no danger of receiving damage by wet: for there is ſeldom, or never, any rain there in harveſt. But, what is ſtill more remarkable, theſe plentiful crops of corn, are conſtantly produced without any manure. " The plains of Africa," ſays our author, p. 399, " are never manured; yet the ſame fertility in the ſoil, and the like plenty and abundance, that have been recorded of their crops, for above theſe two thouſand years, continue to this day."

" If we look towards the Baltic, we ſhall not only find ſeveral large countries, that have been long noted for plenty of corn, but alſo ſome others, which may probably come in for a large ſhare of that trade; and very much ſink the general price of corn in Europe. For, I obſerve, that among other countries, where your Muſeum is circulated, Ruſſia is mentioned, where you remark, gentlemen, " that great encouragement is given to agriculture." If this is continued with ſpirit, it may have great effects, in regard to corn, and other articles of commerce.

" The great river Wolga takes its courſe for many hundred miles through the fertile parts of that vaſt empire: and captain Perry, who was employed by the late czar, in ſeveral great works, and in different parts of that country, fourteen years, did at laſt take a ſurvey of that river, in order to make a communication between it and the Nieva, that falls into the gulph of Finland, at Peterſburgh. This he found very practicable, and would have performed it, had not the ill-uſage he met with, obliged him to leave the country. The great importance of this communication, he mentions in his State of Ruſſia, p. 245. " If the Czar," ſays he, " lives to perform the communication, which it is his intention to make, for free water carriage, between the Wolga and Peterſburgh, he will then be able to bring oak and timber, with plenty of corn, to that place, at very eaſy rates: that the ſame may both pay a conſiderable duty to the czar, and turn very much to the advantage of his country, by the being exported from thence to other parts of Europe: for corn may then be loaded much cheaper there, than can be delivered, either at the ports of Riga, Dantzick, or Koningſberg; from whence, and other places in the Baltic, the Hollanders alone, load every year eight hundred or a thouſand ſail of ſhips with corn.

" The Ruſſes make the moſt part of their bread with rye, which they reckon to be the moſt ſtrengthening for men: and in many places on the Wolga, between the mouth of Shackſna and Caſan, rye is uſually ſold for the value of an Engliſh ſix-pence, or ſeven-pence per buſhel, according to Engliſh meaſure: wheat is about nine-pence per buſhel; and all other grain is there in price proportionable."

" When theſe things are duly weighed, together with the improvements in huſbandry now carrying on in many neighbouring countries; there is great reaſon to expect, that the general price of corn in Europe, will be lower than it has hitherto been; and of courſe a leſs demand for it from England: which will check the progreſs of Engliſh agriculture; and hence the neceſſity of a public encouragement to tillage and exportation, and of introducing new methods and improvements. It is to thoſe already made, in conſequence of the bounty, that the farmers have hitherto been enabled to continue raiſing ſtill larger quantities of corn, though the price has been ſinking upon them for one hundred years; and though during that time, the price of labour, and of the neceſſaries of life, have been advancing; as alſo the rent of land, taxes, and coſt of implements of huſbandry.

" Though I am of opinion, that public granaries would be very prejudicial in England, I would not be underſtood to mean, that no proviſion ſhould be made againſt times of ſcarcity. On the contrary, I think this highly neceſſary: but that ſuch proviſions ſhould be in the hands of private perſons; and more eſpecially, of the growers of corn: and this for ſeveral obvious reaſons; but chiefly, becauſe the poor are thus ſupplied at firſt hand; and, therefore, in the cheapeſt manner. Likewiſe, as this is the moſt certain way, to prevent engroſſing, in every degree hurtful to the public. For, of the ſeveral cauſes, that have been aſſigned of the high price of corn, there is none, in my opinion, ſo groundleſs, as that of its being engroſſed by the farmers. That ſuch a great number of perſons, of ſmall capitals, diſperſed over the whole kingdom, who have no foreign correſpondence, and very little at home further than their own neighbourhood; that theſe perſons, ſo circumſtanced, can combine together, to raiſe or keep up the price of corn, is altogether incredible; and contrary to every idea of engroſſing.

" By keeping wheat in ricks, the farmers loſe the immediate benefit of the ſtraw: and the corn is liable to be damaged, by vermin, and otherwiſe. Sometimes they have not convenient room to houſe, and threſh their wheat, when the market is riſing; and, at other times, they muſt pay an advanced price for threſhing it. Theſe inconveniencies might be avoided, if they had granaries to lodge it ſafely; and it would then be ready for market, upon the ſhorteſt notice. The granaries, contrived by M. Duhamel, are, in my opinion, by much the cheapeſt and beſt hitherto propoſed; and very convenient for the uſe of farmers, or others, who might incline to lay up ſome corn upon ſpeculation; eſpecially if made of plank, and ſo conſtructed, that they could be eaſily taken to pieces, and carried from one place to another, where the owner might think proper to ſet them up again: and probably they might be contrived ſo as to be made larger or ſmaller occaſionally.

" But, whatever methods may be thought of, to preſerve corn, in a cheaper or more compendious manner than has been commonly practiſed, they will not invalidate the objections to public granaries, as they lie againſt the whole ſcheme, for other and the ſtrongeſt reaſons, beſides the expence. And, as it is of great importance to the community, that there ſhould be corn in private hands, and in all parts of the kingdom, againſt times of ſcarcity, it is, I apprehend, a matter worthy of the conſideration of the London Society, by what means the farmers and others may be encouraged and enabled, to preſerve corn in a cheap and ſafe manner." *Muſeum Ruſticum, vol.* VI. *pag.* 404.

WHEE, *or* WHEY, a heifer.

WHINS, the ſame with furze. *See the article* FURZE.

WHISKET, a baſket.

WHITE-CLOVER, a well known plant, and reckoned the ſweeteſt feed of any of the ſown graſſes; and it is of moſt advantage to the farmer, becauſe it is perennial, or laſts a great number of years on the land.

This plant ſends forth roots at every joint, ſo that it thickens, and ſoon makes a thick ſward. When land is to be laid down for paſture, the farmer will reap great profit, if, with about four buſhels of clean-ſifted hay-ſeed to an acre, he ſows eight pounds of this clover; but it is to be remarked, that it is never to be ſown with corn.

It may be ſown either in ſpring or autumn; if in ſpring, it may be cut about the latter end of July; if ſown in autumn;

tumn; the crop will be much earlier. As ſoon as ever the hay is off the land, it ſhould be rolled with a heavy roller. In laying down land with theſe graſſes, it will be proper for the farmer to be very careful that he cleans the land of all ſorts of weeds; and the hay-ſeeds are to be ſown firſt, immediately after which the clover is to be regularly ſcattered. After ſowing, the land ſhould be lightly harrowed, with a ſhort tined harrow, to bury the ſeed; and a few days afterwards, if the weather is dry, it ſhould be rolled, to break the clods, and cloſen it.

It will be good huſbandry, if, after the plants are come up, the farmer ſhould ſend in ſome weeders, to pull up all the tall rampant weeds which might injure the crop, for, if they are ſuffered to feed, they will ſoon ſtock the land.

It will be proper to take the advantage of dry weather, and roll the land three or four times, after the plants have attained ſome ſize; for the clover, as is already obſerved, taking root at every joint, the ſward will thereby be greatly thickened.

If a farmer knows his own intereſt, he will ſow ſome of this white clover-ſeed by itſelf, in order to ſupply himſelf with what ſeed he may want, for it is ſometimes very dear. The beſt ſeaſon for ſowing is autumn, upon dry lands, about the beginning or middle of September; but in open, cold lands, much expoſed, a month ſooner is better: all the caution required in this autumnal ſowing is to let the land be very well rolled in the month of October, before the froſts come on, and again in March.

WHITE-SCOUR, a diſeaſe with which ſheep are too often affected, and by which great numbers of them die.

The following medicine has been often given with ſucceſs, provided the ſheep are at the ſame time removed into a dry paſture.

> Take a pint of old verjuice, half a pound of common or bay ſalt, dried well before the fire, pounded, and ſifted through a ſieve. Then mix the verjuice with the ſalt by degrees; and add half a pint of common gin, and bottle it up for uſe. When any of your ſheep are ſeized with this diſorder ſeparate them from the flock, and give each of them three large table ſpoonfuls of the mixture for a doſe, repeating it two days after, if they are not better.

WHITE-LANDS, chalky lands.

WILDS, a term uſed by our farmers to expreſs that part of a plough by which the whole is drawn forwards.

WILDERNESS, a kind of grove of large trees, in a ſpacious garden, in which the walks are made either to interſect each other in angles, or have the appearance of meanders and labyrinths.

Wilderneſſes, ſays Mr. Miller, ſhould always be proportioned to the extent of the gardens in which they are made; for it is very ridiculous to ſee a large wilderneſs planted with tall trees, in a ſmall ſpot of ground; and, on the other hand, nothing can be more abſurd, than to ſee little paultry ſquares, or quarters of wilderneſs work, in a magnificent large garden. As to the ſituation of wilderneſſes, they ſhould never be placed too near the habitation, nor ſo as to obſtruct any diſtant proſpect of the country; there being nothing ſo agreeable as an unconfined proſpect; but where from the ſituation of the place, the ſight is confined within the limits of the garden, nothing can ſo agreeably terminate the proſpect, as a beautiful ſcene of the various kinds of trees judiciouſly planted; and if it is ſo contrived, that the termination is planted circularly, with the concave towards the ſight, it will have a much better effect, than if it end in ſtrait lines or angles. The plants ſhould always be adapted to the ſize of the plantation; for it is very abſurd for tall trees to be planted in the ſmall ſquares of a little garden; and in large deſigns ſmall ſhrubs will have a mean appearance. It ſhould alſo be obſerved, never to plant ever-greens amongſt deciduous trees; but always to place the ever-greens in a wilderneſs in a ſeparate part by themſelves, and that chiefly in ſight.

As to the walks, thoſe that have the appearance of meanders, where the eye cannot diſcover more than twenty or thirty yards in length, are generally preferable to all others, and theſe ſhould now and then lead into an open circular piece of graſs; in the center of which may be placed either an obeliſk, ſtatue, or fountain; and, if in the middle of the wilderneſs there be contrived a large opening, in the center of which may be erected a dome or banquetting-houſe, ſurrounded with a green plot of graſs, it will be a conſiderable addition to the beauty of the whole. From the ſides of the walks and openings, the trees ſhould riſe gradually one above another to the middle of the quarters, where ſhould always be planted the largeſt growing trees, ſo that the heads of all the trees may appear to view, while their ſtems will be hid from the ſight. Thus in thoſe parts which are planted with deciduous trees, roſes, honeyſuckles, ſpiræa frutex, and other kinds of low flowering ſhrubs, may be planted next the walks and openings; and at their feet, near the ſides of the walks, may be planted primroſes, violets, daffodils, &c. not in a ſtrait line, but ſo as to appear accidental, as in a natural wood. Behind the firſt row of ſhrubs ſhould be planted ſyringas, althæ frutex, mezereons, and other flowering ſhrubs of a middle growth: and theſe may be backed with many other ſorts of trees, riſing gradually to the middle of the quarters.

The part planted with ever-greens, may be diſpoſed in the following manner, viz. in the firſt line next the great walks, may be placed the laurus-tinus, boxes, ſpurge-laurel, juniper, ſavin, and other dwarf ever-greens. Behind theſe may be placed laurels, hollies, arbutuſes, and other ever-greens of a larger growth. Next to theſe may be planted alaternuſes, phyllireas, yews, cypreſſes, Virginian cedars, and other trees of the ſame growth; behind theſe may be planted Norway and ſilver firs, the true pine, and other ſorts of the fir growth; and in the middle ſhould be planted Scotch pines, pinaſter, and other of the larger growing ever-greens, which will afford a moſt delightful proſpect, if the different ſhades of the greens are curiouſly intermixed.

But beſide the grand walks and openings (which ſhould always be laid with turf, and kept well mowed) there ſhould be ſome ſmaller ſerpentine walks through the middle of the quarters, where perſons may retire for privacy; and by the ſides of theſe private walks may alſo be ſcattered ſome wood flowers and plants, which, if artfully planted, will have a very good effect.

In the general deſign for theſe wilderneſſes, there ſhould not be a ſtudied and ſtiff correſpondency between the ſeveral parts; for the greater diverſity there is in the diſtribution of theſe, the more pleaſure they will afford.

WILLOW, the name of a well known tree, of which there are ſeveral ſpecies, ſome of which may be propagated to great advantage, particularly that known by the name of the Norfolk willow, as demonſtrated by the late Mr. North, in an Appendix to a little Treatiſe on Graſſes, publiſhed by him ſome years ago. As this pamphlet may have reached the hands of but few of our readers, and will, now the author is dead, be ſcarcely ever republiſhed; we were perſuaded it merited a place in our work, eſpecially as it may ſerve as an example of a profitable method of cultivating trees of this kind, that may be applied to ſeveral others, alſo obſerving a due regard to the difference of circumſtances.

Directions for propagating the ſound-growing Norfolk willow.

“ This willow (I dare affirm) will prove very profitable to the planter, and of great utility to the kingdom in general. It will grow taller and larger in twenty or thirty years, than moſt other ſorts of trees will in ſixty or ſeventy. It grows very kindly, and great quantities may be propagated at a ſmall expence. A very conſiderable profit from it will come to the planter in five or ſix years after planting: in eight or ten years more another profit will ariſe much larger than the firſt; and at laſt, which will be in about twenty or thirty years after planting, the profit will be ſurpriſing, as I will make it appear in the ſubſequent account.

“ In order to begin with this willow-plantation, the land muſt be ſecurely fenced from all kinds of cattle, and muſt be well ploughed or dug in winter, to make the ſurface looſe, and to kill the graſs and weeds. The ſeaſon for planting is from November to April, and ſometimes later. The dryeſt land ſhould be planted firſt.

“ One year's ſhoots are beſt for ſets when they are deſigned to make large trees. The ſets ſhould be cut to eighteen or twenty inches long; about eight or nine inches of the thick or lower ends muſt be thruſt into the ground. A ſtrong ſhoot of one year's growth will frequently make three or four good ſets, but I would not adviſe cutting any ſets from the very tops of the rods, becauſe they will be too weak to make ſtrong ſhoots the firſt year.

“ The proper diſtance theſe ſets ſhould be planted, is about three feet promiſcuouſly. An acre will require about five thouſand. In June, after planting, the ſets ſhould be all looked carefully over: and ſuch, as have more than one ſhoot, ſhould be reduced to one, and it ſhould be minded, to leave the uppermoſt and ſtrongeſt. The ſuperfluous ſhoots ſhould be cut off cloſe to the ſet, that the bark may ſooner cover the wound.

“ At the ſame time the ground ſhould be hoed over to kill the weeds, and to looſen the ſurface, in order to ſow turneps, which will no ways hurt the ſets, but rather be of ſervice, provided they are properly hoed, and ſet out at good diſtances, and not ſuffered to grow within a foot of the ſets. The winter following, when the turneps are gone, the ground ſhould be dug all over, and, the ſummer after, the weeds cut down with hooks; which is the laſt, and all the labour of cleaning they will ever want. The beſt inſtrument to dig theſe plantations with, is the ſort of broad-trined fork they uſe in Kent to dig their hop-grounds. The price, by the acre, is twelve ſhillings for once digging.

“ When theſe ſets have grown four or five years, about three-fourths of them muſt be dug up, in order to leave ſpace for the others to thrive. If they have throve well, in five years they will be above a foot in circumference, and twenty or thirty feet high. Theſe young trees will be very proper for many uſes, as for chair-makers, hoops, gates, hop-poles, &c. and will ſurely be worth three-pence a piece, upon an average.

“ From five thouſand ſets which are planted upon an acre, at about three feet apart, certainly three thouſand may be very properly taken away, and the remaining ones will not be left quite ſix feet apart. If theſe young trees are valued at but three-pence a piece, they will be worth thirty-ſeven pounds, but I rather believe, they will be worth more. Eight or ten years after the firſt thinning, three parts in four ſhould again be took up, which will be about one thouſand five hundred; and five hundred or more will be left at about twelve feet apart, which ſhould grow twelve or fifteen years longer, when they will be in fine maturity. The ſecond thinning will be of much more value than the firſt; upon an average, no doubt but they will be worth half a crown a tree at leaſt, as they will be tall and large, and may be put to divers uſes. Many of them will be very proper for maſts for ſmall veſſels, as the wood is light and tough.

“ In twelve or fifteen years more, the remaining five hundred trees will be very tall and large, perhaps above ſixty feet high, and five or ſix feet in circumference. The leaſt value one may conceive muſt be twenty ſhilling a tree; ſo that, at the loweſt profit one can ſet upon the produce of an acre of land, planted with this noble willow, in about thirty years at moſt, it will be worth ſix hundred pounds, and all the rent, &c. paid at the rate of twenty ſhillings a year. I really think I have allowed too low prices for the growth, and that it is very probable they will be worth more. The wood of this tree is very white and tough, and without pith or ſap; ſo muſt be very proper for carvers, turners, &c. Boards of this wood are as good for floors, or wainſcoting common rooms, as any other. I am told, by a man of great veracity and judgment, that poſts of this wood, ſet in the ground, will outlaſt all other ſorts, except yew, or heart of oak. He alſo affirms, that there is no tree upon the earth ſo proper for ſhips maſts as this, as it is light and tough, and will not ſplinter, as fir does.

“ This tree has oblong, pointed, ſaw-edged leaves, of a moſt refreſhing light green: at the bottom of each footſtalk grow two ſmall wings, which almoſt environ the young ſhoots.

“ This willow will thrive upon almoſt any ſoil, ſo it be not too dry.

“ It is alſo the beſt kind to plant, in large ſets, by the ſides of rills, &c. where they will produce larger lopping, and in leſs time than any other ſort of willow will do.

“ If any gentlemen, &c. have a mind to make plantations of this profitable tree, it would be well worth their while to lay out the ground in ſome gentle meander-walks; which will be but little extraordinary expence, and, in few years, will give both ſhade and ſhelter.

“ This willow will make the moſt profitable coppice woods, to cut every ſix or eight years, for hop poles, and many other very uſeful purpoſes.

“ They ſhould at firſt be planted about two feet and a half a part; and, after five or ſix years, three parts in four ſhould be dug up, and the remainder cut down within ſix or eight inches of the ground, to remain for ſtubs.

“ This is alſo one of the beſt ſorts of willow for baſket-makers, as it grows freely, and is very tough.

“ In many countries, where firing is ſcarce, this willow would turn to great advantage, merely for fuel; as it will grow into large billets, in three or four years, and will burn very well both green and dry.

“ Since I wrote this, a gentleman told me, that he knew of three willow-trees being ſold for fifteen pounds, but he could not inform me what kind they were; I fancy them to be the bright ſwallow-tail willow; for, next to the Norfolk kind, it is the largeſt growing ſort; and beſt for moſt uſes.”

Mr. North calls this the Norfolk willow; but that is only a local name for this tree. It is by ſome called the Hertfordſhire willow, and has had various other names in different places. The deſcription he has given of the leaves, and the firm ſound texture of the wood, without pith or ſap, will, however, ſufficiently aſcertain the ſpecies to thoſe who may not before know it. When he publiſhed this account, he advertiſed, that he would furniſh ſets to any who might want them. As he is very lately dead, who may be his ſucceſſors in his buſineſs, or whether they will continue to provide for the demand of ſets, we are at preſent ignorant. But it would be a matter of regret, that the difficulty of procuring them, ſhould be any diſcouragement to thoſe who may be diſpoſed to make plantations of this tree.

There is an addition, which might be made to Mr. North's plan of deriving an intermediate profit from a plantation of theſe trees, while the principal of them are growing to due maturity. It is this, to leave at the ſecond thinning one tree in the middle of every four, that are intended to grow to maturity; which middle tree will conſequently be at more than ſix feet diſtance from any other, being in the diagonal line of the four. The trees ſo left ſhould be then cut down, within ſix or eight inches of the ground, and ſuffered to ſhoot afterwards as ſtubs or pollards. In which ſtate they will afford hop-poles, billets, twigs, for baſket-work, &c. if cut at proper periods, from ſeven years to every other year, reſpectively to the purpoſes, for which the ſhoots may be wanted. This kind of plantation, of pollards, with tall trees, is not ſo proper in a drier, as in a moiſt ſituation; becauſe the crouding the roots may, in dry ſeaſons, injure the growth of the trees intended to ſtand for wood, where there is a want of moiſture in the ground. But in a wet ſoil, it will rather aſſiſt than retard them; and will be a conſtant ſource of profit during the whole continuance of the plantation.

Other trees may be treated in the ſame manner, allowing for the reſpective differences of each, with very great advantage, in ſwampy and marſhy ground, as in the low parts of meadows, or the waſte of manors; and the plantations will often prove a beauty and convenience in other reſpects. In ſuch caſes the twenty ſhillings per year, allowed for rent in Mr. North's account, may be wholly or moſtly ſaved.

WIND-GALL, a flatulent ſwelling which yields to the preſſure of the finger, and recovers its ſhape on the removal thereof: the tumor is viſible to the eye, and often ſeated on both ſides of the back ſinew, above the fetlocks, on the fore-legs; but moſt frequently on the hind legs; though they are met with in various parts of the body, wherever membranes can be ſo ſeparated, that a quantity of air and ſeroſities may be included within their duplicatures.

When they appear near the joints and tendons, they are generally cauſed by ſtrains, or bruiſes on the ſinews, or the ſheath that covers them; which by being over-ſtretched, have ſome of their fibres ruptured; whence probably may ouze out that fluid which is commonly found with the included air: though where theſe ſwellings ſhew themſelves in the interſtices of large muſcles, which appear blown up like bladders, air alone is the chief fluid; and theſe may ſafely be opened, and treated as a common wound.

On the firſt appearance of wind-galls, their cure ſhould be attempted by reſtringents and bandage; for which purpoſe let the ſwelling be bathed twice a day with vinegar, or verjuice alone, or let the part be fomented with a decoction of oak bark, pomegranate, and allum boiled in verjuice, binding over it, with a rowler, a woollen cloth ſoaked in the ſame. Some for this purpoſe uſe red wine lees, others curriers ſhavings wetted with the ſame, or vinegar, bracing the part up with a firm bandage.

If this method, after a proper trial, ſhould not be found to ſucceed, authors have adviſed the ſwelling to be pierced with an awl, or opened with a knife; but mild bliſtering has in general the preference given to theſe methods; the including fluids being thereby drawn off, the impacted air diſperſed, and the tumor gradually diminiſhed. A little of the bliſtering ointment ſhould be laid on every other day for a week, which brings on a plentiful diſcharge, but generally in a few days is dried up, when the horſe may be put to his uſual work; and the bliſtering ointment renewed in that manner once a month or oftener, as the horſe can be ſpared from buſineſs, till the cure is compleated. This is the only method to prevent ſcars, which firing of courſe leaves behind, and unleſs ſkilfully executed, too often likewiſe a fullneſs on the joint, with ſtiffneſs; the mild bliſtering ointment, where the ſublimate is left out, is the propereſt for this purpoſe. *Bartlet's Farriery, p.* 276.

WIND-ROW, the green parts, or borders of a field, dug up, in order to carry the earth on the land to mend it; ſo called becauſe it is laid in rows, and expoſed to the wind.

WINE, a general name given to any briſk, agreeable cordial liquor drawn from vegetable bodies, and fermented, particularly that procured from the juice of the grape. *See the article* FERMENTATION.

One and the ſame kind of grape proves greatly different in taſte and flavour, according to the climate and expoſure to the ſun. In cold countries the vine, if it grows at all, never ripens its fruit; and even in France and Italy it is conſtantly obſerved, that the grapes produced on the ſouth ſides of hills are notably ſweeter than thoſe which grow on plane grounds. Among the Tockay wine-hills, there is but one which directly fronts the ſouth, and the advantage of it's ſituation are not a little remarkable: from the extraordinary ſweetneſs of its grapes, it is called the ſugar-hill. It affords the moſt delicious of all the Hungarian wines, and is appropriated to the uſe of the imperial family.

In very warm dry ſeaſons, the grapes at the bottoms of the hills are beſt; in warm and moiſt ones, thoſe at the top; ſuch as grow in the mid-region being always good. In dry ſummers, the grapes are ſweeteſt, but leaſt juicy: in rainy ones they abound with juice, which proves proportionably weaker and more dilute. Froſts in autumn promote their ripening; but froſt ſucceeding heavy rains makes them apt to burſt and ſhed their juice.

The grapes in America are remarkably apt to burſt; which Mr. Miller imputes, either to the too great moiſture of the air in that country, or to their receiving too much nouriſhment from its over rich ſoil. But gentlemen of America think that their air, except in marſhy places, is drier than ours; and are therefore of opinion, that the burſting of their grapes is not owing to the too great moiſture of the air. If it proceeds from too much nouriſhment, the remedy would ſeem to be eaſy, by training up a great number of branches to conſume that nouriſhment. Others, perhaps with more reaſon, impute their burſting to their ripening too early, while the heavy rains, frequent in autumn, continue to fall. In this caſe, they may be raiſed againſt lofty trees, as was the method of the ancient Romans, and as ſtill is the practice in many parts of Languedoc and Provence. The reflection of the heat, from the earth, would then be leſs, and the leaves of the trees would ſhelter the grapes from the ſun. By this means, being later before they fill, they would not be ſo apt to burſt; and as the latter end of the autumn is generally fair, they may then have an opportunity of coming to their full maturity, without the danger of burſting. Or if it be thought more adviſable to quicken their ripening, the warmeſt ſoil and ſituation ſhould be choſen for the vines, and they ſhould be kept low.

A due degree of maturity is eſſentially neceſſary in every kind of fruit, the juice of which is to be made into wine; becauſe the juice of unripe fruit is a rough acid liquor, which cannot be made to undergo a vinous fermentation, without great difficulty. In ſome inſtances, as in verjuice, it will remain in the ſame ſtate for years together. Nor is there leſs danger from the fruit's being over ripe; becauſe the leaſt taint or putrefaction will, as before obſerved, run through the whole proceſs of the wine, in ſpite of every art that can be uſed to correct or remove it.

When a conſiderable portion of the grapes have attained their full maturity, theſe ſhould be gathered with great ſkill and care; leaving the unripe for a future gathering. Moſt vintagers make it an almoſt general rule, to gather their grapes at a certain ſtated time, according to the cuſtom of the country, without attending to their various degrees of ripeneſs; therein imitating other ruſtics, who ſeldom vary their operations as the ſeaſons vary. Thus, in ſome countries they make it a general rule to gather their grapes when dry; and in others they as carefully gather them when they are wet with dew. In both, the circumſtances of the ſeaſons ſhould perhaps vary this cuſtom: for example, when a warm kindly ſeaſon has brought the grapes to a due maturity, ſuch juice wants no addition; and if, on the other hand, the dryneſs of the ſeaſon ſhould have thickened their juice too much, the dew may remedy that defect. If a cold or rainy ſeaſon has prevented their ripening thoroughly, and they ſtill continue in an acid watery ſtate, ſurely the warmeſt and drieſt hours ſhould be choſen for gathering them.

In ſome places, the grape is concentrated or rendered richer, by ſuffering it to remain on the tree till great part of its watery moiſture has exhaled; the ſtem of each cluſter being cut half through, when the fruit is ripe, to prevent the afflux of any freſh juice, from the plant. The ſweet Hungarian and Spaniſh wines are made from grapes that have been thus half dried.

In order to make good wine, the grapes of the ſame vine ſhould be gathered at three different times. The firſt gathering ſhould conſiſt of the ripeſt, fineſt and moſt open bunches. They ſhould be cut as cloſe as poſſible to the fruit, the better to avoid the auſtere ſharpneſs and bitterneſs of the ſtalk, and all their rotten or green berries be carefully picked off, or rather cut off with a pair of ſharp ſciſſars. Some are even ſo nice as to cut off the grapes at the end of the bunches, becauſe they are always weaker in quality, as well as leſs ripe, than thoſe which grow higher up on the ſtalk. By this means, they indeed diminiſh the quantity of their wine; but what they do make, is thereby vaſtly improved. An inferior wine is, however, made of the grapes that are ſo cut off. This practice is, indeed, attended with ſome trouble; but it anſwers extremely well, and deſerves to be much recommended, as a means of obtaining at leaſt ſome good wine, in years when, and places where, the grapes do not ripen perfectly. The ſecond gathering ſhould be of the large, cloſe, and leſs ripe bunches; for cloſe bunches never ripen thoroughly: and the third will of courſe conſiſt of the refuſe of the former gatherings; but no rotten grapes ſhould ever be mixed with either. Each of theſe three cuttings ſhould be preſſed ſeparately. It is highly neceſſary always to employ a ſufficient number of gatherers, each of which ſhould be provided with a baſket and knife, and ſhould lay the bunches, as faſt as they are cut, gently in the baſkets, without bruiſing or ſqueezing them: for the more expeditiouſly they are gathered, the finer will be the colour of the wine; and the ſooner they are preſſed the better will be its quality. Women are moſt commonly employed for gathering the grapes, becauſe their labour is cheaper than that of men, and this does not require any great exertion of ſtrength.

This firſt work, which is of the utmoſt importance to the making of good wine, may be ſtill more completely performed by duly attending to the following circumſtance. The fruits of different vineyards are of different qualities:

ſome, ſituated on very light and ſtony land, yield exceedingly delicate and high flavoured wine, which ſeldom is ſtrong; whilſt the grapes of vines growing on a richer ſoil, where they receive more nouriſhment, afford a wine which has more body. Both theſe good qualities may be united in the ſame wine, either by mixing the grapes of the different growths before they are preſſed, or by mixing the different wines that have been obtained from them: but the ſureſt way is to mix the grapes, becauſe it is thought that theſe liquors do not eaſily incorporate perfectly after they are made: the weakeſt of them is ſaid to change its colour, and to communicate its defects to the other, inſtead of being mended by the ſuperior quality of that with which it is blended: ſo that, according to many who pretend to have had long experience in theſe matters, the leaſt evil, and that leaſt is a very great one, which can ariſe from thence, is a cloudineſs in the liquor, a ſort of floating lees which will always tarniſh the beauty of its colour, ſpoil the perfection of its taſte, and prevent its ever becoming perfectly bright. This does not happen when the perfect grapes of one vineyard are mixed with the perfect grapes of another: for, from the juices of theſe different fruits preſſed out and fermented together, proceeds an exquiſite, ſound, delicate, fragant, and bright coloured liquor, which will keep ſeveral years without the leaſt alteration. It is by a knowledge of the good effects produced by a judicious mixture of the grapes of three or four vineyards of different qualities, that the celebrated Champagne wines of Silleri, Aï, and Hautvilliers, have been brought to the perfection for which they are ſo famed. Every thing that can delight the palate ſeems to be united in them. But this knowledge can be acquired only by many repeated trials and long experience.

One of the ways of making wine in the higheſt perfection of which it is ſuſceptible, is to ſtrip the grapes from off their ſtalks before they are thrown into the vat. By this means all the auſtere roughneſs which the ſtalks would communicate to the liquor is guarded againſt, and the muſt may be ſuffered to ferment, without danger, till the fermentation has ſufficiently opened the body of the fruit. The wine which is thus obtained is the melloweſt, beſt coloured, ſoundeſt, and fitteſt for keeping.

The above directions for gathering and ſorting the grapes are equally proper, whether white wine is to be made, or red; for either of theſe differently coloured wines may be, and generally is, obtained from the ſame grapes, that is to ſay, from black ones. As to the white wine which white grapes yield, it ſeldom has much ſtrength or flavour, ſoon grows yellow, and, for want of body, rarely keeps well even till the next ſummer. All the white wines of Champagne, which look as bright and as clear as cryſtal, are made from the blackeſt grapes, and never preſerve their colour better than when all the plants of white grapes have been rooted out of the vineyard. Formerly, the wine of Aï would hardly keep a year; the thin ſweet juice of the white grapes, of which the quantity was great in the vineyards of that diſtrict, turning yellow, gained the aſcendant, and altered the whole maſs of the wine. But ſince white grapes have been no longer uſed in the white Champagne wines, that of the mountain of Reims laſts ſeven or eight years, and that of the river Marne keeps well for four or five.

The wine of black grapes may be made of almoſt any depth of colour that one pleaſes. They who deſire to have it perfectly white, proceed thus. The gatherers go into the vineyard very early in the morning, and ſelect the fineſt bunches, which they cut as cloſe as poſſible to the fruit, then lay them gently in their ſmall hand baſkets, and when theſe begin to be full, put them, ſtill as gently as can be, into panniers, commonly called dorſers, in which men or women carry them, with the greateſt care not to tumble or bruiſe them in the leaſt, to the end of the vineyard, where they are put carefully into large panniers, with all their bloom, or azure, as it is technically termed, and all the dew upon them. This dew increaſes greatly the quantity of the wine; but at the ſame time it weakens it conſiderably.

If the ſun begins to be a little powerful, the vintagers ſpread wet cloths over the baſkets, whether dorſers or panniers; becauſe, if the grapes ſhould be heated, the liquor drawn from them would be apt to contract a reddiſh teint. If the place where they are to be preſſed is not far from the vineyard, men or women carry the dorſers gently on their backs to the preſs; but if the diſtance is conſiderable, the panniers, into which the grapes are in that caſe put, are loaded upon quiet eaſy going beaſts, which carry them ſlowly, and without ſhaking, to the cellar, where they remain covered and cool. When the heat of the ſun is but moderate, the vintagers continue their work ſafely till eleven o'clock: but when it ſhines ſtrongly, they leave off at nine.

For the making of white wine, of which we now ſpeak, the grapes are thrown, as faſt as the panniers arrive with them, not into the vat, as would be done for red wine, but into the preſs, of whatever form it be, and the firſt preſſing is given immediately. The wine which runs from this preſſing is the moſt delicate of any. The French call it *vin de goutte*, becauſe it rather drops than runs, as but little force is uſed in preſſing it. After this firſt preſſing, which is but gentle, for fear of diſcolouring the liquor, the preſs is raiſed, the ſcattered grapes are thrown up upon the cake, and the ſecond preſſing, called the turning up *(la retrouſſé)* is given. Here the preſs is ſcrewed down with much greater force than before, and if this ſecond running is not quite ſo plentiful as the firſt, though it ſometimes is more ſo, it is at leaſt but little inferior to it in flavour or colour, and preferable in this, that it has a ſtronger body, and will keep a conſiderably longer time. The wine of the firſt preſſing is, however, always ſet apart, if it has been drawn from quite ripe grapes and in very warm weather; becauſe the juice of the fruit then runs very plentifully, and there might be danger of reddening it by mixing it with that of the ſecond preſſing: but this mixing of them is uſeful, and ſometimes neceſſary, on account of the greater ſtrength of the ſecond running when the year is not a warm one, and when the firſt preſſing has not yielded plentifully.

After the two firſt preſſings, the ſides of the cake of grapes are cut down perpendicularly, with a ſteel ſpade, ſo far as they exceed the breadth of the upper part of the preſs which is let down upon the fruit; the grapes thereby ſeparated are thrown up on the top of the cake; and the third preſſing, commonly called the firſt cutting, is given. The juices of this firſt cutting are excellent, to make a perfect liquor; and they may alſo be added to the red wine, if any of this is made ſeparately. A fourth preſſing, a fifth, and ſo on of others, which are called the ſecond, third, and fourth cutting, are given after this; the ſides of the cake being cut down and thrown up each time, till the grapes ceaſe to yield any more juice. The liquor of the cuttings becomes gradually more and more red, becauſe the action of the preſs becomes more and more forcible upon the thin ſkin which envelops the berry, and the particles detached from thence are what render the wine red. Sometimes too the heat of the ſun, or the ſhaking of the fruit in the carriage, are ſo great, and act ſo powerfully upon the outſide of the grapes, that the tinging particles which are in the ſkin of the berries, being let looſe, mix immediately with the juice of the grape at the very firſt preſſing, and then a perfectly white wine cannot be made; but it will be of the colour of a partrige's eye, or even deeper. The wine itſelf is not, in fact, at all the worſe for this: but the faſhion is to have it either perfectly white, or of a full bright red.

The wines of theſe different cuttings (as the latter preſſings are called) are collected ſeparately, and afterwards mixed according as they contain more or leſs of the quality that is wanted. Thoſe who have many grapes preſs them at two, three, or even four different times, and collect each of the runnings ſeparately. For the firſt they conſtantly chooſe the moſt perfect grapes, and this wine is always worth a third part more than the ſecond, and ſo on in proportion.

It is eſſential to obſerve that the preſſings for white wine, if it be wiſhed to have it very pale, ſhould be performed as quick as poſſible one after the other, in order that the grapes may not have time to heat, nor the liquor remain long upon the murk. Particular attention ſhould be paid to this for the two firſt runnings, becauſe they yield the fineſt wine.

Of the ſame black grapes, namely the black morillons, the pineaus, and the Auvernats, with which we have ſeen that white wine is made in Champagne, red wine is made in Burgundy; and indeed the ſame has, of late years, been attempted alſo in Champagne, with no bad ſucceſs; though not ſo as by any means to equal the fine white wines of that country, or the beſt red wines of Burgundy.

As much as the heat of the ſun is avoided by the vintagers who make white wine, ſo much it is ſought after and wiſhed for by thoſe who make red wine. Theſe always chooſe to gather their grapes when the ſun ſhines hotteſt; becauſe they find that its action upon the outſide of the berries produces more effect than ſeveral days ſteeping in the vat would do; for that the grapes then ferment very ſpeedily. As to the reſt, the cautions before directed for gathering the grapes for white wine, in regard to their ripeneſs, the ſorting of them, cutting the bunches off with as ſhort ſtalks as poſſible, clearing them of all damaged, rotten, and unripe berries, &c. ſhould be equally obſerved here. Some expreſs the juice of theſe grapes in the open air, either in the vineyard itſelf, or cloſe to it, by throwing the bunches into large tubs, and there maſhing or bruiſing them to pieces, with ſticks, or by putting children into the tubs to tread out their juice. Others carry them home, with care not to bruiſe them by the way, and put them in a vat, in which they are trodden and maſhed. This, in either of theſe caſes, is repeated till the veſſel is full; and after that the broken grapes are let lie in their liquor more or leſs time, according to the heat of the weather, the flavour of the muſt, and the degree of colour that is intended to be given to the wine. During this time, the whole muſt be frequently ſtirred together, the better to raiſe a fermentation, and tinge the liquor with a due degree of red; for it is known by experience, that the redneſs of wine proceeds from the more or leſs intimate mixture of the colouring which is in the ſkin of the grape, with the juice which is contained in the pulpy body of the berry. It is, in fact, chiefly to give this dye to the wine, that the trodden grapes are let lie to ferment in the tub or vat before they are preſſed.

Some adviſe, as a general rule for all red wines, to let the grapes lie in their liquor forty-eight hours; whilſt others, going on in the beaten track of their forefathers, without daring even to ſuſpect that there may poſſibly be errors in the ſtated practice of their country, talk of letting the grapes infuſe during ſeven or eight days, or even longer, and act accordingly: but the authors of the Maiſons Ruſtique, who ſeem to have taken their directions from more judicious and more accurate obſervations, ſay poſitively, that the duration of this infuſion of the huſks ſhould be proportioned, not only to the heat of the weather, but alſo to the natural quality of the grapes, and to the uſual, or intended colour of the wine that is to be made. Thus, for the Coulange wine, which is one of the moſt eſteemed growths of Burgundy, only four hours, or at moſt five, are allowed for the ſteeping of the huſks, unleſs the weather be chilly and rainy, in which caſe they are ſometimes ſuffered to remain all night in the liquor. This is likewiſe, now, the practice of the beſt vintagers throughout the whole province of Burgundy, in moſt parts of that of Orleans, and, in ſhort, in almoſt every part of France where the fineſt, higheſt flavoured, and moſt ſpirituous red wines are made: and the reaſons for it are, that this time is found to be ſufficient to give the wine a duly deep colour; that it is apt to contract a roughneſs from the ſtalks if it remains too long upon them (to guard againſt which, as much as can be, care is taken to pull the ſtalks out with the rake, or ſtick, with which the muſt is ſtirred in the tubs or vat, whilſt others, more cautious, pick the grapes from off them before it is trodden out); and alſo, becauſe too much fermenting of the muſt always renders the wine harſh and coarſe, deprives it of its moſt volatile parts, and the quantity of the muſt is conſiderably diminiſhed by the loſs of what flies off, or is otherwiſe waſted in the fermentation. Others again make it a rule not to draw off their muſt till its head begins to fall. But in this they are evidently wrong; becauſe a great part of the moſt active ſpirits of the liquor is certainly evaporated thereby. It may indeed be true, and probably is, that the liquor which has lain long upon the murk acquires the moſt ſtrength, and is therefore fitteſt for keeping: but at the ſame time it alſo acquires a roughneſs and bitterneſs of taſte, communicated from the ſtones and ſtalks of the grapes, which are far from rendering it the more palatable.

Might not the ſureſt way of judging when the liquor has lain a ſufficient time upon the bruiſed grapes be, to thruſt one's hand pretty deep into the vat, to take from thence a handful of the murk, and to ſmell to it, as the dyers do, to judge of the diſpoſition of their vats? One might then, perhaps, eſpecially with the help of ſome experience, know pretty exactly whether the liquor be ſufficiently concocted, and whether it has acquired colour enough. If it ſmells ſweet, it ſhould be let work a little longer in the vat; at leaſt till it has loſt that ſmell, and has acquired ſo ſtrong a ſcent as to affect the noſe. Then may probably be the right time for drawing it off. A good bodied wine will never taſte of the grape ſtone, if it be taken in its proper degree of the vat; but it will keep ſound for many years, and be always fit to drink.

To the different ways of managing the muſt is certainly owing, in a great meaſure at leaſt, that ſome people make much better wine than others from grapes of the very ſame ſort, of equal ripeneſs, and of the growth of equally good and well ſituated vineyards. Indeed, for thicker, heavier, and coarſer wines, than thoſe of either Burgundy or Orleans, of which, chiefly, we have now been ſpeaking; ſuch, for example, as the Bourdeaux claret, of which we are ſo fond in this country, and of which the French themſelves do not drink any at home, a whole day is frequently allowed for the ſteeping of the huſks, and ſometimes more, before the preſs is recurred to. But as to the rule of letting the grapes lie to ſteep in their liquor forty-eight hours, and much leſs the longer time which ſome recommend and practice; we cannot, for the above reaſons, think it properly applicable to any ſort of wine, unleſs it may, perhaps, be in very cold unfavourable weather, or for ſuch thick, heavy, dark coloured, and very heady wines, as thoſe of Oporto, which, as is well known, are ſcarcely drinkable even here, till age has depurated them and ſoftened their natural roughneſs. It is true, that wine which has fermented long upon the murk may always be beſt for keeping; but it will never be the moſt pleaſing to drink.

We conſequently do not approve of this part of the method of making red wine in Chianti, from whence we may probably judge of the general practice in Italy. When the grapes there are of a due ripeneſs, and the weather warm and dry, they are cut as ſoon as the ſun or wind has dried up the dew that was on them, and are put into little barrels, commonly called piggins, in which they are carried to the wine vat, on mules if it be diſtant, but between two men if it be near. They are then bruiſed to maſh in thoſe barrels with a club, and thrown directly into the vat, or elſe into a kind of very large hopper placed over the vat, with a grate lengthwiſe, through which the juice, huſks, ſtones, and ſtalks all paſs into the vat, upon their being trodden; and this is continued till the vat is full; when immediately, or ſometimes even hours before it is full, the muſt thus made ferments. By this means the huſks, ſtalks, and ſtones are thrown up to the top of the liquor, where they form a thick cruſt; and this ebullition, which will continue for many days if the liquor be ſtrong, for its duration depends on the ſtrength of the muſt as well as on the temperature of the air, is ſuffered to proceed till the wine is judged to be fit for drawing off. This fitneſs is determined by the palate; and herein conſiſts the greateſt ſkill in the art of making wine. Old practitioners know preciſely, by the colour, ſmell, and taſte of the muſt, the exact time that beſt ſuits their method of proceeding: but it cannot be learnt without great attention, and long experience. The wines of the plains are generally deemed ready for tunning in about ten days, thoſe of the hills in about fifteen, and thoſe of the mountains in Chianti in about eighteen or twenty, or ſometimes more; for in this way of proceeding, the weather has always a very great influence on the ripening of the muſt. When it is judged to be near ready for tunning, thoſe who are ſkilled in thoſe matters taſte it every eight hours. The longer the ebullition is continued, the drier and deeper coloured will the wine be; and the leſs it is continued, the ſweeter and paler will be the liquor.

The vats are proportioned to the quantity of wine that is to be made at one preſſing, and there frequently are ſeveral of them in the ſame vineyard; for the Italians preſs all their red grapes in the open air. The vats on which the hoppers are ſet are covered with boards, and a coarſe linnen cloth, the better to prevent the evaporating of the wine, and other accidents.

When the Italians make their ſtrong white wines, or muſcadines, they gather their grapes carefully, and lay them in the ſun for three or four days, or more; always houſing them at night, or at leaſt covering them then ſo that no dew may fall on them. They call the ebullition which theſe undergo in the vat a ſhort one, becauſe it does not exceed five or ſix days; after which they tun up the wine, and ſhift it twice or thrice from one caſk to another, to make it become fine. As to the Verdea or white Florence, as it is called, they draw it off from the vat almoſt as ſoon as an ebullition begins to riſe in it, and has thrown up the huſks, ſtones, &c. ſo as to form a cruſt at top. They then let the ebullition continue for a day and a half, or at moſt two days, in the caſk into which it has been drawn, from which they afterwards ſhift it into another, and in a few hours more into a third and fourth, to check and prevent the fermentation. By this means it is made to retain that ſweetneſs which the ladies in moſt countries are fond of: but wine thus managed never is perfectly fine.

When the muſt has fermented upon the huſks of the grapes in the tubs, or vats, as long as is thought proper, it is poured off from the former into other veſſels, and drawn off from the latter by means of a braſs cock placed about three or four inches above the bottom of the vat, from whence it runs into a receiver, which, as well as that under the preſs, generally is a very large caſk, open at one end, and placed upright directly underneath the cock or channel through which the liquor flows. A bundle of pretty cloſe-tied twigs, commonly of vine cuttings, or of the haulm of aſparagus run up to feed, is placed within the vat, before the grapes are put into it to be trodden, cloſe to the entrance of the cock, to prevent the huſks from running into it ſo as to choak it up; and a large ſtone or two is laid upon this bundle, to keep it down. Beſides this precaution to retain the huſks, &c. of the grapes, and prevent their mixing with the liquor that is drawn off, ſome, for greater ſecurity, let their muſt run from the cock through a ſieve, into the receiver, from whence (as alſo from the abovementioned tubs, in the uſing of which the ſame precaution of keeping back the huſks, &c. is carefully obſerved when the liquor is poured out of one into another), it is laded by hand, in bowls, jugs, jets, or pails, and poured into the caſks, through pewter funnels.

After the muſt has been thus poured or drawn off, the murk, that is to ſay, the remainder of the grapes at the bottom of the tubs or vat, is collected together and put into the preſs, where it is ſqueezed very hard, three or four times, in ſhort, till it is perfectly dry, its ſides being cut down each time, and thrown up, as before directed for the latter preſſings of the grapes; and the liquor obtained from thence, eſpecially if the preſs be ſcrewed ſo tight as to crack the ſeeds of the grapes, has a ſtronger body than any of the preceding runnings, but not any part of their fine, high, or delicate flavour. Some, however, mix a little of it with their other wines, to ſtrengthen them, and thereby make them keep the better: but certainly not to mend their taſte.

Others, in whom the ſpirit of oeconomy is very prevalent, pour as much water as they think proper upon the murk in the vat, immediately after the muſt has been drawn off. They do this immediately, for fear of the murk's turning ſour, as it would be very apt to do, if they ſhould wait longer. They then ſtir it about, and leave it upon the murk a longer or ſhorter time, according to the heat of the weather, till they find it pretty highly coloured, and judge that it has incorporated all the remaining particles and ſpirit of the wine. They then draw this water off into another veſſel, and carry the remaining murk to the preſs, where they ſqueeze it till not a drop of moiſture remains in it. The liquor thus extracted is mixed with that which was drawn off before, and is then barrelled. This is principally intended for common uſe, or rather for ſervants: but it muſt be drank in the enſuing winter; for it will turn ſour by the next ſummer. It is briſk and pleaſant enough whilſt it laſts good, and is much preferable to water cyder; though not equal to the refuſe wine, as it is called, of which a vat, or more, is generally made by itſelf, of the damaged, rotten, or unripe black grapes that were left at the laſt gathering, as not being fit for the finer wines.

Another uſe too which the French make of the murk of their grapes after the muſt has been drawn off from the vat, is, to amend ſuch of their wines, whether red or white, old or new, as are deficient in colour or ſtrength. To this end, they empty them out of their caſks into the vat, immediately after the muſt has been drawn off, ſtir the murk up ſo as to mix it thoroughly with them, and then let them remain upon it, at moſt twenty-four hours if it be new-wine, and twelve hours if it be old. When they find that it has taken a ſufficient degree of colour, and that it is not ſweet to the taſte, but agreeable to drink, they draw it off, barrel it up ſeparately, in order to know it again, and then put the remaining murk in the preſs, where it is ſqueezed as dry as poſſible.

As to the white grapes that were rejected at the former gatherings, they are let hang upon the vines till the latter end of October or beginning of November, that they may be a little bitten by the froſt. They are then gathered, and a wine is made of them which is ſold quite warm from the vat, and does well enough to mix with coarſe red wine.

The newly preſſed murk of grapes ſoon contracts a heat; and as it contains many ſpirituous parts, it is then uſed as an effectual remedy for rheumatic pains, ſtiffneſs of the joints, and numbneſs of the limbs. The way of applying it is, to bury the part affected under a heap of fermenting murk.

By the time that the murk has undergone the utmoſt dint of preſſing, it will be as hard as a ſtone: but even then it will yield, when diluted with water, fermented, and diſtilled, a ſpirit which has its medicinal, as well as domeſtic, uſes. Or it makes a good manure for land; particularly, ſay ſome, for vines and for aſparagus.

The too great propenſity to fermentation in hot countries has laid the inhabitants of thoſe parts under the neceſſity of uſing means to retard it: but the method which they practice for this purpoſe renders their wines, as Dr. Neumann juſtly obſerves, ſcarcely deſerving of that name; becauſe they hardly undergo any degree of fermentation at all, and are, in fact, no better than boiled muſt. Several of the Italian wines are of this ſort, and are called by the general name of *vino cotto*, " boiled wine." It is to thin watery juices, extremely prone to ferment, and in which fermentation, when once begun, can ſcarcely be ſuppreſſed till it has run beyond the vinous ſtate, that the proceſs of boiling over a fire is applied. The fermentative quality is thereby reſtrained, and the liquor becomes richer, and continues fit for drinking at leaſt a year or two, though it is never ſo wholſome as the fermented wines. The effects of muſt and of wine upon animal bodies are diametrically oppoſite: for muſt relaxes and liquefies, and, if drank immoderately, is apt to produce dangerous fluxes; whereas perfect wine, on the contrary, corroborates and conſtringes. This the doctor reckons the firſt of three claſſes into which he very properly divides wine, with reſpect to its fermentation.

The ſecond claſs comprehends thoſe wines which have undergone fermentation, but not a complete one. Of theſe there are two kinds. The firſt is the thin ſweet wines; which are no other than muſt partially fermented, or whoſe fermentation is checked, while it can be checked, before the ſweetneſs has gone off. Theſe wines can ſcarcely be kept above a year. Such as the Tyrol, ſome of the Savoy, and ſeveral of the Italian. The ſecond ſort is the ſtrong, full-bodied, rich, ſweet wines, which are generally a mixture of fermented and inſpiſſated muſt; the latter being added to increaſe the richneſs of the liquor, and prevent the fermentation from running beyond its due limits. Theſe kinds of wines greatly heat the conſtitution, and ought to be very ſparingly drank: ſuch are Malmſey, Canary, and ſome of the Spaniſh and Hungarian wines.

To the third claſs belong thoſe wines which have been completely fermented, and have thrown off their groſs matter. Theſe are the moſt perfect wines, and for common uſe the moſt wholſome.

In cold countries, where, for want of the ſun's having force enough to mellow and enrich the juice of the grape, the muſt is thin and poor; ſugar, or dried grapes, ſhould be added to the muſt, to give it a body. Authors name a variety of other ingredients for this purpoſe; but they are uſeful only as they contain a ſaccharine ſubſtance. It is therefore moſt adviſable to uſe good ſugar, which requires no other care than diſſolving it in the juice in the proportion deſired, or found to be wanted. If part of the juice is evaporated by fire, as is ſometimes practiſed, a ferment muſt be added, to make up for the inaptitude to ferment, which experience has ſhewn to be in all juices that have been boiled.

When we here adviſe the adding of ſugar, in particular, we do it on a ſuppoſition of its being the ſubſtance moſt eaſily come at; and alſo becauſe it has been proved by ſome late experiments, that all juices are more or leſs fermentable in proportion to the quantity of ſaccharine matter contained in them.

If the juice is ſo ſour that it will not ferment kindly, no alkaline ſalts ſhould be recurred to, though greatly recommended by ſeveral authors; becauſe they raiſe ſo ſtrong an effervefcence, that they deprive the liquor of much of its moſt volatile and active principles, and thereby leave it vapid. Inſtead of theſe, ſuch calcarious ſubſtances as will give the leaſt taſte to the liquor, or diſſolve the leaſt in it, ſhould be preferred. Such are, extremely well cleaned oyſter or other ſhells, and hard lime-ſtone or marble reduced to powder. Theſe ſhould not be calcined or burnt; becauſe they would then communicate a diſagreeable taſte to the liquor, and be beſides attended with the diſadvantage of raiſing too great an effervefcence. Next to theſe, chalk bids the faireſt to anſwer the deſired end. But a caution neceſſary to be obſerved when theſe or any other ſuch like ſubſtances are uſed, is, that the too great acidity of the liquor ſhould be only leſſened; for a certain degree of acidity is eſſentially neceſſary in all wines. If the juice is otherwiſe rich in ſubſtance, and faulty only in being too acid, warmth alone has, in many inſtances, been found to be a ſufficient cure. Madeira, for example, is always harſh, till it has been mellowed by heat: and thus again, ſome gentlemen in England and America, when the juice of their grapes has not fermented kindly, have obtained a very good wine by expoſing the containing veſſels, in a warm ſituation, to the ſun, with an intention of turning it to vinegar. Chemiſts know that all vegetable acids are volatile in certain degrees of heat; and it is highly probable that the effect of this ſummer expoſure may be the evaporation of the acid, and thereby the converſion of the whole into a mild vinous fluid. Inſtances are not wanting, of the rougheſt verjuice being turned to a ſtrong pleaſant cider, or vinous fluid, by means of a warm ſituation accidentally given it. Habit has made a gently acid even deſirable in ſome wines, as in rheniſh.

In ſeveral parts of Germany where the grapes ſeldom come to full maturity, and are therefore gathered ſomewhat green, the makers of wine have iron ſtoves in their cellars, and keep in them a conſtant fire, at leaſt during the time of fermentation. This, by heightening the fermentation, ripens and meliorates the wines, and renders them much more palatable and agreeable than they would otherwiſe be. We have already ſeen that keeping the wines in places conſiderably warmed either by the ſun, or by fire, will have the ſame effect, even ſo late as in the ſummer after the vintage: for acid liquors remain long without either fermenting thoroughly, or putrifying.

As the wines drawn from the laſt gathering of the grapes cannot be ſo perfect as the others, for want of due maturity in the fruit, the people of Champagne and Burgundy have recourſe to the following method, to accelerate their ripening. When the wines have been about three weeks in the caſks, and have been drawn off their firſt lees, they roll them up and down for ſome time, five or ſix times a day, for four or five days running; then two or three times a day, for three or four days; and afterwards twice a day, for about four days; then once a day, for about a week; and after that, once in four or five days. If the grapes were gathered very green, the rolling in this manner is continued, in all, for about five or ſix weeks: but if they were tolerably ripe when gathered, rolling once in four or five days, for about a month or ſix weeks, is found to be ſufficient. This rolling of the liquor in the caſks is intended to ſupply the defect of its firſt fermentation.

It now appears evidently, from the foregoing account of the practice of making wines in hot and cold countries, that a means to counteract the inconveniences of the climate is wanting in each. If they had proper cellars and vaults, as before obſerved, the too quick and too great fermentation in hot countries might be reſtrained and kept within due bounds; and a proper degree of heat during the fermentation in a cold country, might give the juice that rich mellowneſs which the too weak ſun could not.

The new wines will generally ferment of themſelves, within a few days after they have been put into the caſks. Thoſe that do not ſhould be helped, by putting into them a little of the froth, or yeaſt, which works from the others. The fineſt wines will ferment the ſooneſt: and this fermentation will continue for about ten or twelve days, according to the ſort of the wine, and the ſeaſon of the year.

While the wine ferments, the bung-hole of the caſk muſt be left open, or only covered with a thin linen cloth, to prevent any dirt from falling in: and this cloth ſhould be laid hollow, ſo that the froth ariſing from the fermentation may have room to work off.

When the fermentation is pretty well over, which is known by the froth's ceaſing to riſe ſo faſt as before, the bung may be cloſed down, after filling up the caſk with liquor to within two inches of the top; and a vent-hole ſhould then be opened and left, to carry off whatever may be thrown up by any ſubſequent fermentation. This filling up of the caſk to within two inches of the vent-hole ſhould be regularly performed every two days, for about ten or twelve days running: for the fermentation will continue a conſiderable time, though in a leſs degree; and if the caſks are not kept ſo full as that the foulneſs thrown up by the fermentation may be carried off at the vent-hole, it will fall back again into the wine, and prevent its becoming clear. After filling up each caſk in this manner to within two inches of the bung, for about ten or twelve days, it muſt be filled up to within an inch every fifth or ſixth day, for the ſpace of a month; after which, once a fortnight will be ſufficient during the next three months.

Though the fermentation will be over long before this laſt mentioned time, yet the caſks muſt be filled up once a month ſo long as they remain in the cellar: for as the wine will waſte inſenſibly in them, it will grow flat and heavy, if they are not kept conſtantly filled up. It were needleſs to ſay, that the vent-holes muſt be ſtopped when the fermentation is over.

About the middle of December, the wines may be drawn off from their lees into freſh caſks, for the firſt time; taking care to fill the caſks up, and to place them ſo that they may not be ſhaken or diſturbed until the middle of February, when it will be right to draw them off again into other caſks. If the quantity of lees is then found to be ſo conſiderable as to endanger their contracting a putrid taint by remaining too long mixed with the wine, it may be adviſable to draw it off again after a proper interval of time; or ſometimes it may be neceſſary to repeat this racking even more frequently, though hardly ſo often as is practiſed in Champagne, viz. even twelve or thirteen times in the ſpace of four years; becauſe, though this may render the wine very clear, bright, and pleaſing to the eye, it muſt ſurely diminiſh its ſtrength, and conſequently make it be the leſs fit for keeping.

A leathern pipe, about ſix or ſeven inches in circumference, well ſewed with a double ſeam, to prevent the wine's running out, is, at the diſtance of every five or ſix feet, very tightly bound with ſtrong waxed twine around braſs rings of the ſame dimenſions, made to ſcrew into other rings faſtened in the ſame manner to other ſimilar pipes. The number of theſe pipes may be ſuited to whatever diſtance is found proper or neceſſary: or, when the diſtance between the caſks is always nearly the ſame, the leathern pipe may be made of one ſingle piece, with only a braſs ſcrew-ring at each of its ends. To theſe ſcrews the extremities of the leathern pipe ſhould be fitted, ſo as to ſcrew exactly on or into them, two ſtrong braſs cocks, which are however firſt to be thruſt as lightly as poſſible, by their more taper ends, the one into the uſual tapping place of the caſk which is to be emptied, and the other into the uſual tapping place of that which is to be filled; that is to ſay, each of theſe cocks is to be firmly and cloſely fixed at about two or three inches above the loweſt part of the head of the caſk to which it is applied. It were needleſs to obſerve that theſe cocks muſt be quite ſtrait, the better to complete the communication from one caſk to the other. When every thing is thus prepared, the cocks, being duly fixed in their reſpective caſks, are both opened, and the wine then flows naturally from the full caſk into the empty one, till the liquor becomes of an equal height in each, without in the laſt diſturbing the lees of the wine in the caſk that is to be emptied. When the wine ceaſes to run ſpontaneouſly, the reſt of it is forced out by means bellows conſtructed as follows.

Theſe bellows are about three feet long, and a foot and an half broad at their wideſt part. They are made and ſhaped in the common manner to within about four inches of their ſmaller end, from whence the remainder of them is but three or four inches wide. In the inſide of the place where their breadth is thus altered, the air paſſes through a hole of an inch bore; and upon this hole, on the ſide of it that is next the nozzle of the bellows, is a piece of leather, like the valve of a pump, ſo fitted that when the bellows are lifted up to take in freſh air, that valve inſtantly cloſes upon the hole, in ſuch manner that none of the air which has paſſed through this hole, and entered into the caſk, can be drawn back again; but the bellows take in freſh air, by their holes below.

Inſtead of ending with a ſtrait nozzle like other bellows, theſe terminate in a tube or pipe of wood, a foot long, cloſely jointed into their ſmaller end, and there well glued and ſtrongly faſtened by good pegs, in a direction perpendicular to that of the body of the bellows, in order to its conducting the air downward. This nozzle, for ſuch we ſhall now call it in compliance to cuſtom, is round, and about nine or ten inches in circumference over its outſide at the top, from whence it diminiſhes gradually towards its other end, the better to fit it for entering ſome inches in at the bung hole of the veſſel, and alſo to cloſe up that hole ſo exactly, that no air may get in, or come out, at its ſides. The upper part of this nozzle riſes about two inches above the level of the ſmall end of the bellows, and is there cut ſomewhat flat, that it may be the more eaſily ſtruck with a wooden mallet, and thereby forced the cloſer into the bung-hole of the caſk: and alſo, at about two fingers breadth below the upper part of this nozzle, is nailed an iron ring, thro' which is paſſed an iron hook, or brace, a foot long, by means whereof the bellows are cramped down to the hoops of the caſk: for without this precaution, the force of the air would drive the bellows out of the bung-hole, and the operation of emptying the broached veſſel would not be performed.

It now is eaſy to conceive the manner in which theſe bellows force the remaining wine out of the caſk that is to be emptied: for, upon opening the bellows, the air ruſhes in at the holes in their bottom; and upon ſhutting them, it is forced through their nozzle into the caſk: the valve juſt above their nozzle prevents its returning back; and thus a quantity of air ſufficient to counter-act the weight of the atmoſphere on the wine in the caſk that is to be filled, is eaſily forced into that which is to be emptied.

When the wine is drawn off to within about two or three gallons, a hiſſing is heard in the cock of the then almoſt empty caſk. The cock in the other ſhould then be turned, ſo as to cloſe it, and the pipe of communication ſhould be taken away. That done, all the remaining clear wine is drawn off from the caſk that is to be emptied, but with great care to ſtop when it becomes in the leaſt cloudy. This bright wine is then poured into the bung-hole of the caſk that is to be filled, and the entire filling of it up is completed with ſound wine of the ſame quality as that which has been drawn off. It is then cloſely bunged down; and when this has been done, the cock may be taken out, and a plug put in, with very little loſs of wine. Or, if the owner be ſo curious as to deſire not to loſe any of his liquor, the little air neceſſarily left near the bung-hole may be drawn off with a ſmall hand-air-pump, and then ſcarcely a drop of wine will run out when the cock is drawn.

At every racking of this kind a peg-hole is made in the caſk, if there be not one before, in order to examine the degree of waſting of the wine: for wine waſtes ſenſibly in keeping, how cloſely ſoever the caſk be ſtopped; a part of it tranſpiring through the pores of the wood: but, as Dr. Neumann obſerves, it is not the ſpirituous, but the watery part that is thus loſt; for the remaining wine proves ſtronger than at firſt, and the ſtrength continues to increaſe as the quantity diminiſhes. In filling up the veſſels, for it is neceſſary that they ſhould be kept full, care muſt be taken never to mix wines of diſſimilar qualities.

The Hungarian, for example, does not well bear any other wine, particular rheniſh: for if the ſpontaneous diminution of a caſk of Hungarian wine be made up with rheniſh, though both of them keep extremely well by themſelves, the mixture will preſently ſpoil: and ſo it is of other wines.

The lees in the ſeveral caſks that have been racked off may be collected together, and when their thicker part has ſubſided, a ſpirit may be drawn from the thinner.

Diſtempers ſeldom happen to fermented liquors, but from ſome fault in the manner of managing them. If the fermentation has been duly carried on, the wine racked off the lees before they can contract a putrid taint, and afterwards kept in an equal degree of heat; the wine will anſwer the expectation of the maker. When it is to be tranſported, and thereby neceſſarily brought into a warmer air, brandy is often added, to check the propenſity to a new fermentation. This is alſo ſometimes done to give ſtrength to the wine: but it is not a practice by any means to be recommended.

It is neceſſary for the preſervation of ſome wines, particularly of ſuch as are apt to be frequently on the fret, to fumigate the caſks with burning brimſtone, to which ſome add, perhaps uſeleſsly, vinous ſpirits and aromatic ingredients. The fumes of brimſtone ſtrongly reſiſt fermentation, but wines which are largely impregnated with them cannot be recommended as wholeſome. The colour of red wine is deſtroyed by them. What is called ſtum, is no other than muſt whoſe fermentation has been prevented, or prematurely ſuppreſſed, by fumigation with ſulphur.

The colour of wine is frequently artificial. A pale yellow may be natural, but a fine deep yellow proceeds from an addition of burnt-ſugar, or other colouring matters, or from the oaken caſk in which the wine has been kept. Wine may be naturaly of a pale dilute red; but a deep red is almoſt always the effect of artificial additions, as of the red-woods, elder-berries, bilberries, &c. In France, no ſecret is made of theſe practices, the colouring matters being publicly thrown out after they have been uſed. Turbid wines are fined by a mixture of whites and ſhells of eggs, powdered alabaſter, and iſinglaſs. The uſe of the ſhells and alabaſter is to correct any ſmall degree of acidity that the wine may have contracted: and indeed if we look into the many compoſitions made uſe of by vintners, we ſhall ſee that they are all framed upon this principle; wherefore it would be needleſs here to particulariſe them. If the wine is grown very ſour, the beſt way of correcting it, ſo as to preſerve the ſpirit and flavour, is, by adding a quantity of ſalt of tartar ſufficient to neutralize the acid, juſt before it is to be uſed. It then becomes a pleaſant wholeſome liquor: but if ſalt of tartar is mixed with any fermented liquor long before it is to be uſed, the efferveſcence which it raiſes will deprive the liquor of its ſpirit, and leave it quite vapid. Iſinglaſs is uſed only for clarifying the wine. Weak wines are improved by an addition of ſpirit, particularly before the fermentation is completed; for after this period it is apt to ſpoil the vinoſity. Poor wines are enriched by ſweets, and flavoured by various additions ſo as to emulate the more coſtly: thus elder-flowers give the flavour of Moſelle, and the flowers of the yellow clary will make almoſt any common white wine reſemble new rheniſh. Even the moſt delicious wines have been imitated alſo without a drop of the juice of any grape; with ſolutions of ſugar, juice of currants, figs, and other fruits.

After the wine, and particularly that of countries where the ſun is not very powerful, has paſſed its fermentation in the vat, and is drawn off into caſks, it will require ſomething to feed upon. To this end, it will be right always to preſerve a few bunches of the beſt grapes, which may be hung up in a room till there be occaſion for them; when they ſhould be picked off the ſtalks, and two or three good handfuls of them ſhould be put into each caſk, according to its ſize.

The French recommend ſtrongly the two following methods; the one for giving additional ſtrength and colour to red wine, and the other for clarifying wines in general.

For the former, a ſound well-hooped caſk is ſet upright on one of its ends, the other end is taken out, and a layer of vine-cuttings is ſpread at the bottom of the caſk, to the depth of about three inches. Some of the fineſt and ripeſt black grages are then choſen, and their berries are cut off from the ſtalks, as cloſe as poſſible to the fruit, which the utmoſt care is taken not to burſt or damage. The grapes thus ſelected are put gently upon the layer of vine-twigs, and the caſk is filled with them up to the beginning of the bung-hole. Another layer of vine-cuttings is placed gently upon theſe grapes, till it reaches the upper part of the bung-hole, and the caſk is then filled with grapes, culled as before, to within a foot of the top, where another layer of vine-cuttings is ſpread over them, and the head of the caſk is then replaced. The caſk thus prepared is filled with good coarſe red wine, to within three fingers breadth of the bung-hole, that the liquor may have room to ferment without much loſs, and in this ſtate it is carried gently to the place where it is to remain. Great care is taken to keep this veſſel conſtantly filled up with wine of the ſame ſort, both whilſt it ferments, and afterwards as it is uſed: for if the grapes in it were at any time to be left long without a ſufficient quantity of wine upon them, the whole would grow vapid and be ſpoiled. The principal uſe which the vintners make of this liquor, is to ſupply their cuſtomers conſtantly with wine of the ſame taſte and colour, by mixing it with what they ſell.

The other method, which is practiſed only when wine is to be fined very ſpeedily, conſiſts in this. A parcel of very thin chips, the longer the better, or of pretty thick ſhavings, of new but well dried beech, is ſteeped for two days in water, which is changed at leaſt twice a day, the better to take off the taſte of the wood. Theſe chips are then well drained; and after they have been thoroughly dried in the air, as many of them are put lightly into a caſk, of which the head has been taken out for this purpoſe, as will fill it to within about a finger's breadth of the top. The head is then properly replaced in the caſk, ſo as to fit it for holding liquor, and a pint of good brandy is poured in at the bung-hole, upon the chips. After this, the bung-hole is ſtopped cloſely with a bung, and the caſk is rolled about till the chips have imbibed all the brandy. The caſk is then carried to its allotted place, and immediately filled with ſome of the wine that is to be ſpeedily fined. The wine will ſoon be fit for drawing off; and when that is done, the caſk with the chips in it ſhould be filled up again directly, becauſe the chips, like the grapes and vine-cuttings beforementioned, will looſe all their virtue if they are left long without a ſufficiency of liquor upon them.

When the wine that is poured upon theſe chips begins to require a length of time in order to its becoming fine, it is a ſign that they are over-loaded with lees. The head of the caſk is then taken out anew, the chips are waſhed in water till they are cleared of the lees, they are then dried in the air as before, and after being again ſoaked with brandy, or waſhed in perfectly clear wine, they are replaced in their former caſk; after that this alſo has been well waſhed and cleaned, and they continue to anſwer the ſame purpoſe as at firſt.

All the abovementioned practices are innocent enough: but, as Dr. Neumann rightly obſerves, ſome of the dealers in wines have had recourſe to ſuch dangerous artifices as have been pernicious to thouſands. They have ſweetened acid wines by litharge, or other preparations of lead; and impregnated ſweet ones with mercury-ſublimate and with arſenic. Lead is diſcovered in wines by adding a decoction of orpiment made in lime-water. If the wine is genuine, it does not ſenſibly change its colour on this addition, though on ſtanding, a yellowiſh-white powder falls to the bottom: but if it has any ſaturnine impregnation, its colour becomes immediately darker, brown, reddiſh, or blackiſh. Arſenic may be detected by a ſolution of lead in aqua fortis; and mercury-ſublimate, by volatile alkaline ſpirits, or by a ſolution of fixed alkaline ſalts.

As to the concentrating of wines by cold, commonly called condenſing or congealing of them, it ſeems to us ſo much a matter of mere curioſity, rather than of uſe, that, though Dr. Stahl has taken the pains to give a full and accurate account of the manner of performing this proceſs, by which the wine is not only freed from its ſuperfluous humidity, ſo as to be greatly diminiſhed in bulk, and of courſe rendered more convenient for tranſportation, but alſo, ſay the advocates for this practice, infinitely enriched and ennobled in its quality, and rendered ſo much more perfect and durable, as to be from thenceforth unalterable by any accident or changes of the weather (for by this means "the philoſophic ſpirit of the wine", to uſe the language of the adepts, is obtained).

"When wines, ſays Dr. Neumann, are expoſed to the action of a freezing air, a part of their water congeals, and the unfrozen part proves proportionably ſtronger and more ſpirituous. By repetitions of this proceſs, firſt pointed out by Paracelſus, and ſince carried to a greater length by Stahl, the beſt wines are reduced to about one ſixth of their original volume. Wines thus concentrated or freed from their redundant phlegm, are no longer the delicate liquors they were before. They are too unpleaſant, as well as too ſtrong, to be drank by themſelves; and when mixed with other wines, they communicate to them alſo a diſagreeable taint. The phlegm which congeals retains a part of the truly vinous matter, as appears from its being convertible into vinegar; but this phlegm, mixed with the unfrozen wine, does not reſtore its priſtine qualities: both the phlegm by itſelf, and the mixture, ſoon corrupt. When once the principles of wine are ſeparated from one another, no art can reproduce wine by joining them together again. When barely the inflammable ſpirit has been diſtilled off, the addition of that ſpirit to the reſiduum does not reſtore its vinoſity. The reſiduum itſelf often ſuffers a new ſeparation upon this addition, its tartareous parts precipitating."

When the wine is of an age at which it uſually is bottled, care ſhould be taken to examine whether it be ſufficiently bright; becauſe a natural brightneſs is the moſt certain indication of the liquor's having undergone a due fermentation, and conſequently of its being rendered moſt wholeſome. If any ſmall degree of cloudineſs is obſerved in it, the whites of eggs will eaſily remove that imperfection; and if it inclines to tartneſs, the ſhells of the eggs ſhould be mixed with their whites: but if the degree of cloudineſs is thought to be greater than the whites of eggs will cure, recourſe is had to iſinglaſs, the quantity of which ſhould be proportioned to the quantity of the liquor, and to its degree of foulneſs; for wine that becomes bright of itſelf does not need any. The proper way of uſing the iſinglaſs, is to diſſolve it over the fire in ſo much water as will form it into a jelly; then to dilute it ſufficiently with ſome of the ſame wine as it is intended to clarify, afterwards to ſtrain it through a flannel bag, and finally to pour it into the caſk, and ſtir it well about with a whiſk that reaches only to about half way down the caſk. For wine that is very tart, the proper corrective is powdered marble, alabaſter, or un-burnt lime-ſtone, as before directed.

A quite faſhionable gentleman would hardly have vouchſafed, a few years ago, to taſte a glaſs of Champagne which did not ſparkle or froth ſtrongly: but that notion of its excellency is now pretty much laid aſide. Opinions have been ſo greatly divided in regard to the cauſe of this ſparkling, ſome aſcribing it wholly to the force of drugs uſed for that purpoſe by the dealers in this wine; others imputing it to the un-ripeneſs, or, as ſome call it, the tartneſs of the wine, becauſe, in fact, moſt of the wines that do ſparkle and froth are extremely tart; and others again attributing this effect to the influence of the moon, according to the times of bottling theſe wines; that we cannot do better than copy here the ſubſtance of what the authors of the Maiſon Ruſtique have ſaid on this ſubject.

"It is true that many dealers in wine, ſeeing how immoderately fond moſt people were of this ſparling liquor, did often put into it alum, ſpirit of wine, pigeon's dung, and many other drugs, to make it froth exceedingly; but it is certain, from experience, that the bottling of it at any time between the vintage and the month of May, will alſo make it froth. Some pretend that it froths moſt when it has been bottled neareſt to the time of gathering the particular ſort of grapes of which it was made: but many deny this. There is no time of the year in which it froths more than at the end of the ſecond quarter of the moon in March; and that without any artifice at all. One may always be ſure that the Champagne wine which has been bottled between the tenth and the fourteenth days of the ſame moon will froth perfectly. This has been proved by ſuch reiterated experience, that it cannot be doubted. It is, however, proper to obſerve, that the wine does not froth immediately after its having been bottled. It muſt have been at leaſt ſix weeks, and often two months in bottles, before it will froth well. If it has been tranſported to any diſtance, it muſt be let reſt for a month in the vault, eſpecially in ſummer, to recover itſelf.

"But as the Champagne wines, and particularly thoſe of the mountain of Reims, are not in general ſufficiently ripe for bottling at the abovementioned time, but ſtill retain too much tartneſs, or hardneſs, if the ſeaſon has been cold and moiſt; or too much ſweetneſs, if it has been hot; the ſureſt and beſt way to have exquiſite wine which ſhall froth perfectly, is not to bottle it till the riſe of the ſap in Auguſt. Experience has certified, that it froths exceſſively when bottled between the tenth and the fourteenth of the moon in Auguſt: and as it will by that time have loſt its too great tartneſs, or its over great ſweetneſs, one may be aſſured that the wine which is bottled then will be the ripeſt and moſt frothy.

"Another experiment has been tried, which is, not to bottle the Champagne mountain wine till the ſpring of the ſecond year, that is to ſay, eighteen months after it has been made; and it has been found to froth ſufficiently, though not above half ſo much as that which was bottled while the ſpring-ſap of the preceding year was riſing. It is not thought that the river wine, which has leſs body than that of the mountain, can froth ſo much in the ſecond year.

"They who would have Champagne wine that does not froth at all, muſt bottle it in October or November of the year after the vintage. If it be bottled in June or July, it ſtill will froth a little, though but very little.

"As theſe wines, eſpecially in their firſt year, work continually in the cellars and vaults, and ſtill more in bottles than in caſks, according to the different ſeaſons and the different impreſſions of the air; it is not ſurprizing that the ſame wine, particularly the new, ſhould ſometimes appear different to the taſte. A wine, for example, which is fit for drinking in January and February, ſhall ſeem hard in March and April; becauſe of the riſing of the ſap which then agitates it: and this ſame wine, after ſeeming to be perfectly ripened in the next June and July, ſhall again have, in Auguſt and September following, a hardneſs which could not be perceived in either of the two preceding months; becauſe the riſing of the ſap in Auguſt will have increaſed the motion of its parts, or, in other words, have ſet it on the fret. Thus the ſame Champagne wine, of the firſt year, if it be of the river growth, and frequently that of two years old if it be of the growth of the mountain, will appear more or leſs ripe or mellow, more or leſs exquiſite, more or leſs forward, according to the different motions it receives from the different impreſſions of the air, which vary moſt ſenſibly in the different ſeaſons of the year."

What is here implied, though perhaps not quite clearly expreſſed, is, we apprehend, the true cauſe of the ſparkling or frothing of wine; namely, its not having been perfectly fermented, and conſequently not had a thorough aſſimilation of its conſtituent parts. The want of this certainly makes it fret in the bottle: and accordingly we ſee, that, the better to ſecure its ſparkling, the people of Champagne bottle it in the very ſeaſon when it is moſt likely to be on the fret; viz. at the time of the weather's turning from cold to warm. Several other cauſes may likewiſe put wine on the fret, and among theſe a principal one is the want of cellars in which an equal temperature of the air is preſerved all the year round. This, and the imperfectneſs of the fermentation of the liquor, are undoubtedly the real cauſe of the ſparkling or frothing of wine.

As a general rule, if it be intended that the wine ſhould not froth, the beſt time for drawing it off, whether into bottles, or into caſks, is when the weather is extremely fair and clear, the barometer high, and, of choice, during a northerly wind; becauſe the air is then cooleſt, and the wine leaſt apt to be on the fret. By inverting theſe rules, and drawing off the wine in warm damp weather, when the barometer is low, and the wind ſoutherly; what is bottled at this time will froth; for wine in the caſk is always cloudy then, and conſequently diſpoſed to fret.

It may not be uninſtructive, and certainly cannot be unentertaining to our readers, if we copy here Dr. Neumann's account of, and curſory remarks on, the principal wines that are drank in Europe. "1. The Madeira iſlands, and Palma, one of the Canaries, afford two kinds: the firſt called Madeira Sec; the latter, which is the richeſt and beſt of the two, Canary or Palm Sec. The name Sec (corruply written Sack,) ſignifies dry; theſe wines being made from half dried grapes. There is another ſort of Sec wine, inferior to both the foregoing, prepared about Xeres in Spain, and hence called, according to our orthography, Sherris, or Sherry. 2. The wines of Candia and Greece, particularly the latter, are of common uſe in Italy. Malmſey was formerly the produce of thoſe parts only, but is now brought chiefly from Spain: it is a ſweet wine, of a golden or browniſh-yellow colour: the Italians call it *Manna alla bocca e balſamo al cervello*, "Manna to the mouth and balſam to the brain." Zant and Cephalonia ſend alſo to Venice ſome good, and no ſmall quantity of indifferent wines: almoſt all the wines indeed made uſe of in the Venetian territories come from Greece and the Morea; of which there are ſome ſorts ſo bad, and ſo cheap, that large quantities are made into vinegar for the preparation of ceruſſe. 3. Italy, not Greece, produces the *vino Greco*: this is a gold-coloured unctuous wine, of a pungent ſweetneſs, the growth of Mount Veſuvious, greatly ſophiſticated by the Neapolitans. In the neighbourhood of Veſuvious is made the Mangiaguerra wine, as alſo a thick blackiſh one called Verracia; and at the foot of the hill, the delicious *vino vergine*. The Italians apply this laſt name likewiſe to all the other wines made without preſſure. The kingdom of Naples affords the Campania or Pauſilippo and Muſcatel, the Surentine, Salernitan, and other excellent wines, as alſo the Chiarello, much drank at Rome. But the principal of all theſe wines is the red, fat, ſweet, and gratefully poignant one, called *Lachryma Chriſti*. The eccleſiaſtical ſtate produces the light, pleaſant Albano; and the ſweet Monteſiaſcone, a yellowiſh not very ſtrong wine, which comes the neareſt to good Florence, but does not keep well; together with ſeveral of leſs note, as the Nomentan, Monteran, Velitrin, Prænetic, il Romaneſco, d'Orvieto, &c. 5. In Tuſcany are the excellent white and red Florence; the celebrated, hot, ſtrong red wine of Monte Pulciano; the Montalneo, Porte Hercole, &c. But along the coaſt of the Adriatic, at Ancona, Rimini, Peſaro, and as far as Bologna, one meets with exceeding bad wines, chiefly of the boiled unfermented kind, heavy, diſagreeable, and unwholeſome. 6. In Lombardy alſo there is abundance of bad wines: the Modeneſe and Monſerrat are tolerable; the Marcemino, produced about Vicenza and Padua, pretty good. The other wines moſt commonly drank in that province are the Breſcian, Veroneſe, Placentine, Lumelline, and Pucine; and in the Genoeſe, the Vino di monte vernaccia, vino amabile or vino di cinque terre, and Vino razzeſe. Between Nizza and Savona is produced an incomparable Muſcadine; near Aquileia is the Roſatz, and near Pavia the Vino Piccante. 7. Piémont and part of Savoy have excellent light wines. 8. The Sicilian, Sardinian and Corſican wines are alſo good: the firſt, as particularly the Catanian, Panormitan, Meſſinian, and Syracuſan, are accounted the beſt, and are chiefly bought up by the Knights of Malta. 9. Moſt of the Spaniſh wines are compoſed of fermented or half fermented wine, mixed with inſpiſſated muſt and variouſly manufactured, or of an infuſion of dry grapes in weak muſt. No wines freeze more difficultly than the Spaniſh; theſe abounding both with unctuous matter and with inflammable ſpirit. The principal of them are, the Alicant, which is a thick, ſtrong, very ſweet, and almoſt black as well as nauſeous wine; Sherry, Spaniſh Malmſey, Malaga, commonly called Mountain, and what is ſimply termed Spaniſh wine. Theſe, at leaſt, are the ſorts moſt generally imported here: but in Spain itſelf there are many more, ſuch as, the Tarragon, Salamanca, Cordova, Galicia, Andaluſia, ſundry baſtards, vino de toro, &c. 10. In Portugal there is plenty of red Port, a cheap but not a very excellent wine, drank in large quantities in England, and often dreadfully ſophiſticated. The beſt vino tinto, a blackiſh red wine uſed by the coopers for colouring other wines, is ſaid by ſome to be the produce of Portugal. So largely do the Portuguze deal alſo in Madeira, that their king receives yearly twelve thouſand pipes of this wine by way of tythes. 11. In France, there is a great variety of wines; of which the ſtrong, ſweet, full-bodied, ſpirituous ones are called *Vins de liqueur.* There is ſcarcely a province in France that does not produce wine: Languedoc and Provence afford the ſweeteſt; and the ſame provinces, with Champagne and Burgundy, the ſtrongeſt. The wines of the northern parts of that kingdom, as Picardy and Bourdeaux, are the worſt; and thoſe about its middle, as Paris and Orleans, of a middling kind. The moſt celebrated of the French wines are thoſe of Champagne and Burgundy, the Cote rotie, St. Laurence, Frontignac, Muſcat de Lion, Cahors, Hermitage, Grave, &c. 12. In Swiſſerland, the beſt are the Neufchatel, Velteline, La cote, and Reiff wines. The Velteline ſtraw-wine, ſo called from the grapes being laid for ſome time upon ſtraw before they are preſſed, is particularly celebrated. 13. The dry-grape wines of the Upper-Hungary are in general excellent, and greatly ſuperior to thoſe of the Lower. They have a delicious aromatic ſmell and taſte, a notably diaphoretic, and corroborating virtue, and when drank freely occaſion no head-ach, heavineſs of the limbs, or other inconveniencies. They do not eaſily become vinewed even in open veſſels; and retain their ſweetneſs and agreeableneſs for a length of time, though they loſe a little of it from year to year. 14. Among the German wines, the Tyrol are very delicate, particularly thoſe of Tramin and Etſch; but they do not keep. 15. Good Auſtrian wine is not to be rejected. Thoſe of Kloſter-Neuburg and Broſenberg are accounted the beſt, and, in the opinion of ſome, excel in taſte that of Edenburg in Lower Hungary. There are alſo good wines in ſeveral other parts of the imperial dominions. 16. In the Palatinate, the beſt wine is that of Worms, eſpecially the ſort called women's milk; and next to this, thoſe of Edinghoff and Ambach. 17. Among the more eſteemed German wines are to be reckoned alſo Rheniſh, Mayne, Moſelle, Neckar, and Elſaſs. A certain writer calls the Rheniſh made in Hockheim (hock) the prince of the wines of Germany. 18. The Bohemian, Sileſian, Thuringian, Miſniam, Naumberg, Brandenburg, and other German wines, are generally inferior to the foregoing. Some however, of thoſe of Miſnia and the Marche, made from ripe picked grapes, have this advantage, that they are greatly meliorated by age, ſo as to be preferred by many to the Rheniſh, Neckar, and Franconia wines, and frequently mixed with other of greater note. The tartiſh German wines keep the longeſt of any: ſome of them have been kept two or three hundred years; and in Straſburg there is a caſk of it fourteen hundred years old, and many above ſeventy; the wine being occaſionally racked off into ſmaller and ſmaller caſks, that the veſſel may be conſtantly full. Theſe very old wines are preſerved rather for curioſity than uſe, as they not only grow too ſtrong for drinking, but at laſt quite diſagreeable. The beſt are thoſe of a middle age, from twenty to about fifty years."

We cannot cloſe more properly, than with the above quoted excellent chemiſt's definition of the characters of good wine.

"The goodneſs and wholeſomeneſs of wines are judged of, from their being bright, clear, and ſparkling in the glaſs; of an agreeable reviving ſmell and taſte; leaving, when held in the mouth for ſome time, a ſlight ſenſe of aſtringency; being moderately ſtrong and ſpirituous; paſſing freely by urine; exciting appetite; producing a gentle ſweat in the night; keeping the belly open next day; without being followed by any head-ach, heavineſs of the limbs, or other uneaſineſs. Such a wine, moderately uſed, is a very valuable cordial. The ſweet rich wines are either new, or very ſtrong and fiery: they heat the body much more, and, if drank to any degree of exceſs, their effects continue much longer than thoſe of the thinner wines, which contain an equal quantity of ſpirit. The red wines, in general, have the greateſt aſtringency."

The following directions for making domeſtic wines, taken from the Muſeum Ruſticum, will, we are perſuaded, be agreeable to our readers.

"As to the art of making wine, I think the rendering it more generally known, and practiſed here, may not only afford a convenience with regard to expence, and a ſecurity with regard to health, to private perſons; but an advantage to the public, in the balance of trade: a principle, at preſent, overlooked: though, in a ſhort time, it will probably be ſeen in a more intereſting light.

"Among the various articles of foreign luxury, wine certainly makes one of the moſt capital; and yet, what with the taking ſuch extreme great quantities, as oblige us to receive, as well the product of inferior, as good vintages; and what with adulteration, as well practiſed before the wine is imported hither, as after; we in general drink very indifferent natural wines, or very exceptionable artificial mixtures of liquors, called ſo. Though for theſe, we either pay great annual ſums to foreign countries, or to thoſe, who make it their buſineſs to impoſe upon us at home.

"This is the more to be regretted: becauſe we have it in our power wholly to avoid it: and, by a little attention and trouble to provide ourſelves with wine, that is ſuperior in flavour, cordial effect, wholeſomeneſs, and every other quality, with a ſaving of at leaſt fifty or ſixty *per cent.* of the expence. The means, by which, I ſuggeſt it to be in our power to do this, is, by the domeſtic production of wine in our own families: which, were the art well known, and the advantages, as I have here enumerated them, well underſtood, could not ſurely fail to be a much more general practice than it is at preſent.

"It may be ſaid to appear from experience, that wine thus made here, is not ſo good as the foreign: and that, we find, in the inſtances of thoſe, who have tried to introduce it, the ſucceſs is not equal to my repreſentation. To this, I anſwer, that experience has verified what I advance, in the few inſtances of thoſe, who have made domeſtic wine with ſkill; and kept it to be of a due age: without which, even foreign wine would not be good. But the reaſons, why greater numbers do not ſucceed, is the want of knowledge; a ſordidneſs, with reſpect to expence; or the drinking the wine before it be fit: which is almoſt univerſally the caſe. For, where this art has been practiſed without any of theſe diſadvantages, ſuch wine has been produced, as not only has equalled the foreign, in all general good qualities; but has even been miſtaken for ſeveral of the moſt valuable kinds, even by the moſt ſkilful judges.

"The want of knowledge in the art of making domeſtic wine, being, therefore, one principal cauſe of the neglect of doing it more frequently, I ſhall here endeavour to remove it, by furniſhing ſuch inſtructions, as can ſcarcely fail to enable any attentive perſon to practiſe it, with eaſe and certainty. And, I am perſuaded, that, to middling people, eſpecially thoſe living in villages and places remote from ſea-ports, where it is difficult to procure even indifferent wine in ſmall quantities, I ſhall do a material kindneſs: tho' the advantage of making domeſtic wines is by no means, confined to ſuch perſons, or ſituations; but even all others might find their account in it, both with reſpect to expence and health.

"I will, therefore, firſt give a recipe for making the moſt perfect wine, that can be produced, by compoſition, in this country. By compoſition, I mean, ſuch as is not made of the ſimple native juice, of any one kind of fruit. But this kind is, indeed, in a great degree native, as the water added to the dry fruit is only, in fact, the reſtoration of what evaporated in the drying and ripening the fruit: and the produce of this proceſs is, therefore, in reality, a natural wine, and ſuperior to any, that can be made of the native juices of the fruits of our country; or perhaps equal to the beſt of thoſe of any other. This recipe will ſerve, alſo, as a baſis, for the ſhowing afterwards how other, and cheaper kinds, may be made.

“ Take thirty gallons of ſoft water, either rain, or river water. It ſhould be obtained in as clear a ſtate as poſſible, but boiling is needleſs. Put this water into a veſſel, at leaſt, one-third bigger than will contain that quantity: and then add to it one hundred weight of Malaga raiſins, groſsly picked from their ſtalks. Mix the whole well together, that the raiſins may not remain clotted in lumps: and then cover it partly, but not intirely, with a linen cloth; and let it ſtand in a warm place, if the ſeaſon be not hot. It will ſoon begin to ferment; and muſt be well ſtirred about, twice in twenty-four hours, for twelve or fourteen days. It muſt be then examined, by the taſte, to try if the ſweetneſs be nearly gone off: and if that be found ſo, and the fermentation be greatly abated, which will be perceived by the raiſins beginning to lie quietly at the bottom, the fluid muſt be ſtrained off; and preſſed out of the raiſins, firſt by the hand, and afterwards by a preſs, if ſuch be eaſily procured. But, if there be no preſs, two boards may be uſed with the aſſiſtance of a large weight, or other ſtrong compreſſive force; which muſt be continued as long as any fluid can be made to drop from the maſs. The fluid, thus ſeparated from the ſkins, or marc of the raiſins, muſt be then put in a good ſound wine caſk, well dried and warmed, together with eight pounds of Liſbon ſugar, and a little yeaſt: but ſome part of the liquor muſt be kept out, to be added, from time to time, as the abatement of the fermentation, that will come on again, may admit, without the wine riſing out of the caſk. In this ſtate it muſt continue for a month, with the bung-hole open: and then, the whole of the liquor kept out, having been now put in the veſſel, muſt be cloſely ſtopped up; ſo that no air may enter: and in this ſtate it muſt be kept for a year, or longer. At which time, it may be bottled off.

“ This wine may be drunk, and will be very good at the end of a year and half: but it will be much better, if kept longer: and will improve for four or five years. When it has a proper age, it will equal any of the ſtrong cordial foreign wines: and may, by the addition of proper ſubſtances to flavour and colour it, be made to reſemble them.

“ This is the moſt perfect kind, of what may be called artificial wine; but others may be made cheaper. There are two methods of making a ſaving in the expence. The one is, to ſubſtitute, inſtead of the whole quantity of raiſins here directed, a greater proportion of ſugar: leaving out four pounds of raiſins for one of ſugar added: or the quantity of both ſugar, and raiſins, may be diminiſhed; and a proportion of clean malt-ſpirits added, when the bung of the caſk is cloſed up. The uſe of diſtilled ſpirits, in this manner, is not ſo objectionable, as it may at firſt appear to perſons, who are not acquainted with theſe matters. For ſuch ſpirits will loſe their fiery quality, and be rendered ſoft and mellow, by their incorporation with the oily part of the wine. And there is nothing more certain, than that the practice of uſing them is general in the preparation of all the foreign wines, for our market: and moſt particularly thoſe ſtronger kinds, which are moſt eſteemed by us.

“ Any other kind of large raiſins, which are cheap, may be uſed, as well as the Malaga: and the thinner the ſkins, and the ſweeter the pulp, the ſtronger will be the wine.

“ It has been practiſed formerly to bruiſe the raiſins; but it is unneceſſary with reſpect to the common ſorts, as they will ſoon burſt with the fermentation; and freely give out their contents. But there are ſome ſmall kinds with tough ſkins, which, if employed for this purpoſe, ſhould be bruiſed: or they will reſiſt the penetration of the water. Theſe kinds are not, however, ſo good for the purpoſe of making wine as the larger; or, at leaſt, if they be choſen for any particular flavour, they may give the wine, there ſhould be only a certain proportion mixt, added to ſome of the other kinds: and, in this caſe, they ſhould be firſt bruiſed.

“ The practice of a double fermentation, as here directed, firſt of the raiſins themſelves, and afterwards of the ſugar, is not the common method: and very good wine may be made, by fermenting both at the ſame time. But this method is, nevertheleſs, preferable; for it ſometimes happens, from ſome unknown circumſtances in the fermentation, when ſuch method is not practiſed, that the wine will turn out cloudy, and not admit of being fined, by any means at preſent underſtood: which accident is prevented by this double fermentation remaining, as the ſecond perfectly works all the remaining half fermented part of the pulp. Moreover, in conſequence of this more perfect fermentation, the wine is lighter, and becomes wholeſome and perfect with leſs age: the glutinous matter of the raiſins being intirely reſolved.

“ Of this wine, by adding the proper flavour, may be formed, imitations of all the natural wines, of a very ſtrong body: and, by abating the proportion of raiſins, ſugar, or both, other ſmaller kinds, may, by the ſame means, be produced.

“ If this wine be perfectly fermented, and kept a long time, ſo that no ſweetneſs remain, it will reſemble Madeira: and has very frequently paſſed for it.

“ An imitation of Frontiniac may be made, by the wine, in which the proportion of ſugar, or of malt-ſpirits, to the raiſins, is large; and the whole body weaker. The muſcadel flavour of Frontiniac, being exactly to be imitated, by an infuſion of the flowers of meadow-ſweet, in ſome of the wine: and added in that proportion, which may be found ſufficient to raiſe the due degree of the flavour. In the making this artificial Frontiniac, the fermentation ſhould be ſtopt, by cloſing the caſk, and adding the ſpirit, while a conſiderable ſweetneſs yet remains: and the wine may be drunk after it has been a ſhort time in bottles.

“ Cyprus wine may be imitated, alſo, by the ſame means: the infuſion of the meadow-ſweet being added to the wine prepared in the beſt manner above directed. But, in this caſe, three or four pounds more of ſugar, than the quantity given in the recipe, ſhould be uſed; and the fermentation ſtopt, while a conſiderable degree of ſweetneſs remains. This kind will be the better for age: and, if properly managed, can never be diſtinguiſhed, even by actual compariſon, from the true Cyprus: as I can aſſert from the fact itſelf.

“ The imitation of mountain is to be made, by preſerving a ſmall degree of ſweetneſs, giving the nut-like flavour, and keeping the beſt kind of the above wine to a due age. This nut-like flavour may be obtained, by the infuſion of the Florentine orris-root, powdered with a very ſmall proportion of orange and lemon-peel: and the wine may be rendered more dry or ſweet, by continuing the fermentation a greater or leſs time; and adding a correſpondent proportion of clean malt-ſpirits, when the fermentation is ſtopt ſooner. The adding ſome of the ſtony ſeeds of the raiſins well bruiſed, alſo, gives the nut-like flavour: and the putting in a part of the ſtalks of the raiſins, gives a ſharpneſs, found in general in this kind of wine.

“ The racy taſte of canary, now commonly called ſack, may be counterfeited by the addition of a proper quantity of the juice of white currant-berries to the wine, made with a large proportion of ſugar to the raiſins; and left very ſweet in the fermentation. But it is ſaid, that a ſpirit, diſtilled from the leaves of clary and clean malt-ſpirits, and put to the wine, will give to it ſuch a ſtrong reſemblance of ſack, as renders it abſolutely undiſtinguiſhable from that wine.

“ It is ſaid, alſo, that the juice of the bramble-berries, added to the mixture of the wine, before the fermentation, gives both the exact colour, and flavour of claret. But, in this caſe, the quantity of raiſins ſhould be conſiderably diminiſhed, and that of the ſugar increaſed, though not to the full proportion: as the fermentation muſt be continued till all ſweetneſs be deſtroyed; and this wine is not intended to have ſo great a body as the others.

“ It is better, therefore, for this imitation of claret, to work it only of moderate ſtrength; and to add ſome proportion of diſtilled ſpirit: it will be perfect at the end of two years. This, and the imitation of ſack by the ſpirit of clary, I have never ſeen tried: but have them on very good authority. I ſhould be apt to believe, a ſmall proportion of red-argol, or tartar, diſſolved in ſome of the wine, and added together with the ſpirit, when the bung is cloſed up, would aſſiſt the imitation very m ateriall.

“ Any intelligent perſon may eaſily collect, from theſe inſtructions, ſufficient lights to qualify them to make better or cheaper kinds of wine, according to their inclination. But whatever kind is made, at leaſt a year ſhould be given to it: and, in moſt caſes, a longer time. For nothing has ſo much contributed to the diſcrediting, and excluding the uſe of domeſtic wines, as the drinking them too new: eſpecially after an injudicious, and undue management of the fermentation; by which means they have been made to appear flatulent, aceſcent, and foul. But the very oppoſite of theſe qualities will be found in them, when properly treated and kept.”

To WINNOW, to clear corn from the chaff, &c. *See the article* THRASHING.

WITHERS, the part of a horſe where the ſhoulder bones join at the bottom of the neck and mane.

All pinches of the ſaddle on the withers, ſhould be treated with repellers; for this purpoſe bathe the tumor well with hot vinegar three or four times a day: if that does not ſucceed alone, an ounce of oil of vitriol may be put to a quart of vinegar, or half an ounce of white vitriol diſſolved in a little water, and added to the ſame quantity. Theſe are generally very effectual repellers for this purpoſe in horſes, and will frequently prevent impoſthumation: when the ſwelling is attended with heat, ſmarting, and little hot watery pimples, the following mixture will then be more proper to bathe with.

> Take two ounces of crude ſal ammoniac, boiled in a quart of lime water, where that cannot be had, a handful of pearl or wood aſhes may be boiled in common water; pour off the decoction when ſettled, and mix with it half a pint of ſpirit of wine: anoint the part afterwards with linſeed oil, or elder ointment, to ſoften and ſmooth the ſkin.

But when theſe ſwellings are critical, the conſequence of a fever ſettled on this part, you muſt avoid the repelling method, and aſſiſt in bringing the ſwelling to matter, by means of ſuppurating poultices: experienced farriers, adviſe, never to open theſe tumors till they break of themſelves; for if they are opened before they are ripe, the whole ſore will be ſpongy, and diſcharge a bloody ichor, which ſoon degenerates into a ſordid ulcer. But take care to inlarge the openings and pare away the lips, that your dreſſings may be applied eaſily; and avoid the ligament which runs along the neck to the withers: if a gathering forms on the oppoſite ſide, open it in the ſame manner, but take care they incline downwards, for the ſake of depending orifices, and letting the matter flow off eaſily, and if the bones ſhould be found foul, they muſt be dreſſed with tincture of myrrh till they ſcale off: if the fungus is very troubleſome, and the diſcharge, oily, yellow and viſcid; pledgits ſoaked in the following, made hot, have been found very effectual, bathing the ſwelling round with ſpirit of wine and vinegar.

> Take half an ounce of blue vitriol, diſſolved in a pint of water; oil of turpentine, and rectified ſpirit of wine, of each four ounces; white wine vinegar, ſix ounces; oil of vitriol and Ægyptiacum, of each two ounces.

Theſe ſharp liquid applications are often found more efficacious dreſſings than ointments with precipitate, or verdigreaſe, or indeed any other digeſtives; as they inſinuate themſelves more readily into the interſtices of the funge, or little quag-holes, ſo commonly obſerved in theſe kind of ulcers; and at the ſame time, level and deſtroy the riſing, and exuberant pupillæ; whereby the ulcer grows more ſmooth and dry, ſoon heals up, and cicatriſes.

When the cavities are truly fiſtulous, the calloſities muſt be cut out, where it can be done, with a knife; and the remainder deſtroyed by corroſives; viz. precipitate, burnt allum, and white vitriol. *Bartlet's Farriery, pag.* 273.

WITH-WIND, *ſee the article* BIND-WEED.

WOAD, the Engliſh name of a plant, called by botaniſts *Iſatis ſativa, vel latifolia.*

This plant puts forth ſtems about three feet high, and of the thickneſs of a man's finger: theſe divide at their top into ſeveral branches loaded with many leaves irregularly placed; and theſe leaves, which reſemble pretty much thoſe of dog's-tongue, are ſleek, and of a bluiſh green colour. The branches bear alſo great numbers of flowers compoſed of four yellow petals diſpoſed croſs-wiſe: the pointal becomes a capſule flattened on the edges, and each capſule contains two oblong ſeeds: the root is large, woody, and penetrates deep into the ground. This plant delights in a warm climate, ſuch as Italy and the ſouthern parts of France; though it has likewiſe been cultivated in Normandy, and is ſaid to ſucceed in Germany; as experience has ſhewn that it does alſo in this country.

A light, black, kindly, and rich ſoil, or a meadow newly broken up, is choſen for the cultivation of woad; but it muſt not by any means be ſown on ſtoney or ſhallow land. It thrives well in plains, but ſtill better on the ſouth ſide of a hill: the eſſential point is, that the ſoil be good, and that it have the above-mentioned qualities.

Though the land which is intended for woad be never ſo good, it muſt be dunged a year before it is ſown with this plant, and be made firſt to bear a crop of wheat, or of onions, &c. After theſe are taken off, three deep ſtirrings ſhould be given with the plough, or, which is much better, with the ſpade: the firſt ſtirring ſhould be in November, and the other two in February, March, or April. If the land which is intended for woad lies flat, and has not ſlope enough to carry off the wet, channels muſt be cut of a greater or leſs ſize, according as the ground is more or leſs diſpoſed to retain the water.

In warm climates, woad is ſown ſo early as the beginning of April, unleſs the weather chances then to be too cold, in which caſe this ſowing is deferred till the beginning of May: but for countries like ours, where the ſpring is attended with froſts, particularly in the night, Mr. Miller is certainly right in adviſing to lay the land up in narrow high ridges juſt before winter, that the froſt may mellow it; to croſs-plow it in the ſpring, laying it again in narrow ridges, and between this time and the enſuing month of June to harrow it well twice, at different intervals, in order to root up whatever weeds may have appeared; then, in June, to give the ground a third plowing as deep as the plough will go, making the furrows narrow; after this, to harrow it again when any new weeds are come up; and finally, towards the end of July, or the beginning of Auguſt, to plow it for the laſt time, laying it as ſmooth as poſſible. A good harrowing after this will fit it completely to receive the ſeeds, which, if rain falls ſoon after their being ſown, or if they are ſteeped in water during the night before the ſowing, as Mr. Miller adviſes, will appear in a fortnight, if the ſeaſon be favourable. They ſhould be but lightly covered, and ſhould be ſowed ſo thin as that the plants may ſtand ſix inches aſunder. Some ſtrew pigeon's dung on the land juſt after having ſown it with woad, and the plants become much the finer for this manure.

It is a common cuſtom to ſow woad in broad-caſt: but all plants which require being hoed ſhould certainly be ſowed in rows, becauſe this method greatly leſſens the labour and time of hoeing; and beſides, it is much eaſier, in this caſe, to give each plant its due diſtance.

When the woad is grown large enough to be diſtinguiſhed, it ſhould be carefully cleared of all weeds, for theſe would hurt it greatly; and at the ſame time the plants ſhould be thinned wherever they ſtand too cloſe: without this precaution, the woad would produce but very few leaves, and would remain extremely ſtinted in its growth.

The intervals between the plants ſhould be ſtirred whenever the ſeaſon requires it; and in the doing of this, by which the weeds thereby rooted out will ſoon be deſtroyed in dry weather, care ſhould be taken to lay a little earth up around the ſtems of the woad. M. Du Hamel, whoſe account we have here reſumed, ſays he has been aſſured, that, in countries where there is a conveniency of water, the woad-grounds are flooded: but to reap any benefit from this practice, the water ſhould be in ſufficient plenty for the huſbandman to be able to repeat the flooding frequently; for otherwiſe the heat of the ſun, after having exhaled the water too ſoon, would harden the ſurface of the earth, and thereby greatly injure the plants.

Woad generally affords two crops in the ſame year, and ſometimes, when the ſeaſon has been favourable, it has yielded even four. The two firſt are the beſt, and theſe are commonly mixed together in the manufacturing of this plant: but the after-crops are always kept ſeparate; for if theſe are mixed with the other, the whole will be ſpoiled. The two firſt crops will ſell for from twenty-five to thirty pounds a ton; but the latter will not bring more than ſeven or eight pounds, and ſometimes not ſo much. An acre of land well huſbanded will produce a ton of woad, and in good ſeaſons near a ton and a half. The firſt crop is gathered towards the end of Auguſt, and the laſt at the end of October, or in the beginning of November: but this laſt crop muſt be got in before the firſt froſts come on; for the leaves that might be gathered afterwards would not be worth any thing. When the plant is ripe, which is known by its firſt leaves beginning to dry, all the leaves are cut off by a man who graſps the plant by handfuls, and they are then laid in a heap to wither. Whilſt they are in this ſituation, they muſt be ſheltered from the ſun and rain, and they muſt be frequently turned, in order that they may heat equally: they are then carried to a mill ſomewhat like that which is uſed for preſſing the oil out of linſeed, and are there ground till they are reduced into a paſte, which is afterwards formed into cakes of about a pound weight, and theſe are laid to dry in a covered place where neither the ſun nor rain can come at them. This paſte is dried thus for about a fortnight, that is to ſay, till it has acquired conſiſtence enough to be formed into ſmall roundiſh lumps, by means of little wooden moulds into which it is put for that purpoſe. As faſt as theſe lumps are taken out of the moulds, they are laid upon wicker hurdles looſely woven, ſo as not to touch one another, and in ſuch manner that the air may come at every part of them, as is practiſed in the drying of ſtarch. Theſe lumps become very hard, and in this condition it is that they are ſold. When they are to be uſed, they muſt be ſteeped a long while in water before they can be broken.

The woad thus prepared yields an excellent blue dye, very laſting, and with which all the degrees of this colour may be made. It is not long ſince this plant was preferred to indigo: afterwards, through a kind of toleration, the dyers were allowed to put a ſmall quantity of indigo into their vats of woad; but now that the making and manner of uſing indigo have been greatly improved, it is looked upon as a matter of indifference whether that or woad be uſed for dying blue.

At the laſt cutting of the woad, and with that cutting, the crown of the root is taken off; whereas only the leaves were gathered in the preceding cuttings. When it is intended to ſave the ſeeds of woad, a ſmall portion of the plantation ſhould be allotted for this purpoſe at the laſt cutting, and then a part only of the leaves there ſhould be taken from the plants: but it is proper to retrench ſome of them, becauſe experience has ſhewn that the plants on which all their leaves are left run to ſeed too ſoon, and that their ſeeds have in this caſe often been deſtroyed by the cold of the enſuing ſpring. Thus woad, being a biennial plant, ſhould not be ſuffered to ſeed before the month of Auguſt in the ſecond year after it has been ſown; and therefore ſome of its leaves ſhould be cut off in October, to prevent its being too forward.

Beſides cold, weeds, and drought, which are very pernicious to woad, locuſts will ſometimes devour a whole field of it in an evening. When theſe enemies are obſerved, all the leaves ſhould be immediately cut off, that the plants may put forth new ones.

The ſame field ſhould not be made to bear a ſecond crop of woad immediately after the firſt; for this plant is a great impoveriſher of the ground: but after it has been taken off, wheat may be ſown the firſt year, millet the ſecond, and in the third it may be laid down again to woad, if it has been well manured.

WOLVES TEETH, a name given to thoſe teeth, which grow in ſuch a manner, that their points prick, or wound either the tongue, or gums, in eating. Old horſes are moſt liable to this infirmity, and whoſe upper overſhoot the under teeth in a great degree.

To remedy this evil, you may either chop off the ſuperfluous parts of the teeth with a chizzel and mallet, or file them down, which is the better way, till you have ſufficiently waſted them.

WOOD, a large and thick plantation of trees.

Woods and groves are the greateſt ornaments to a country ſeat; therefore every ſeat is greatly defective without them, wood and water being abſolutely neceſſary to render a place agreeable and pleaſant. Where there are woods already grown to a large ſize, ſo ſituated as to be taken into the garden or park, or ſo nearly adjoining, as that an eaſy communication may be made from the garden to the wood; they may be ſo contrived by cutting of winding walks through them, as to render them the moſt delightful and pleaſant parts of a ſeat, eſpecially in the heat of ſummer, when thoſe walks afford a goodly ſhade from the ſcorching heat of the ſun.

Where perſons have the convenience of grown woods near their habitation, ſo as that there may be an eaſy communication from one to the other, there will be little occaſion for wilderneſſes in the garden; ſince the natural woods may be ſo contrived, as to render them much pleaſanter than any new plantation can poſſibly arrive to within the compaſs of twenty years, where the trees make the greateſt progreſs in their growth; and in ſuch places where their growth is ſlow, there cannot be expected ſhade equal to the grown woods in double that number of years; but there is not only the pleaſure of enjoying a preſent ſhade from theſe woods, but alſo a great expence ſaved in the planting of wilderneſſes, which, if they are large, and the trees to be purchaſed, will amount to no ſmall ſum.

If the wood is ſo ſituated, as that the garden may be contrived between the houſe and that, then the walk into the wood ſhould be made as near to the houſe as poſſible, that there may not be too much open ſpace to walk through in order to get into the ſhade; if the wood is of ſmall extent, then there will be a neceſſity for twiſting the walks pretty much, ſo as to make as much walking as the compaſs of the ground will admit; but there ſhould be care taken not to bring the turns ſo near each other as that any two walks may be expoſed to each other, for want of a ſufficient thickneſs of wood between; but where the wood is large, the twiſts of the walks ſhould not approach nearer to each other than fifty or ſixty feet; or in very large woods they ſhould be at a greater diſtance; becauſe, when the underwood is cut down, which will be abſolutely neceſſary every tenth or twelfth year, according to its growth, then the walks will be quite open until the underwood grows up again, unleſs a border of ſhrubs, intermixed with ſome evergreens, is planted by the ſides of the walks; which is what we would recommend, as this will greatly add to the pleaſure of theſe walks.

Theſe wood walks ſhould not be leſs than eight or nine feet broad in ſmall woods; but in large ones fifteen feet will not be too much; and on each ſide of the walks, the border of ſhrubs and evergreens may be nine or ten feet broad; which may be ſo managed, as to ſhut out the view from one part of the walk to the other at thoſe times when the underwood is cut down; at which times there will be an abſolute occaſion for ſuch plantations, and at all times they will afford great pleaſure by adding to their variety, as alſo by their fragrant odour.

The former method, which was practiſed in cutting theſe walks through woods, was to have them as ſtraight as poſſible; ſo that there was much trouble to make ſights through the woods, for direction how to cut them; but where this was practiſed, every tree which ſtood in the line, good and bad, was cut down, and many times boggy or bad ground was taken into the walks, ſo that an expence of draining and levelling was neceſſary to render them proper for walking on; beſides this, there were many other inconveniences attending theſe ſtraight cuts through woods, as, firſt, by letting in a great draught of air, which in windy weather renders the walks unpleaſant; and theſe cuts will alſo appear at a great diſtance from the woods, which will have a very bad effect; therefore the modern practice of twiſting the walks through woods is to be preferred. In the cutting of theſe walks there ſhould be particular care taken to lead them over the ſmootheſt and ſoundeſt part of the ground, as alſo to avoid cutting down the trees; ſo that whenever theſe ſtand in the way, it will be better to lead the walk on one ſide than to have the tree ſtand in the middle; for although ſome perſons may contend for the beauty of ſuch trees which are left ſtanding in walks, yet it muſt be allowed, that unleſs the walk is made much broader in thoſe places than in the other, the trees will occaſion obſtructions to the walkers or riders, eſpecially when ſeveral perſons are walking together; ſo that it will be much better to have the walks entirely clear from trees; and where any large ſpreading tree ſtands near the walk, to cut away the ſmall wood ſo as to make an opening round the trees, where there may be ſome ſeats placed for perſons to reſt under the ſhade. The turns made in theſe walks ſhould be as eaſy and natural as poſſible; nor ſhould there be too many of them, for that will render the walking through them diſagreeable; therefore the great ſkill in making of theſe walks is, to make the turns ſo eaſy as not to appear like a work of art, nor to extend them ſtraight to ſo great length, as that perſons who may be walking at a great diſtance may be expoſed to the ſight of each other; both theſe extremes ſhould be avoided as much as poſſible, ſince they are equally diſagreeable to perſons of true taſte. When a wood is properly managed in this way, and a few places properly left like an open grove, where there are ſome large trees ſo ſituated as to form them, there can be no greater ornament to a fine ſeat than ſuch a wood.

We ſhall now treat of the culture of woods for profit to the poſſeſſor, and public benefit of the nation.

The great deſtruction of the woods and foreſts which has been of late years made in this country, ſhould alarm every perſon who wiſhes well to it; ſince there is nothing which ſeems more fatally to threaten a weakening, if not a diſſolution, of the ſtrength of this once famous and flouriſhing nation, than the notorious decay of its timber: and as this devaſtation has ſpread through every part of the country, ſo unleſs ſome expedient be ſeriouſly and ſpeedily reſolved on, to put a ſtop to this deſtruction of the timber, and alſo for the future increaſe of it, one of the moſt glorious bulwarks of this nation, in a few years, will be wanting to it.

And as there are ſmall hopes of this being remedied by thoſe entruſted with the care of public woods, ſince their private intereſt is ſo much advanced by deſtroying the timber, which they were appointed to preſerve; therefore, unleſs private perſons can be prevailed on to improve their eſtates, by encouraging the growth of timber, it is greatly to be feared, that in an age there will be a want of it for the ſupply of the navy; which, when ever it happens, muſt put a period to the trade of this country.

It has been often urged, by perſons whoſe judgment in other affairs might be depended on, that the great plantations, which for ſeveral years paſt have been carried on in ſeveral parts of this kingdom, will be of public benefit by the propagation of timber; but in this they are greatly miſtaken, for in moſt of the plantations which have been made for years paſt, there has been little regard had to the propagation of timber, preſent ſhade and ſhelter have been principally conſidered; and in order to obtain theſe ſoon, great numbers of trees have been taken out of woods, hedge rows, &c. which, if they had remained in their firſt ſituation, might have afforded good timber, but being tranſplanted large, are abſolutely rendered unfit for any uſe but fuel; ſo that the great quantity of plantations which have been made, I fear, will rather prejudice than be of uſe to the improvement of timber; nor is there any other method of increaſing the uſeful timber of this country, than by ſowing the ſeeds in the places where they are to remain, or in ſuch ſituations where there are plenty of oaks in the neighbourhood; if the ground is properly fenced, to keep out cattle and vermin, the acorns which drop from thoſe trees will ſoon produce plenty of young trees, which, if properly taken care of will ſoon grow to be large.

The two moſt ſubſtantial timbers of this country are the oak and cheſnut; though the latter has been of late years almoſt entirely deſtroyed in England, ſo that there are ſcarce any remains of trees of ſize in the woods at preſent; but there can be no doubt of this tree having been one of the moſt common trees in this country, as may be proved by the old buildings in many parts of England, in which the greateſt part of the timber is cheſnut. Next to theſe, the elm is eſteemed as a profitable timber; but of theſe there are few cultivated in woods, eſpecially in the ſouth part of England, where they chiefly grow in hedge-rows, or plantations, near houſes; but in the north-weſt part of England, there are numbers of very large trees of the witch-elm growing in parks, and ſome in woods, as if that tree was a native of this country, which has been much doubted; though as this tree propagates itſelf by ſeeds, it may be deemed an indigenous plant in England.

The beech is another tree common in the woods, eſpecially upon the chalky hills of Buckinghamſhire, Kent, Suſſex, and Hampſhire, where there are ſome very large woods entirely of this ſort; ſome of which have been of long ſtanding, as appears by the age of the trees; but whether this tree is a native of this country, has been a point often diſputed.

The aſh is a very profitable tree, and of quick growth; ſo that in leſs than an age, the trees will arrive to a large ſize from the ſeeds, therefore a perſon may hope to reap the profits of his labour, who ſows the ſeeds; but this is not a beautiful tree to ſtand near a habitation, being late in the ſpring in putting out its leaves, and the firſt that ſheds them in autumn; nor is it a friendly tree to whatever grows near it, the roots drawing away all the nouriſhment of the ground, whereby the trees or plants which grow near are deprived of it; ſo that where the aſh grows in hedge-rows, the hedges in a few years are entirely deſtroyed; and if they are in paſture-grounds, and the cows browze on them, the butter made with their milk will be bad; for which reaſon the aſh ſhould be ſown ſeparate in lands which are incloſed, where cattle are not permitted to come, and at a diſtance from the habitation.

Upon ſandy or rocky ſoils, the Scotch pine will thrive exceedingly, and turn to great advantage to the planter, provided the plants are planted young, and treated in a proper manner. There are alſo ſeveral aquatic trees, which are very profitable to thoſe who have low marſhy lands, where the harder kinds of timber will not thrive; theſe are the poplars of ſeveral ſorts, the willow, alder, &c.

Where there are young woods, great care muſt be taken of the fences; for if cattle ſhould get in among the trees, they will, in a ſhort time, do infinite damage to them, by browzing on their branches, or barking the trees; and during the firſt ten years of their growth, they ſhould be ſecured from hares and rabbets, otherwiſe, in ſevere froſt, when the ground is covered with ſnow, whereby they are deprived of other food, they will get into the woods, and eat off the bark from the young trees, and gnaw all the branches within their reach; ſo that in a few days, where there are plenty of theſe animals, there may be ſuch deſtruction made among the young trees, as cannot be retrieved, but by cutting them down to the ground, which will be a loſs of ſeveral years; therefore thoſe perſons who have the care of young woods ſhould be very diligent in froſty weather in looking over the trees and ſtopping holes in the fences, to keep out all vermin.

Another care to be taken of young woods, is the thinning the trees from time to time, as they increaſe in their growth; but in doing of this, there muſt be great caution uſed, for it ſhould be gradually performed, ſo as not to open the trees too much, to let the cold air among them, which will greatly retard their growth; nor ſhould the trees be left ſo cloſe, as to draw each other up like May-poles, but rather obſerve a medium in this work, cutting down a few each year, according as there may be neceſſity for it, being careful not to permit thoſe to ſtand, which may ſpoil the growth of the neighbouring trees, always obſerving to leave thoſe trees which are the moſt promiſing.

The young trees in theſe woods ſhould not be lopped or pruned, for the more they are cut the leſs they will increaſe in bulk; every branch which is cut off will rob the tree of its nouriſhment, in proportion to the ſize of the branch; therefore the hatchet ſhould not be ſuffered to come into young woods, unleſs in the hands of ſkilful perſons.

Where perſons have more regard to the future welfare of the timber than their immediate profit, the underwood ſhould be grubbed up as the trees advance, that the roots may have the whole benefit of the ſoil, and their ſtems enjoy the free air, without which their ſtems are generally covered with moſs, and their growth greatly ſtinted; as may be obſerved in all ſuch woods where there is any quantity of underwood remaining, in which places it is rarely found that the trees do ever grow to a large ſize; therefore when large timber is deſired, the trees muſt have room to extend their roots and branches, without which it cannot be expected: but from a covetous temper, many people let their underwood remain as long as it will live; for as the timber increaſes, the underwood will be gradually decaying by the ſhade and drip of the large trees, ſo that by this method the timber ſuffers more in a few years than the value of the underwood; therefore by endeavouring to have both, neither of them can be ſo good as where they are ſeparately preſerved.

If perſons who have eſtates would be careful to nurſe up trees in their hedge rows, it would in time become a fortune to their ſucceſſors; as hereby the timber growing in the hedges may be worth more than the freehold of the eſtate, which has often been the caſe with eſtates from which their poſſeſſors have cut down timber for fortunes for their younger children; the frequency of this ſhould encourage perſons to be a little more attentive to the growth and preſervation of young woods, ſince the expence and trouble is not great, and the future profit very certain; beſides, the pleaſure of ſeeing trees of a man's own ſowing make yearly advances, muſt be very great to thoſe who have any reliſh for country amuſements.

There are ſeveral perſons who plant copſes for cutting every ten or twelve years, according to their growth. Theſe are uſually planted in autumn, either with ſtools or young plants, which are drawn out of the woods; the latter ſhould always be preferred to the former. Theſe copſes are commonly planted with ſeveral ſorts of trees, as oak, beech, cheſnut, aſh, birch, willows, &c. but the aſh and cheſnut are the moſt profitable, where they grow kindly, becauſe the poles of aſh are very valuable; theſe alſo are good for hoops, ſo that there is no danger of having ſale for theſe copſe woods when they are fit for cutting; but where the copſes are intended to remain, there ſhould be no ſtandard trees left for timber, becauſe as the heads of the trees ſpread, and over-top the underwood, it will cauſe that to decay, and where the ſtandards are left upon the ſtumps of the copſe wood they will never grow to a large ſize, nor will the timber be ſo valuable as that produced immediately from a young root; therefore whoever will make the experiment, will be convinced that it is more for the advantage of both to keep them in diſtinct woods.

But where perſons plant copſes upon land free from trees, it will be the better method to ſow the ſeeds, eſpecially if cheſnut, oak, or beech, are the trees intended; for although it is a prevailing opinion with the generality of perſons, that by planting they ſave time, yet I am ſure of the contrary; for if the ſeedling plants are kept clear from weeds, they will, in eight or ten years, out-grow thoſe which are planted; and theſe unremoved copſes will continue much longer in vigour than the other; ſo that for either timber or copſe wood, the beſt method is to prepare the ground well, and ſecure the fences and ſow the ſeeds, which is ſo far from loſing, that in twenty years it will be found to gain time, which is what every planter wiſhes to do.

The uſual time of felling timber is from November to February, at which time the ſap in the trees is hardened; for when the ſap is flowing in the trees, if they are cut down the worm will take the timber, and cauſe it to decay very ſoon; therefore if the durableneſs of the timber is conſidered, the trees ſhould always be cut in the winter months; but as the bark of the oak is ſo very valuable for tanning leather, there has been a law paſſed to oblige perſons to cut theſe trees during the ſpring-ſeaſon, when the bark will readily peel off, by which the timber is rendered unfit for building either ſhips or houſes, as it will be very ſubject to caſt, rift, or twine, and the worm will ſoon take it; therefore it would be more for the public benefit, if a law was enacted to oblige every perſon to ſtrip off the bark of ſuch trees, as are deſigned to be cut down in the ſpring, when the bark will run, leaving the trees with their branches ſtanding till the following winter, which will be found to anſwer both purpoſes well. *Miller's Gard. Dict.*

WOOD-COCK *Soil*, ground whoſe ſoil under the turf is of the colour of a wood-cock, and is not good.

WOOD-LAND, ground covered with woods. It is alſo a term uſed, by the farmers of many counties of England, for a ſort of ſoil, from its conſtant humidity and dark colour, reſembling the ſoil in woods, which, of whatever nature it originally is, will always be made to appear thus from the continual dropping of trees, and the want of a free air and ſun, together with the fall of leaves, deſtroyed and waſhed to pieces by the wet.

This ſoil in the open countries has a conſiderable quantity of clay in it, and holds the water a long time that once falls upon it: in wet weather it ſticks firmly to the ploughſhare; and, in dry, is very apt to crack. In uncultivated places it uſually produces ruſhes and ruſh-graſs. A moiſt and dripping year is extremely detrimental to this ſort of land.

WOODY, abounding with wood.

WOOL, the covering of ſheep. Each fleece conſiſts of wool of ſeveral qualities and degrees of fineneſs, which the dealers therein take care to ſeparate.

The Engliſh and French uſually ſeparate each fleece into three principal ſorts, viz. 1. Mother-wool, which is that of the back and neck. 2. The wool of the tails and legs. 3. That of the breaſt and under the belly. The wool moſt eſteemed is the Engliſh, chiefly that about Leominſter, Coltſwold, and the Iſle of White; the Spaniſh, principally that about Vegovia; and the French, about Berry.

An account of three experiments made to diſcover whether wool, laid up in the fleece, alters in its weight.

It has been a matter of ſome doubt amongſt graſiers, farmers, and dealers in wool, whether or not wool, after it is ſhorn and laid up in the fleece, alters in its weight. The following experiments were made to decide this queſtion.

EXPERIMENT I.

This wool was ſhorn dry, and laid up in a two-pair-of ſtairs room, on a boarded floor.

	Weight	
	lb.	oz.
1746, Aug. 10	76	6
Sept. 7	76	8
Oct. 14	77	11
Nov. 18	78	0
1747, Jan. 26	80	0
Feb. 20	80	4
Mar. 23	79	8
Apr. 18	77	13
June 24	76	8
July 28	76	8
Sept. 16	75	15
Nov. 2	78	1
Dec. 8	78	14
1748, Feb. 15	79	1

The weight was increaſed from Auguſt 10, 1746, (when it was firſt laid up) to February 20, 1747, in the proportion as 100 to 105.

EXPERIMENT II.

This wool was ſhorn dry, and laid in a lower room, with a brick floor one foot above the floor.

	Weight	
	lb.	oz.
1746, Oct. 15	100	4
Nov. 18	101	2
1747, Jan. 26	102	8
Feb. 20	102	11
Mar. 23	102	9

The weight increaſed from October 15, 1746, to February 20, 1747, as 100 to 102½.

N. B. It is ſomething difficult to account for this parcel of wool not encreaſing more in its weight, as it lay ſo near the ground floor; but very probably the air had been very damp and raw from the time it was ſhorn till the 15th of October, 1746, when it was firſt weighed, ſo that the wool had then very likely gained weight conſiderably.

EXPERIMENT III.

This wool was ſhorn dry, and laid up in a two-pair-of-ſtairs room, with a boarded floor.

	Weight	
	lb.	oz.
1756, Aug. 30	36	9
Nov. 19	37	2
1757, Feb. 19	37	12
Mar. 24	37	6
April 1	37	4
D°. 21	36	14
May 2	36	13
June 1	36	8½
D°. 13	36	4
July 8	36	1½
D°. 27	35	12
Sept. 30	36	4
1758, Jan. 25	37	11½

The weight of this wool encreaſed from the time it was laid up, Auguſt 30, 1756, to February 19, 1757, as 100 to 103¼.

Both wool, and woollen rags, make an excellent manure. The rags ſhould be chopped ſmall, about an inch or two ſquare, and ſcattered on the earth at the ſecond plowing; for being thereby covered, they will begin to rot by ſeed time. They imbibe the moiſture of dews and rain, retain it long, and, as Dr. Home obſerves, thereby keep looſe ſoils in a moiſt ſtate. They coſt about fourpence a buſhel at London, from whence many loads are ſent every year to Dunſtable (which is thirty miles), where they are laid even on ſtiff lands, juſt after the ſowing of the corn, allowing to the acre four ſacks of ſix buſhels each.

WORMS are very prejudicial to corn fields, eating up the roots of the young corn, and deſtroying great quantities of the crop. Sea-ſalt is the beſt of all things for deſtroying them. Sea-water is proper to ſprinkle on the land, where it can be had; where the ſalt ſprings are their water do; and were neither are at hand, a little common or bay-ſalt does as well. Soot will deſtroy them in ſome lands, but is not to be depended upon, for it does not always ſucceed. Some farmers ſtrew on their lands a mixture of chalk and lime; and others truſt wholly to their winter-fallowing to do it, if this is done in a wet ſeaſon, when they come up to the ſurface of the ground, and ſome nails with ſharp heads be driven into the bottom of the plough. If they are troubleſome in gardens, the refuſe brine of ſalted meat will ſerve the purpoſe, or ſome walnut leaves ſteeped in a ciſtern of water for a fortnight or three weeks, will give it ſuch a bitterneſs that it will be a certain poiſon to them. A decoction of wood-aſhes, ſprinkled on the ground, will anſwer the ſame purpoſe; and any particular plant may be ſecured both from worms and ſnails by ſtrewing a mixture of lime and aſhes about its roots. It is a general caution among the farmers to ſow their corn as ſhallow as they can, where the field is very ſubject to worms.

WORMS, a well known ſpecies of inſects, very troubleſome to horſes.

Authors have deſcribed three different ſorts of worms that affect horſes, *viz.* bots, which young horſes are often troubled with in the ſpring: the rotundi, or thoſe reſembling earth-worms; and the aſcarides, or thoſe about the ſize of the largeſt ſewing needle, with flat heads.

For the method of curing the bots, *ſee the article* BOTS.

As the ſource of worms in general proceeds from a vitiated appetite and a weak digeſtion, recourſe muſt firſt be had to mercurials, and afterwards to ſuch things as are proper to ſtrengthen the ſtomach, promote digeſtion, and by deſtroying the ſuppoſed ova, prevent the regeneration of theſe animals. Thus, two drams of calomel may be given with half an ounce of diapente, and mixed up with conſerve of wormwood over night; and the next morning the above purge: theſe may be repeated in ſix or eight days. Or the following mercurial purge may be given, which will be leſs troubleſome, and no leſs efficacious.

> Take crude quickſilver, two drams; Venice turpentine, half an ounce; rub the quickſilver till no gliſtening appears; then add an ounce of aloes, a dram of grated ginger, thirty drops of oil of ſavin, and a ſufficient quantity of ſyrup of buckthorn to make a ball.

One of theſe balls may be given every ſix days, with the uſual precautions in regard to mercurial phyſick; and theſe powders intermediately.

> Take powdered tin and Æthiops mineral, of each half an ounce: give every night in a maſh, or his corn.

The various preparations of antimony and mercury muſt be given ſeveral weeks together, in order to get entire riddance of theſe vermin. The Æthiops mineral may be given to the quantity of half an ounce a day; the mercurius alkaliſatus to two drams a day, incorporated with a bit of cordial ball. The cinnabar powders, as directed in the farcy, are no leſs effectual: and when worms are bred from high feeding, or unwholſome food; rue, garlick, tanſy, ſavin, box, and many other ſimples, may be given ſucceſsfully; being for that purpoſe mixed with their food; as alſo, cut tobacco, from half an ounce to an ounce a day.

As the generation of worms perhaps principally proceeds from a weak ſtomach, and bad digeſtion, if the horſe be of a tender conſtitution, and a bad feeder, the following bitter drink ſhould be given to ſtrengthen his ſtomach, and mend his digeſtion; which will prevent the formation of theſe animals, interpoſing now and then a gentle ſtomach purge, prepared with an ounce and half of hiera picra made up into a ball, with ſyrup of buckthorn.

> Take gentian root, zedoary and galangals, of each two ounces; chamomile flowers, and tops of centaury, of each two handfuls; Jeſuits bark powdered, two ounces; filings of iron half a pound; juniper berries four ounces: infuſe in three gallons of ale for a week, ſhaking the veſſel now and then; and give a pint of this night and morning.

To anſwer this purpoſe alſo, an ounce of filings of ſteel finely powdered, has been ſucceſsfully given every day for a fortnight, or longer, in the horſes corn. *Bartlet's Farriery, pag.* 150.

WOUND, a hurt given by violence.

In all freſh wounds made by cutting inſtruments, there is nothing more required than bringing the lips of the wound into contact by ſuture or bandage, provided the part will allow of it; for on wounds of the hips, or other prominent parts, and acroſs ſome of the large muſcles, the ſtitches are apt to burſt on the horſe's lying down and riſing up in the ſtall; in ſuch caſes the lips ſhould not be brought cloſe together; one ſtitch is ſufficient for a wound two inches long; but in large wounds, they ſhould be at an inch or more diſtance; and if the wound is deep in the muſcles, care ſhould be taken to paſs the needles proportionably deep, otherwiſe the wound will not unite properly from the bottom.

Should the wound bleed much from an artery divided, the firſt ſtep ſhould be to ſecure it, by paſſing a crooked needle underneath, and tying it up with a waxed thread; if the artery cannot be got at this way, apply a button of lint or tow to the mouth of the bleeding veſſel, dipped in a ſtrong ſolution of blue vitriol, ſtyptic water, oil of vitriol, or hot oil of turpentine, powdered vitriol, or colcothar, &c. and remember always to apply it cloſe to the mouth of the bleeding veſſels, and take care that it is kept there by proper compreſs and bandage, till an eſchar is formed; otherwiſe it will elude your expectations, and frequently alarm you with freſh bleedings.

In a memoir preſented to the Royal Academy of Sciences by M. La Foſſe, he gives an account of the ſucceſs he had met with, in ſtopping the bleedings of very conſiderable arteries in horſes, by the application of the powder of puff balls, the arteries cicatrizing by this means only, without any ſucceeding hæmorrhage. This lycoperdon, or puff ball was made uſe of for this purpoſe in human ſubjects, about one hundred and ſixty years ago, by Felix Wurtz, a famous old ſurgeon in Germany; but he does not ſeem to have a thought of truſting to it in ſuch conſiderable arteries, as M. La Foſſe mentions, viz. thoſe of the leg and thigh, the bleedings from which divided veſſels, he ſtopt in a few minutes by the uſe of this powder only. The agaric of the oak may alſo be uſed for this purpoſe, where it can be retained by a proper bandage.

Theſe applications, as indeed all ſtyptics, ſeem to act by conſtringing the extremity of the veſſel, or choaking it up, till a grume of blood is formed internally, which plugs up the orifice; and has been found to adhere to it ſo, as to conſtitute one body with the veſſel. M. La Foſſe has proved this by ſlitting an artery up longitudinally, when he found, that the little grume of clear blood, was of a firm conſiſtence, of a lively red, in form of a cone or ſugar loaf, the baſis of which adhered to the little incloſing membrane, which ſhut up the artery without; the pocat of which floated in the cavity of the veſſel.

I purpoſely avoid ſetting down any famous receipts for freſh wounds, whether ointments, or Fryar's balſams, being well aſſured, that in a healthy ſound conſtitution, nature furniſhes the beſt balſam, and performs herſelf the cure, which is ſo often attributed to the medicine; when it it is otherwiſe, and the blood is deprived of its balſamic ſtate, as will appear from the aſpect of the wound, and its manner of healing, it muſt be rectified by proper internal medicines, before a good foundation for healing can be laid by any external applications whatever.

The lips of the wound then being brought together by the needle or bandage, it needs only to be covered with rags dipped in brandy, or a pledgit of tow ſpread with the wound ointment, and the wounded part kept as much as poſſible from motion.

Remember to dreſs all wounds of the joints, tendons, and membranous parts, with terebinthinate medicines: to which may be added honey and tincture of myrrh; and avoid all greaſy applications whatever; fomentations and poultices are alſo generally here of great uſe; the former thin and attenuate the impacted fluids, greatly promote a free perſpiration in the limb, and facilitate the unloading the ſurcharge on the veſſels, by quickening the motion of the fluids; while the latter, by relaxing the veſſels, abate their tenſion, and relieve the obſtruction, by promoting digeſtion.

Punctured wounds from thorns, or any other accidents, ſhould be treated in the ſame manner; applying the beer, or bread and milk poultice over the dreſſing, till ſome ſigns of digeſtion appear; and fomenting the part well every day. This method is alſo very ſucceſsfully uſed to thoſe ſwellings, which often ariſe on the neck from bleeding, the ſores being ſprinkled with precipitate, and burnt allum powdered, to fetch out the core, or fungus, which choaks up the orifice. The uſual method is to introduce a piece of vitriol, or ſublimate, which often brings on a plentiful diſcharge, fetches out the core, and makes a cure; but it is often with the loſs of the vein, and it ſometimes leaves a large ſwelling and impoſthumation.

In gun-ſhot wounds, when the ball has not penetrated too deep, it ſhould be extracted, if it can be fetched away without diſturbance, together with any extraneous bodies that might paſs in with it; the wound ſhould be dreſſed with the old digeſtive of Venice or common turpentine, divided with the yolks of eggs, to which may be added ſome honey and tincture of myrrh. The entrance of theſe wounds frequently requires to be enlarged, and a depending orifice ſhould always be procured if poſſible; and if the wound ſhould not digeſt kindly, apply the beer poultice, and foment with the diſcutient fomentation.

In ſcalds, or burns from gunpowder, or any other cauſe, when the ſkin remains intire, bathe the part well, and keep it ſoaked with rags dipped in ſpirit of wine camphorated: ſalt bound thick on the part has been found very effectual for this purpoſe: and indeed all ſaline and ſpirituous applications excel others, while the ſkin is yet unbroke; but when the ſkin is ſeparated, anoint the part, and keep it conſtantly ſupple with linſeed or ſallad oil, and a plaiſter ſpread with bees-wax and oil; if the ſkin is ſo ſcorched, that ſloughs muſt be digeſted out, dreſs with the wound ointment and oil of turpentine, and finiſh the cure with any drying ointment. Should the horſe be feveriſh from the pain, bleed him, give cooling glyſters, and treat him as we have directed in ſimple fevers.

The fire ſuppoſed to be left in the part after injuries of this kind, is nothing more than the inflammation, which is the natural effect of ſuch cauſes; ſo that the whimſical notions and conceits concerning fire remaining in the burnt part, is extremely abſurd.

Wounds in the feet from nails, gravel, &c.

Accidents of this ſort are very common, and ſometimes for want of early care, prove of bad conſequence; for the parts being naturally tender, are very ſuſceptible of inflammation; and when matter is once formed, if a free diſcharge is not procured, the bone, which is ſpongy, ſoon becomes affected, and the whole foot is then in danger.

When any extraneous bodies, ſuch as nails, ſtubs, thorns, &c. have paſſed into the horſe's foot, you ſhould endeavour to get them out as ſoon as poſſible; and after waſhing the part with oil of turpentine, dreſs the hole with lint dipped in the ſame, melted down with a little tar; the foot may be ſtopped up with bran and hogs-lard heated together, or put it into the turnep, or any ſoft poultice: this method is generally ſucceſsful, when the nail, &c. is intirely removed; but if any piece, or particle, ſhould remain behind, which may be ſuſpected by the degree of pain, and diſcharge of matter; after paring away the ſole as thin as poſſible, introduce a bit of ſponge tent, in order to inlarge the hole, that it may be drawn out by a ſmall pair of forceps, or brought away by digeſtion: if this method ſhould not ſucceed, but the lameneſs continues, with a diſcharge of a thin, bloody, or ſtinking matter, you muſt no longer delay opening the wound with a drawing knife to the bottom, and then dreſs as above directed, or with the turpentine digeſtive, divided with the yolk of an egg, and a little tincture of myrrh afterwards with the precipitate medicine. *Bartlet's Farriery, pag.* 246.

Y.

YARD-LAND, a quantity of land, in ſome countries fifteen acres, in ſome twenty, and in others, twenty-four, thirty and thirty-four acres.

YELLOWS, a diſeaſe incident to horſes and other cattle, and more properly called the jaundice. *See the article* JAUNDICE.

" Having," ſays a correſpondent of the editors of the Muſeum Ruſticum, noted the frequent fatal effects of the diſeaſe in cattle, called the yellows, I, ſome years ſince, reſolved to let no opportunity ſlip of being acquainted with this complaint, in order to aſſign its cauſe, inaſmuch as I apprehend it to be the forerunner of moſt chronical diſeaſes, to which great cattle are ſubject, as the murrain in the guts, ſcowering, aſthma, or wheezing, dropſy, and loſs of milk, &c.

" I have not hitherto been able to find any author who has treated of this complaint in a manner ſuitable to the conſequence thereof, ſo as to trace the ſymptoms in its ſeveral ſtages, in order to effect a cure; and, where this complaint has been quite neglected or ill cured, to point out the conſequence, by ſhewing how it may appear under the abovementioned ſhapes, which, being miſtaken for originals when they are only conſequents, are rarely cured, through the firſt cauſe being unknown.

" This complaint, I apprehend, proceeds from a waſte of bile, that is, a preternatural running out of what is called gall; occaſioned by the rugæ, which are in the inner membrane of the neck of the bilious duct, becoming, by ſome accident, too weak to perform their office, ſo that the gall runs out of the bladder nearly as faſt as it runs in; by which means it forceth itſelf, or a conſiderable part at leaſt, into the porus bilarius, inſtead of being diſcharged by the ductus communis cholidochus into the inteſtines, and, by the means of the vena porta, mixes again with the blood, filling that with its ſharp pungent quality; which cauſeth that fluid to become of a fizy nature, and, conſequently, to move ſlowly in the channels through which it paſſes; whence ariſes that ſluggiſh diſpoſition the beaſt in this complaint is ſubject to, and which is one of the firſt ſymptoms of the diſeaſe.

" And the liver, being deprived of the natural heat and weight thereof, is, together with the ſizineſs of the blood, rendered incapable of performing its office, ſo that the ſupply of bile is not equal to the expence; nor is the blood purified from it as it ought, but paſſes on together till it fixes in ſome part, and there (if not timely prevented) forms a tumor very prejudicial to the beaſt.

" Theſe tumors I have ſeen appear externally in the glands behind the ears, of the ſhoulders, and of the flank, in the dewlap, round the cornet of the hoofs, and in the udder, or milk-bag; internally, in the form of water, in the veins of fat between the muſcular parts of the body, in the kidney fat, and even between the coats of the guts.

" When theſe tumors, which appear externally, come to ſuppuration, the beaſt commonly recovers, though frequently it be a long time firſt.

" The ſeaſons of the year in which cattle are moſt ſubject to this complaint, are for about the five firſt weeks after they are put out to graſs in the ſpring, during which time the ſeaſon is apt to be very warm at days and cold at nights; the graſs being alſo tender, and abounding with moiſture: and, in like manner in autumn; at which time the days are alſo warm and nights cold; and the graſs, on account of autumnal rains, tender as in the ſpring, and more ſo, if the preceding ſummer was tolerably dry.

" The cattle at theſe ſeaſons being faint are very ſubject to perſpire much, by which the pores are greatly opened in the day, and ſudden cold coming on at night haſtily contracts them; and before the warmth of the next day becomes ſufficient to ſet the parts thus contracted at liberty, the matter, which ſhould have been diſcharged by perſpiration, returns into the blood in order to paſs off by urine, by which means a much greater quantity of bile is ſecreted than otherways would; which paſſing into its receptacle, the gall-bladder, cauſes it to extend to a preternatural ſize; thereby extending the paſſage by its preſſure, till the rugæ are ſcarcely to be ſeen: whereby the reſiſtance made by them is not equal to the preſſure of the bile, which, conſequently, forces its way haſtily into the blood, in the manner before obſerved, inſtead of paſſing off as excrement by the guts.

" The early ſymptoms attending this diſeaſe, are, a ſhaking of the beaſt in a morning, and more particularly the hinder parts, as the loins, thighs, and legs; hollowneſs of the eyes, and the hair ſtaring; a dry noſe, and if the cold taken be great, hanging of the ears, the ſwelling of the dewlap, of the glands of the ears, the ſhoulders, or the flanks, and of one or more quarters of the udder, or milk-bag in cows; with a ſudden decreaſe of milk, what remains becoming, after a few days, more yellow than uſual, and will, if boiled, curdle: the fore teeth are generally looſe, as though they would drop out.

" If theſe ſymptoms, eſpecially the firſt, remain unobſerved, as is often the caſe in barren cattle, and ſuch as range at large, it frequently happens that the diſorder ſettles in ſome inward part; as on the pericardium, which cauſes wheezing, and the haſk, and uncommon poverty; when in the guts and meſentery, (or ſweet-bread) cauſes the laſk and ſcowering; and when in the vein of fat, between the muſcles, cauſes the dropſy and uncommon weakneſs.

" In this laſt complaint, on opening a beaſt, the melt or ſpleen was very ſmall and thin, not half ſo large as in a healthy ſtate, as was alſo the liver; but otherways found and perfect, the gall-bladder of an uncommon thickneſs, and its contents very little.

“ In opening a beaſt which was waſted, and ſubject to wheezing and the haſk, the pericardium was become hard, and inclined to calloſity towards the part which joined the heart: the heart unuſually large, but ſound: the lights very ſound, but ſmall: the melt or ſpleen thin and withered: and the liver dryiſh, with a few ſmall hard knots therein: the gall-bladder near as the former.

“ I have obſerved theſe knobs in others, and generally found the gall-bladder, liver, and ſpleen, leſs or more affected; thoſe which had the laſk, and ſcowered, generally having their guts covered, the inſide with a large quantity of mucus reſembling frogs ſpawn: the fleſh of theſe is always of a yellow caſt.

“ Having ſaid thus much of what I apprehend the cauſe, I will now preſcribe what I have very many times known uſed with good ſucceſs for a cure.

“ Firſt, Suffer no blood to be taken away from the beaſt.

> “ Take a handful of rue tops, the like quantity of the greater celendine; ſhred them ſmall, and mix with them one ounce of turmerick root in powder (or inſtead thereof red ſanders); put theſe in three pints of ſtale old ale or beer, and cauſe it juſt to boil up; when it is cold enough, give it the beaſt warm: there is no occaſion to keep the beaſt in before or after, unleſs the inclemency of weather oblige.

“ Two of theſe drinks, at forty-eight hours diſtance, will perfect a cure, if the diſeaſe be not of long ſtanding.

“ Should a ſcowering be come on, then, after the firſt drink, give the following on the intermediate days.

> Take two pounds of oak-bark, boil it in one gallon of water till one fourth be conſumed; ſtrain it; in this water boil two pounds of rice till it be ſoft; mix with it half a pound of the burnt cruſt of bread, taken from the underſide of the loaf; and to all this put two quarts of milk; let it boil for twenty minutes; divide it in two parts, and give one to the beaſt at a time warm.” *Muſeum Ruſticum*, *vol.* II. *pag.* 144.

YEOMAN, the firſt, or higheſt degree of the plebeians of England. The yeomen are properly freeholders, and who cultivate their own lands.

YEW-TREE, the name of a well known tree, common on cold ſoils in many parts of England. The timber of the yew-tree is much eſteemed for various uſes.

There is hardly any ſort of ever-green tree, which has been ſo generally cultivated in the Engliſh gardens as the yew, upon the account of its being ſo tonſible, as to be with eaſe reduced into any ſhape the owner pleaſed; and it may be too often ſeen, eſpecially in old gardens, what a wretched taſte of gardening prevailed formerly in England, from the monſtrous figures of beaſts, &c. we find theſe trees reduced into; but of late this taſte has been juſtly exploded by perſons of ſuperior judgment; for what could be more abſurd than the former methods of planting gardens? where, thoſe parts next the habitation were crouded by a large quantity of theſe and other ſorts of ever-green trees, all of which were clipped into ſome trite figure or other, which beſides the obſtructing the proſpect from the houſe, filled up the ground; ſo that little room was left for other ſhrubs and flowers. Beſides, it occaſioned an annual expence to render the trees diſagreeable; for there never was a perſon who had conſidered the beauty of a tree in its natural growth, with all its branches diffuſed on every ſide, but muſt acknowledge ſuch a tree infinitely more beautiful than any of thoſe ſhorn figures ſo much ſtudied by perſons of a grovelling imagination.

The only uſe this tree is fit for in gardens, is to form hedges for the defence of exotic plants; for which purpoſe, when it is neceſſary to have hedges, it is the moſt proper of any tree in being; the leaves being ſmall, the branches are produced very cloſely together; and if carefully ſhorn, they may be rendered ſo cloſe, as to break the winds better than any other ſort of fence whatever, becauſe they will not be reverberated, as againſt walls, pales, and other cloſe fences; therefore conſequently, are much to be preferred for ſuch purpoſes.

Theſe trees may be eaſily propagated by ſowing their berries in autumn, as ſoon as they are ripe, upon a bed of freſh undunged ſoil, covering them over about half an inch thick with the ſame earth.

In the ſpring the bed muſt be carefully cleared from weeds, and if the ſeaſon prove dry, it will be proper to refreſh the bed with water now and then, which will promote the growth of the ſeeds; many of which will come up the ſame ſpring, but others will remain in the ground until autumn or ſpring following; but where the ſeeds are preſerved above ground till ſpring before they are ſown, the plants never come up till the year after, ſo that by ſowing the ſeeds as ſoon as they are ripe, there is often a whole year ſaved.

Theſe plants, when they come up, ſhould be conſtantly cleared from weeds, which, if permitted to grow amongſt them, would cauſe their bottoms to be naked, and frequently deſtroy the plants when they continue long undiſturbed.

In this bed the plants may remain two years; after which, in autumn, there ſhould be a ſpot of freſh undunged ſoil prepared, into which they ſhould be removed the beginning of October, planting them in beds about four or five feet wide, in rows about a foot aſunder, and ſix inches diſtance from each other in the rows, obſerving to lay a little mulch upon the ſurface of the ground about their roots, as alſo to water them in dry weather until they have taken root; after which they will require no farther care, but to keep them clear from weeds in ſummer, and to train them according to the purpoſe for which they are deſigned.

In theſe beds they may remain two or three years, according as they have grown, when they ſhould again be removed into a nurſery, placing them in rows at three feet diſtance, and the plants eighteen inches aſunder in the rows, obſerving to do it in autumn, as before directed, and continue to trim them in the ſummer, for what they are intended; after they have continued three or four years in this nurſery, they may be tranſplanted where they are to remain, always obſerving to remove them in autumn where the ground is very dry; but on cold moiſt land it is better in the ſpring.

Theſe trees are very ſlow in growing, but yet there are many very large trees upon ſome barren cold ſoils, in divers parts of England.

YOAK, *or* YOKE, a frame of wood, fitted over the necks of oxen, whereby they are coupled together, and harneſſed to the plough.

Horſes and oxen are the animals uſed for drawing ploughs. Sometimes the one, ſometimes the other, and ſometimes both together. It is impoſſible to determine which of theſe is the moſt proper. This depends upon the kind of food moſt eaſily obtained, the other kinds of work required, and the expenſe of breeding, or purchaſing. If the real labour is to determine this without any other conſideration, then oxen are to be preferred; becauſe as they ſtand to the draught, they will overcome a reſiſtance which horſes will yield to.

As it cannot be determined, what kind of cattle are moſt proper for the plough; ſo neither can it be determined, what number is neceſſary. This depends upon the ſtrength of the cattle, and the nature of the ſoil. The number varies according to the work in which the plough is to be employed, and often according to the cuſtom of the place, and fancy of the farmer.

The methods of yoking cattle in ploughs vary almoſt as much as the number uſed. Some of them at firſt ſight are ſo aukward, that it is needleſs to conſider them. The only thing worthy of being inquired into, is, whether the cattle ſhould be yoaked in pairs, or in a line before each other? We ſhall therefore conſider the advantages and diſadvantages attending each way, and compare them together.

The moſt common way of yoaking cattle in ploughs is in pairs. There are ſome diſadvantages attending this way that are obvious. In ploughing the furrows betwixt ridges, the land-cattle go upon the ploughed land, and tread it down with their feet: this, eſpecially if the land is wet, hurts it very much.

There is another diſadvantage very obvious. When there is but as much of the ridge unploughed as to allow the land-cattle to go upon it with difficulty, they are frequently either going into the oppoſite furrow, and thereby giving the plough too much land; or, which is worſe, they are juſtling the furrow-cattle upon the ploughed land.

To remove theſe inconveniencies that attend the ploughing with cattle yoked in pairs, ſome yoke them in a line before each other. It is obvious, that cattle yoked in this manner, going always in the furrow, neither tread upon the ploughed land, nor joſtle one another. In theſe reſpects the yoaking the cattle in a line before each other, ſeems to have the advantage.

It is to be obſerved, however, that this method is not quite free from inconveniencies. When examined, it may perhaps be found attended with as great inconveniencies as the other.

When cattle are yoked in a line, they go all in the furrow. This makes it neceſſary to give the plough more land and than ordinary, either by the ſoke or the muzzle: for if this is not done, the head and ſoke being in the ſame direction with the beam, and the cattle yoaked to the middle of it, the plough will directly follow the cattle, without taking any thing off from the land. Now, it is inconvenient to be obliged to give the plough land either by the ſoke or muzzle; for, when the ſoke is turned out of the plane of the beam, it makes the plough heavy to draw; and, when the muzzle puts the draught too much to one ſide of the beam, it prevents the plough from going upright. The yoking the cattle in pairs is attended with none of theſe inconveniences: for, in this caſe, the quantity of land, which the plough has naturally, when right made, is ſufficient to make it take off a proper furrow.

There is another inconveniency that attends yoking cattle in a line, ariſing from the nature of the animals. Horſes and oxen, like men, love their eaſe, and are diſpoſed to throw the burden upon their fellows. This they have a better opportunity of doing when yoked in a line before each other, than when yoaked in pairs. When yoked in a line, each pulls by the traces of the one behind him; and therefore, though it may be known when the foremoſt neglects his work, by the ſlackening of his traces, yet it cannot be known when any of the reſt neglect their work; for though one of them does this, yet by the pulling of the one before him his traces may be fully ſtretched. But this is eaſily diſcovered, when the cattle are yoked in pairs; for then every one of them has a ſeparate draught. The goadman or driver knows, by the poſition of the yokes or croſs-trees, whenever one of them does not draw equally with his fellow; and the ploughman perceives, by the going of the plough, whenever any of the two pairs does not draw equally with the other: for if the pair that goes foremoſt neglect their work, the plough is pulled out of the ground; and if the pair that go hindmoſt neglect their work, the plough is pulled in too deep. The reaſon is obvious; the plough is made to go at a proper depth, when the two forces by which different directions are given the plough, act at the ſame time. If one of them then ſhould ceaſe to act, the plough cannot go right. If the foremoſt pair ſhould ceaſe to draw, the plough having too little eard for the direction of the draught of the hindmoſt pair, will come out of the ground: and if the hindmoſt pair ceaſe to draw, the plough having too much eard for the direction of the draught of the foremoſt pair, will go in too deep. This does not hold in an ox-plough: for as the ſoam by which the foremoſt pair draw is fixed to the yoke of the hindmoſt pair, the whole force applied to the plough is in the ſame direction; and therefore, though any of the pairs ceaſe to draw, there is no alteration in the going of the plough.

There is yet another inconveniency that attends the common way of yoaking cattle in a line before each other. When the fore cattle are all yoked to the traces of the hindmoſt, it is obvious, that as the beam, to which the draught is fixed, is much lower than his ſhoulders, by which the reſt pull, ſuch a weight muſt be laid upon his back or ſhoulder, as muſt render him incapable of giving any aſſiſtance. Beſides, as the whole force is applied in the direction of the traces of the hindmoſt horſe, it cannot have ſuch influence on the plough, as when a part of it is in a direction more horizontal. When a body is to be moved forward in any direction, the nearer that the direction of the force applied approaches to the direction of the body, it acts with the greater influence. And therefore, as the plough moves horizontally, and as the direction of the united draught of a plough with the cattle yoked two abreaſt, is more horizontal than the direction of the draught in a plough with cattle yoked in a line, the ſame force applied will have greater influence.

When theſe two different ways of yoking cattle in ploughs are thus conſidered and compared together, it is difficult to determine which ought to be preferred. Each of the two ſeems preferable to the other in a certain ſituation. When the land is ſtiff and the labour ſevere, the yoking the cattle in pairs ſeems preferable, as it is certainly the ſtrongeſt draught; and when the land is wet, and in danger of being much hurt by the treading of the cattle, the yoking them in a line before each other ſeems preferable; as thereby they are confined to the bottom of the furrow, which is the firmeſt part of the land, and prevented from doing harm.

When a perſon uſes two or more ploughs, it is a very proper way to have one with the cattle yoked in a line, and the reſt with the cattle yoked in pairs. The ploughs with the cattle yoked in pairs continue as long as the land-cattle have room to go eaſily upon the firm land; and the plough with the cattle yoked in a line, follows, and clears up the furrows. In this way the cattle yoaked in pairs do no damage, and the cattle yoaked in a line are never uſed but where they are of real benefit.

To perſons that incline to yoke the cattle in a line before each other, it will not be amiſs to point out a way to remove the inconveniency laſt mentioned, and ſhow how the cattle may be yoked ſo as to lay no additional weight on the back or ſhoulders of the hindmoſt horſe, and to make the direction of the draught more horizontal. This is done by making the traces of the horſe next to the plough but one very long, and fixing them, not to the ſhoulders of the horſe behind him, but to the croſs-tree, and by fixing the traces of the horſe before him, not to his ſhoulders, but to his traces at the place where the back-rope is fixed. By this the hindmoſt horſe is delivered from the burden laid upon him in the other method, as his draught is entirely independent of that of the reſt. There is indeed ſome weight laid upon the horſe immediately before him, to whom the others are yoked. But this is but ſmall; for his traces are nearly in the ſame direction with theirs, and they are yoked to him at a place lower than his ſhoulders. By this, likewiſe, the direction of the united draught is more horizontal, when there are three or more horſes yoked; it is even more horizontal than when the cattle are yoked in pairs. In a four-horſe plough yoked in pairs the two forces are equal; but in a four horſe-plough, yoked in this manner, the force moſt horizontal is to the other, as three to one.

The traces of the horſe hindmoſt but one being long, will incommode the hindmoſt horſe in turning, if they have nothing to ſupport them. To prevent this, two links muſt be fixed to the ſhoulders of the hindmoſt horſe, and the traces paſſed through them; the links long enough to allow the traces to be ſtretched.

When two horſes are ſufficient for the draught, the yoking them in this manner deſcribed for the two hindmoſt, removes alſo the ſecond inconvenience mentioned, that attends the yoking the cattle in a line: for the ploughman diſcerns, by the going of the plough, when any of them neglect their work, in the ſame manner as when there are four horſes in the plough yoked in pairs

The ordinary method of yoking oxen, is attended not only with all the inconveniencies of yoaking cattle in pairs, but alſo with the laſt-mentioned inconveniency, of yoking cattle in a line. For the ſoam, by which the foremoſt cattle draw, is fixed to the yoke of the hindmoſt pair. Their yoke being higher than the beam, a great weight is laid upon their necks by the drawing of the foremoſt cattle. This inconveniency may be removed, and the oxen yoked in ſuch a manner, as to give two directions to the plough, as is done when horſes are yoked in pairs; by which the draught will likewiſe be made ſtronger. To do this, the ſoam of the pair immediately before the hindmoſt muſt be fixed, not to their yoke, but to the beam; and, to prevent this ſoam from incommoding the hindmoſt in turning, a link muſt be fixed to their yoke for it to paſs through, the link long enough to allow the ſoam to be fully ſtretched. When there are more than two pair in the plough, as is moſt common, the largeſt-ſized cattle ſhould be placed next the plough, and the ſmalleſt-ſized immediately before them. For the lower that the yoke of theſe laſt is placed, the nearer will the direction of their ſoam be to the ſoam of thoſe before them; and thereby the leſs weight laid upon their necks. This method of placing the cattle is contrary to the ordinary way: for it may be obſerved, that the ſmalleſt-ſized oxen are always placed next to the plough. But theſe different ways of placing the cattle are both founded upon the ſame reaſon: for the ſmalleſt-ſized oxen are placed next the plough in the ordinary way of yoking, that ſo their yoke, to which the ſoam of the pair before them is fixed, may be as low as poſſible: for the lower that it is placed, the nearer the directions of the two ſoams approach each other, and the leſs weight is laid upon the necks of the hindmoſt pair. And, for the ſame reaſon, the loweſt-ſized oxen ſhould be placed in the middle, when yoaked in the manner propoſed, that ſo they may be leſs incommoded by the pair before them.

If, in conſidering the moſt proper method of yoking cattle in ploughs, we had nothing in view but the ſtrength of the draught, and conveniency of the cattle; we would always recommend the yoaking the cattle in ſuch a way, as to apply two forces to the plough in different directions. But as we muſt alſo have in our view the going of the plough, hence it becomes neceſſary to obſerve, that ſometimes it is an advantage, to have the draught of the whole cattle in the ſame direction.

In ploughing lea, where the ſward is tough, or any kind [illegible] land, where there are interruptions from roots, or the hardneſs of the bottom; the plough, if two forces are applied to it in different directions, goes very unſteadily, ſometimes too deep, and at other times too ſhallow; and is very difficult to manage. The reaſon is obvious: when the plough meets with ſuch interruptions, as tend to make it go deeper, or ſhallower, than its ordinary way of going; if at the ſame time, the force that acts contrary to the interruption ceaſes; then the plough, in ſpite of all the attention of the ploughman, will either ſtart out of ground, or go in too deep, according to the tendency of the interruption. But when there is only one force acting upon the plough, it is, in ſome reſpect, like the wheeled plough; it goes ſteadily, and at a certain depth; at leaſt, it is not ſo difficult to manage it, as when there are two forces acting in different directions: for though ſome of the cattle, at the time when the interruption is given, ſhould ceaſe to draw, yet the draught continues ſtill in the ſame direction, and the ploughman has only the alteration occaſioned by the interruption, to rectify. Every perſon knows, that an ox-plough goes much more ſteadily than a horſe-plough: and this is occaſioned, not only by the nature of the animals, oxen being more ſteady in drawing than horſes; but alſo by the manner of yoking them, oxen being yoked in ſuch a manner, as that one force only is applied to the plough.

Thus it apppears, that no abſolute determination can be given, which of theſe two ways of yoking cattle in ploughs is to be preferred. Men muſt weigh the advantages and diſadvantages attending each way, and determine according to circumſtances. If the land is of a kind not eaſily ploughed, the cattle not well trained, and the ploughmen not expert, the work will be beſt performed, if there is only one force applied to the plough. But if the land is eaſily ploughed, that is, has few things in it to incommode the plough in going; if the cattle are well trained, and the ploughmen expert, the work will be well enough performed, and the labour leſs ſevere upon the cattle, if two forces are applied to the plough in different directions.

YOAK *of land*, the quantity of land which a yoak of oxen might plough in a day.

FINIS.